

**FINAL ENVIRONMENTAL AND SOCIAL IMPACT
ASSESSMENT**

VOLUME 1: GENERAL FRAMEWORK

Prepared for:



**WORLD TITANIUM
RESOURCES**

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NOVEMBER 2013

CES Report Revision and Tracking Schedule

Document Title	<i>Draft Environmental and Social Impact Assessment Ranobe Mine Project, Southwest Region, Madagascar</i>		
Client Name & Address	<i>World Titanium Resources 15 Lovegrove Close, Mount Claremont Western Australia, 6010</i>		
Document Reference			
Status	<i>Draft</i>		
Issue Date	<i>November 2013</i>		
Lead Authors	<i>Dr Chantel Bezuidenhout</i>		
Reviewer			
Study Leader or Registered Environmental Assessment Practitioner Approval			
Report Distribution	Circulated to	No. of hard copies	No. electronic copies

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1. INTRODUCTION

1.1 *Background to the study*

Coastal and Environmental Services (CES) completed a Pre-feasibility Environmental Assessment on the area in April 2003, which focused on the region between Toliara and Morombe, but with emphasis on the Ranobe Permit Area. The assessment was prepared in order to identify key environmental and social issues and to engage with key stakeholders. The pre-feasibility document consisted of two volumes. Volume 1 provided a description of the Toliara Sands Project as it was then envisaged, and the existing environment at both the Ranobe and the Manombo-Morombe permit areas, identified potential environmental and social impacts on the physical, biological and human environments, and discussed environmental risks associated with the project. A recommended scope for the Ranobe Permit Area environmental impact assessment was also provided for World Titanium Resources¹. Volume 2 of the pre-feasibility report contained a number of specialist reports, which dealt with public participation, provided an ecological description of the study area (land forms and soil, vegetation, flora, fauna and ecological issues), as well as a socio-economic environment baseline assessment.

Following this a detailed Scoping Report for the Ranobe project was undertaken in 2005 and formally submitted to the Malagasy authorities (the Office Nationale Pour l'Environnement - ONE) in 2006. This assessment, which included previously identified key environmental and social issues, was also prepared to facilitate engagement with key stakeholders.

The Plan of Study for an Environmental and Social Impact Assessment (ESIA) was included in the Scoping Report, as well as detailed Terms of Reference for various specialist studies that were required for the ESIA. This document was approved by ONE, and the specialist studies described in the 2006 Scoping Study were conducted between 2006 and 2007, and a very detailed and thorough Environmental and Social Impact Report (ESIA) was prepared. However, it was at this time that Exxaro decided to discontinue the project, and the ESIA was therefore never formally submitted to the Malagasy authorities.

The project as originally designed has now been significantly modified by World Titanium Resources (WTR) to reflect market opportunities and infrastructure constraints within Madagascar. During previous investigations, detailed and comprehensive specialist studies and stakeholder engagement activities were undertaken. The knowledge and experience that was obtained during these activities was used to guide the Scoping Phase and the Draft Scoping Report was submitted to ONE and released for public review in April 2012. In addition to this various specialist assessments have been redone and/or updated and these form the basis for this report.

¹ World Titanium Resources is an ASX listed company and is the 100% owner of the Toliara Sands Project and the Ranobe Mine Project. World Titanium Resources has been the owner of the project since discovery and was known as Madagascar Resources prior to November 2011.

2. PRESENTATION OF THE PROMOTER

2.1 Details and experience of the Proponent

2.1.1 Corporate Profile

World Titanium Resources Ltd ('WTR') is listed on the Australia Stock Exchange (ASX:WTR) and has strong support from two cornerstone shareholders; Boule Titanium Limited (20.7%) and Mineral Deposits Limited (14.9%) as well as a number of respected institutions on the register that are ready to provide the capital required to develop the mine.

Jean-Raymond Boule, Boule Titanium's largest shareholder, is credited with discovering the Voisey's Bay nickel/cobalt deposit in Labrador, Canada. Mr. Boule was also the largest shareholder of Titanium Resources Ltd. (now Sierra Rutile Limited), which funded and restarted the Sierra Rutile titanium mine, the world's largest rutile titanium mine.

Mineral Deposits Limited owns 50% of the TiZir Joint Venture with Eramet, a French mining and smelting company. The TiZir Joint Venture owns the Grande Cote mineral sands project in Senegal and the Tyssedal titanium slag smelter in Norway. The ilmenite from the Ranobe mine is suitable for smelting into titanium slag.

2.1.2 Board and Management

Mr Wayne Malouf (*Executive Chairman*)

Wayne Malouf served as CEO of Titanium Resources Group (TRG) from 2002 to 2005 and TRG's Executive Vice-Chairman from 2005 to early 2008 where he oversaw the company's IPO listing on the AIM Exchange and the successful restart of the Sierra Rutile titanium mine and Sierra Minerals bauxite mine. From 2008 to 2010 Mr Malouf served as CEO of Diamond Fields Resources (DFI) and continues to serve as DFI's non-executive Chairman. He returned to TRG as Executive Chairman from August 2010 to February 2011 to assist in organizational and operational matters. Mr Malouf has a BA and JD from St Mary's University of San Antonio, Texas and an MA in social sciences (economics and international relations) from the University of Chicago. In addition to his mineral sands experience, Mr Malouf has been a practicing attorney since 1987. His current directorships include Diamond Fields International Ltd and certain of its subsidiaries.

Mr Goroodeo (Mahen) Sookun (*Chief Financial Officer*)

Goroodeo (Mahen) Sookun is a fellow of the Association of Chartered Certified Accountants (UK) and holds an MBA (Finance) from the University of Leicester (UK). He has been a Corporate Finance Executive for more than 20 years for private and public companies in Mauritius and Africa in a range of sectors including public utilities, agriculture and textiles, real estate development and mining.

He was the Group Finance and Administrative Manager of Titanium Resources Limited, the AIM-listed company that refurbished the Sierra Rutile mineral sands and bauxite operations. Mahen is currently a Director, CFO and Secretary of Diamond Fields International, a public company listed on the Toronto Stock Exchange.

Mahen was appointed Chief Financial Officer of the Company in May 2012 having previously been a non-executive director of World Titanium Resources.

Mr Norman Roderick (Rod) Baker (*Non-Executive Director*)

Rod Baker has worked for forty years as a mineral exploration geologist, in many countries in five continents. Educated in England, he started his professional career in North Sea Gas before joining the Anglo American Corporation to work in southern Africa. He then joined a

South African consulting group, and carried out work for clients such as Rio Tinto, Selection Trust, U.S. Steel, Falconbridge and Billiton on a number of commodities. He subsequently became an independent consultant, working largely for the United Nations and other clients in Africa, India and the Americas. For the last twenty years he has been mostly engaged in pursuit of his own diamond and gold interests in South America.

Until recently, he was a non-executive director of Titanium Resources Group, and was a founding director of Diamond Field Resources Inc.

Mr Tristan Davenport *(Non-Executive Director)*

Tristan Davenport was educated at Millfield School and subsequently studied Anthropology and Archaeology at the University of London (SOAS). He later trained at De Beers' London office as a diamond sorter and studied diamond gemology at the Gemological Association of Great Britain. In 1995 he joined America Mineral Fields and worked on various mining projects in the Democratic Republic of Congo. He has established and managed heavy mineral processing laboratories in support of exploration programmes in Finland and Norway and has designed and managed exploration projects for companies in Zambia, Sierra Leone and Madagascar.

Mr Darren Morcombe *(Non-Executive Director)*

Darren Morcombe has more than 20 years of professional experience in a variety of natural resource roles in Australia, United States and Switzerland commencing with over 10 years in senior roles with Normandy Mining Limited and Newmont Mining Corp. in the areas of financing, treasury, mergers and acquisitions. He is the founder of Springtide Capital Pty Ltd, which is a private investment company specialising in investments in microcap listed companies, venture capital and resource orientated companies. He was Chairman and major shareholder of a refining and gold financing company European Gold Refineries SA, Europe's largest gold refinery, and Director of AGR Matthey Ltd, one of the largest gold refineries in the world. He retired from this position in 2008 and these businesses are now owned by Newmont Mining Corporation. Darren is a major shareholder of several public companies and also the Chairman of Foran Mining Corporation listed in Canada.

Dr Ian Ransome MSc *(Non-Executive Director)*

Ian Ransome is a geologist, whose academic qualifications include an MSc in geochemistry and a PhD in geology. He has more than 20 years' experience as an exploration geologist, using a multidisciplinary approach to generating and evaluating exploration targets in diamonds, gold, nickel, base and rare metals. Most of his experience has been in a broad range of African countries, including a nickel laterite project in Madagascar. Dr Ransome is presently a director and CEO of Diamond Fields International Ltd.

Dr Richard Valenta *(Non-Executive Director)*

Richard Valenta has 30 years of exploration experience in Australia, Canada, Turkey, Mexico, Brazil, Argentina and other parts of Latin America. Prior to his current role, Dr Valenta was Managing Director of Bondi Mining, Chief Operating Officer of TSX-listed Fronteer Development Ltd, Chief Geoscientist of TSX-listed Aurora Energy Resources Ltd, and Central American Exploration Manager for Mount Isa Mines Exploration Ltd. Dr Valenta has a proven track record for discovery of high-grade gold, copper-gold and uranium resources and has been directly involved in the greenfield exploration, discovery and development of multi-million ounce gold and world-class uranium resources in the Americas and Asia. He is also Managing Director of Chesser Resources Limited.

Mr Jeffrey W Williams *(Chief Executive Officer)*

Jeffrey Williams was the former Managing Director of Mineral Deposits Limited (MDL). He established Nimbus Resources (now MDL) in 1997, and acquired mineral sands assets from BHP-Billiton near Hawks Nest on the New South Wales coast in 1998. He then secured the

Sabodala gold and Grande Cote zircon projects in Senegal in West Africa. Mr Williams was Managing Director of MDL until 2011.

Prior to MDL Mr Williams acquired 16 years' of experience as a professional mining engineer in Australia and seven years in the stockbroking industry, and is a Fellow of the Australasian Institute of Mining and Metallurgy. His mining experience ranges from mine planning, underground management and feasibility studies through to mine development. From 1972 to 1984, he held various positions with CRA Limited at Broken Hill in New South Wales. Following completion of his Masters of Business Administration (MBA) programme in 1987, he played a major role as a Senior Project Engineer with North Limited. From 1989 to 1996, he specialised in gold mining research in the stock broking industry. Prior to establishing Nimbus Resources in 1997, he was the Head of Resources Research at James Capel Australia. Mr Williams is currently a Non-Executive Director of Archean Star Resources and MacPhersons Reward Gold Limited.

Management

Mr Les Michalik (*Ranobe Project Director*)

Les Michalik has over 30 years of project execution and management experience predominantly in the mining and mineral processing industry in Africa, Australia and Europe. Les is the Project Director for the Ranobe Mine Project and will be based onsite at Toliara during the execution phase.

Les was the Turnover Manager for the Ambatovy Nickel Project in Madagascar and has previously worked on titanium dioxide smelter and synthetic rutile projects. Previous employers include Bateman, SNC Lavalin, GRD Minproc, Minara Nickel, Ausenco, and Mount Isa Mines. He is a Member of the Association of Professional Engineers, Managers and Scientists of Australia and holds Diplomas in Mechanical Engineering and Project Management and an MBA from Deakin University.

Mr Jules LeClezio (*Country Manager Madagascar*)

Jules LeClezio has lived in Madagascar for more than fourteen years, and is WTR's country manager. He has in-depth knowledge and experience in establishing and managing companies in Madagascar, and has been involved in all aspects of WTR operations. During this time, Jules established a large network of contacts within Madagascar. He was instrumental in forming the Association for the Development of Industrial Mining in Madagascar (now the Chamber of Commerce) and was heavily involved in setting up Australian Doctors for Africa in Madagascar.

2.2 Environmental and Sustainable Development Policies of the Proponent

It is the policy of World Titanium Resources Limited (the "Company") to achieve and maintain environmentally sound and efficient management practices for its operating, exploration and mining activities.

The overriding objectives of this policy are:

- To comply with the applicable environmental laws, regulations, tenement and permit conditions as a minimum standard for its environmental practices and management procedures;
- To integrate environmental and rehabilitation processes into exploration, mine planning, mining and processing activities;
- To liaise with Government bodies, statutory authorities, local communities and environmental management groups to maintain a proactive stance on environmental issues;

- To facilitate the education of employees and contractors in relation to their roles and responsibilities in environmental management in respect to the Company's activities; and
- To undertake regular monitoring, audit and review of environmental procedures or practices as are appropriate to reflect the Company's corporate responsibility in environmental matters.

Each employee has a responsibility to conduct herself or himself in a manner intended to achieve these objectives. For the purposes of this policy, 'employee' includes any consultant or contractor to the Company.

3. CONTEXT: SUMMARY PRESENTATION OF THE PROJECT

3.1 Project Overview

The Ranobe deposit is located north of the Port of Toliara in south-west Madagascar (Figure 3.1), where a large mineral sands resource containing the valuable heavy minerals ilmenite, rutile, zircon and leucoxene has been identified.

The mineralised zone in the Ranobe Permit Area is around 16 km long and between 1 and 2 km wide. It comprises three mineralised sand units, which together contain approximately 1 200 to 1 400 million tonnes of sand at an average grade of 4 to 5% total heavy minerals (THM).

The Ranobe Mine Project considers the development of 161 million tonnes of THM grading 8.2% over an initial 21 year mine life from one of the three mineralised sand units at Ranobe. The project envisages the development of a dry mine, primary processing plant, mineral separation plant, a road for transport of products to a port for export.

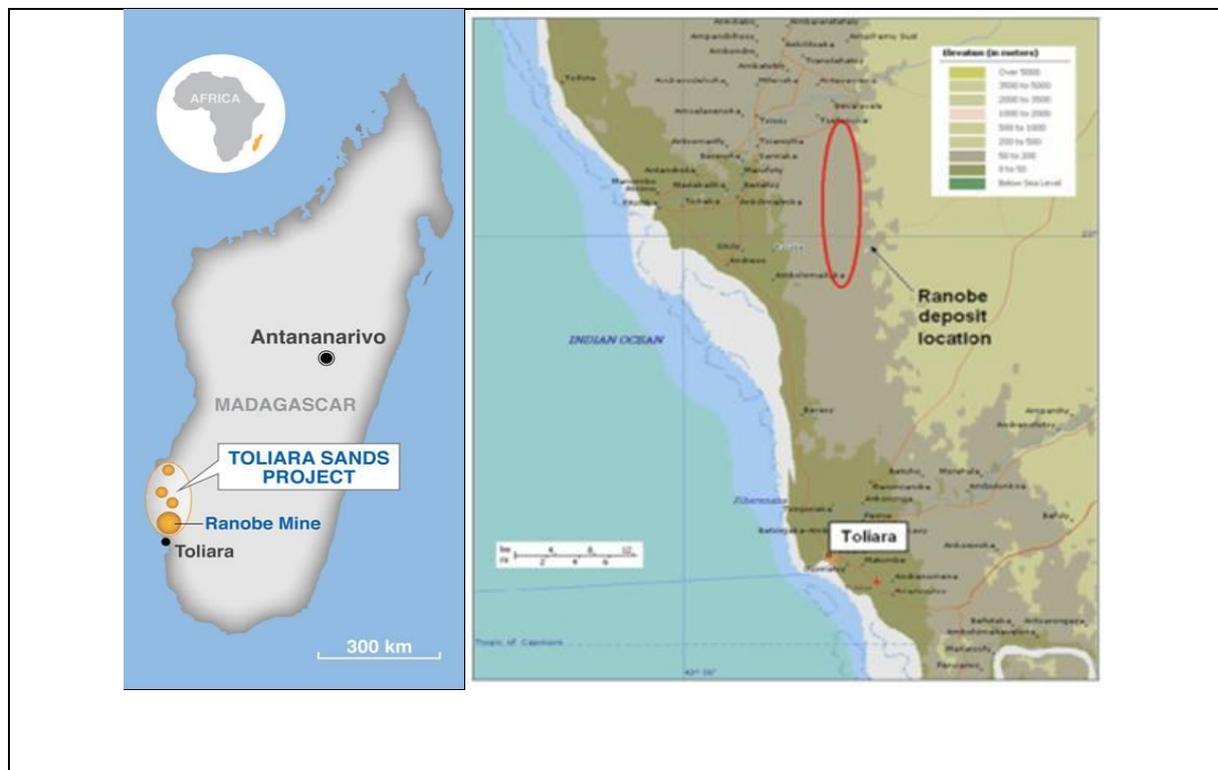


Figure 3.1: The location of the Ranobe Deposit

3.2 Project Motivation

Listed below is an overview of the benefits that the proposed Ranobe Mine Project will provide if it is initiated. The development of the site and the sale of the mineral sands commodity will increase the economic value of the area and the Madagascar government by:

- Developing a new industrial enterprise in the Toliara Region;
- Paying taxes and royalties;
- Hiring local resources to both build and work on the mine site; and
- Investing in the local community.

3.2.1 Developing a new industrial enterprise in the Toliara Region

Ranobe contains a 959 million tonne Mineral Resource containing 6.1% Total Heavy Mineral (THM). Because of its size and relatively high grade, the Ranobe deposit offers the opportunity to develop an initial mine with the potential to expand production significantly in the future.

The initial mine and processing plant will produce 451 000 tonnes of product per annum and will require an investment of approximately Ar 415 000 000 000 (US\$192 million).

3.2.2 Paying taxes and royalties

Once in production, the project is projected to generate tax and royalty revenue for the Madagascar government of approximately Ar 28 340 000 000 (US\$13 million) per annum over the initial 21 year mine life, for total mine life revenue to the government of Ar 588 600 000 000 (US\$270 million).

3.2.3 Hiring local resources to both build and work on the mine site

It is proposed the mine will employ approximately 250 Malagasy staff and, the environmental and social projects will employ approximately 150 additional local residents. The company will advertise all positions locally and will recruit from the local community whenever qualified individuals can be found.

In addition to this the company will actively develop its own local staff and work with regional and national educational institutions to match the skills of graduates to the needs of the company.

3.2.4 Investing in the local community

To date the company has sponsored Australian Doctors for Africa, refurbished wells in a number of communities around the project site and undertaken other community initiatives. Should the project proceed to development WTR is proposing to invest Ar 1 090 000 000 to Ar 2 180 000 000 (US\$0.5m to US\$1m) per year in various projects outside the mine that will employ and help improve the lives of the Malagasy people.

The company is committed to establishing a community trust to ensure positive social and economic changes in the communities close to the mine and processing facilities. The trust will be funded by World Titanium Resources and will be managed by Toliara Sands SARL and community representatives to ensure that projects selected will maximise the impact on and benefit to the communities.

The trust will work in partnership with the government and the community with a focus on three areas:

1. Income Generation Projects

These projects will emphasise the development of new businesses to supply goods and services to the Toliara Sands and the wider community. Support will take the form of financial and technical support as well as business and skills training.

A key focus will be avoiding the development of dependency relationships ensuring that after initial support the businesses developed can be run independently of the project.

2. Social and Cultural Projects

These projects will focus on educational programs, community health initiatives, and support for sport and cultural activities in the community.

3. Rural Infrastructure Projects

Toliara Sands will work closely with local government to invest in infrastructure needs identified by local communities such as school buildings and furniture or health facilities. To avoid dependency relationships the trust will only invest where there is support from the government and community for on-going operation and utilisation of the infrastructure.

The trust will consider the following projects as well as other initiatives brought forward by the community:

3.2.5 Education

Education is critical for the continual development of a country. It is proposed that WTR consider sponsoring the improvement and development of schools in the communes near the Ranobe deposit. This sponsorship could include:

- Promoting the training of teachers;
- Purchase equipment; and
- Develop scholarship opportunities.

3.2.6 Ranobe Forest Environmental Eco Tourist Park

The project would involve fencing off up to 1 000 hectares of Ranobe forest between the Baobab and Ranobe tracks with the following key aims:

- To allow replanting of logged indigenous species;
- To allow reintroduction and protection of local species (lemurs, tortoise etc.);
- To allow development of a tourist facility to appreciate the native forest, birds and animals;
- To provide a sustainable source of income to local communities;
- To provide on-going employment opportunities for local communities; and
- To provide tourists with a facility to cater for various user groups.

The project would be undertaken in conjunction with local communities, Gelose, NGO's (WWF, SAGE, etc.), Ministry of Environment and Forests, National Agency of Water and Sanitation (ANDEA), Toliara University, and MITOHIMAFY.

3.2.7 Establish a Plantation of Fast Growing Species

The project would involve fencing off up to 100 hectares of open savannah near Tsiafanoka with the following key aims:

- To keep out domestic animals;
- To allow planting of selected fast growing species that will provide wood and charcoal;
- To provide a sustainable source of income to local communities; and
- To provide on-going employment opportunities for local communities.

The project would be undertaken in conjunction with local communities, Gelose, WWF, Ministry of Environment and Forests, Toliara University and MITOHIMAFY.

3.2.8 Honey Project

The project would involve assisting local communities establish a honey business within the Ranobe Forest with the following key aims:

- To provide a sustainable source of income to local communities; and
- To provide ongoing employment opportunities for local communities.

This project would be undertaken with the local communities, MIN/EV and MIN/Forest.

3.2.9 ADES Support

Project would involve support of Association for the Development of Solar Energy (ADES) which manufactures in Toliara new energy saving devices (sunoven, wood stoves etc.), by subsidising the cost to local communities with the aim of reducing reliance on local forest for wood and charcoal production.

3.2.10 Fibre Optic Cable

The project would involve supporting the installation of a fibre optic cable or Antenna support from Toliara to the mine connecting the tourist facilities along the coast in partnership with a telecommunication company.

This project would be undertaken with the participation of a telecommunications company, association of hotels in Toliara and Ministry of Telecommunication, Post and New Technology.

3.2.11 Seed Collection, Germination and Plant Out

The project would involve assisting local communities to collect seeds from Ranobe Forest; germinate them in nurseries and selling the plants to the mining operation with the following key aims:

- To provide a sustainable source of income to local communities;
- To provide on-going employment opportunities for local communities; and
- To encourage local communities to protect and value the local forest.

This project would be undertaken with the co-operation of the University of Toliara, NGO's and Gelose.

3.2.12 Haul Road Management

The project would involve employing local personnel to manage traffic along and across the haul road with the following key aims:

- Minimise impact of haul road and trucks on local communities; and
- Provide on-going employment opportunities for local communities.

Approximately 20 managers would be employed to undertake this work.

This project would be undertaken with the participation of Gelose, NGO's, Ministry of Transport .

3.2.13 Staff Training Program

The project would aim to develop skills to promote local and national employment.

This project would involve working closely with the University of Toliara to set up a technical and management training program which will meet WTR's requirements.

3.2.14 Agricultural Project

The project would promote and support some agricultural projects, which would in part supply the mine site with meat and vegetables. Some initiatives may be funded to support the farming production in the mining project area. The project could also support a technical program to improve farming productivity.

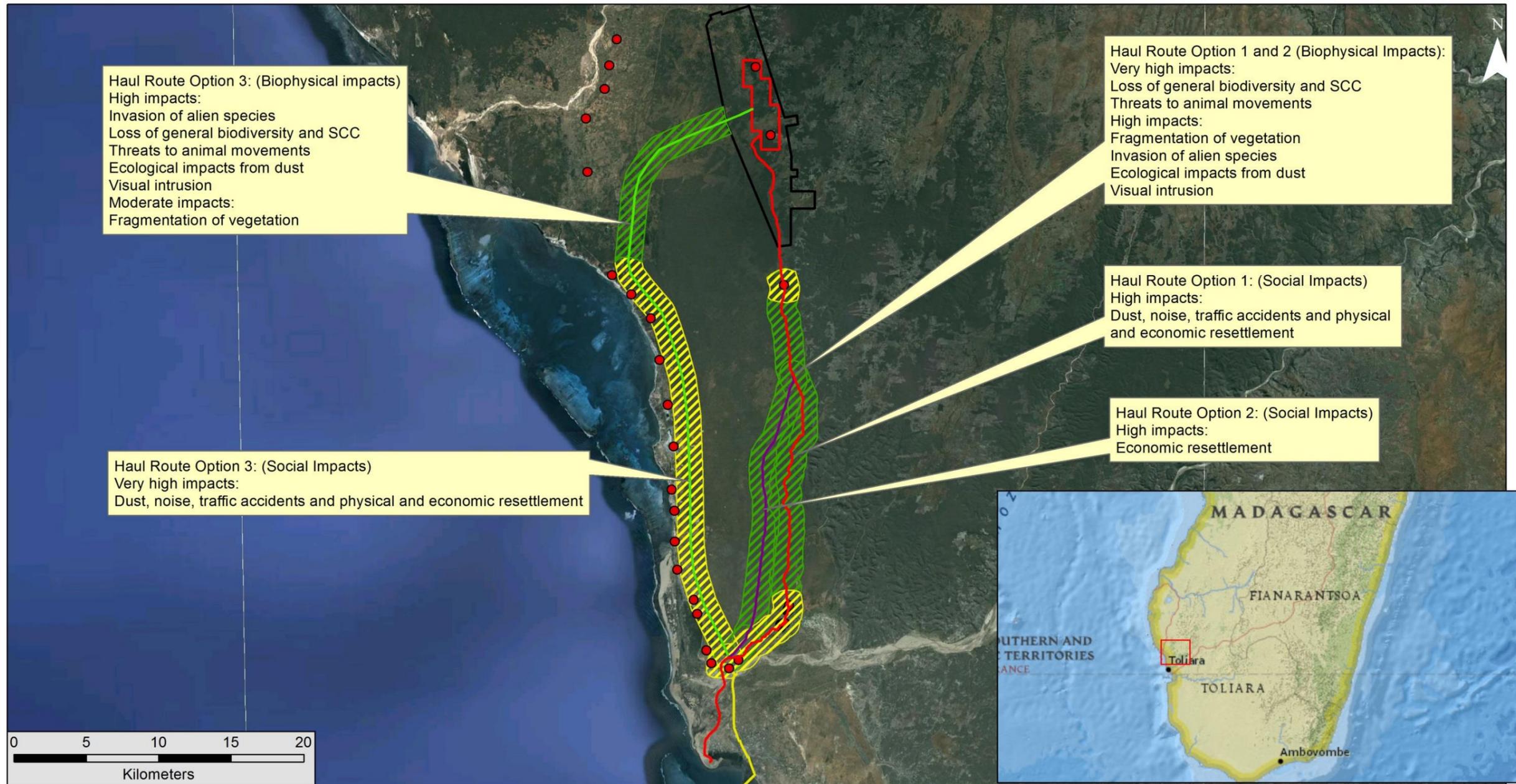
3.2.15 Toliara Sands Youth Football Association

Commence a project to establish a youth football training program and Toliara Sands youth football league. This project would be undertaken with the assistance of a FIFA representative and the local communities.

4. PROJECT VULNERABILITY MAP

The section below spatially represents the biophysical, social, economic, waste and infrastructure related impacts assessed for this project. This has been divided into four sections, including:

- Haul road options;
- Impacts associated with the mining license area;
- Impacts associated with the use of the existing port of Toliara;
- Impacts associated with the new port, i.e. Jetty and associated infrastructure.



 Coastal and Environmental Services Drawn by: Justin Green Date: 18.11.2013 CES Project Code: 27	TITLE:
	Comparison of haul routes
	PROJECT:
	Toliara EIR

TITLE:
Comparison of haul routes
PROJECT:
Toliara EIR

Legend	
— Haul Route Option 1	— Container Route
— Haul Route Option 2	▨ Mainly ecological impacts
— Haul Route Option 3	▨ Mainly social impacts
● Villages	□ Ranobe Exploration Area
	□ MLA 37242

Figure 4.1: Comparison of Haul Roads

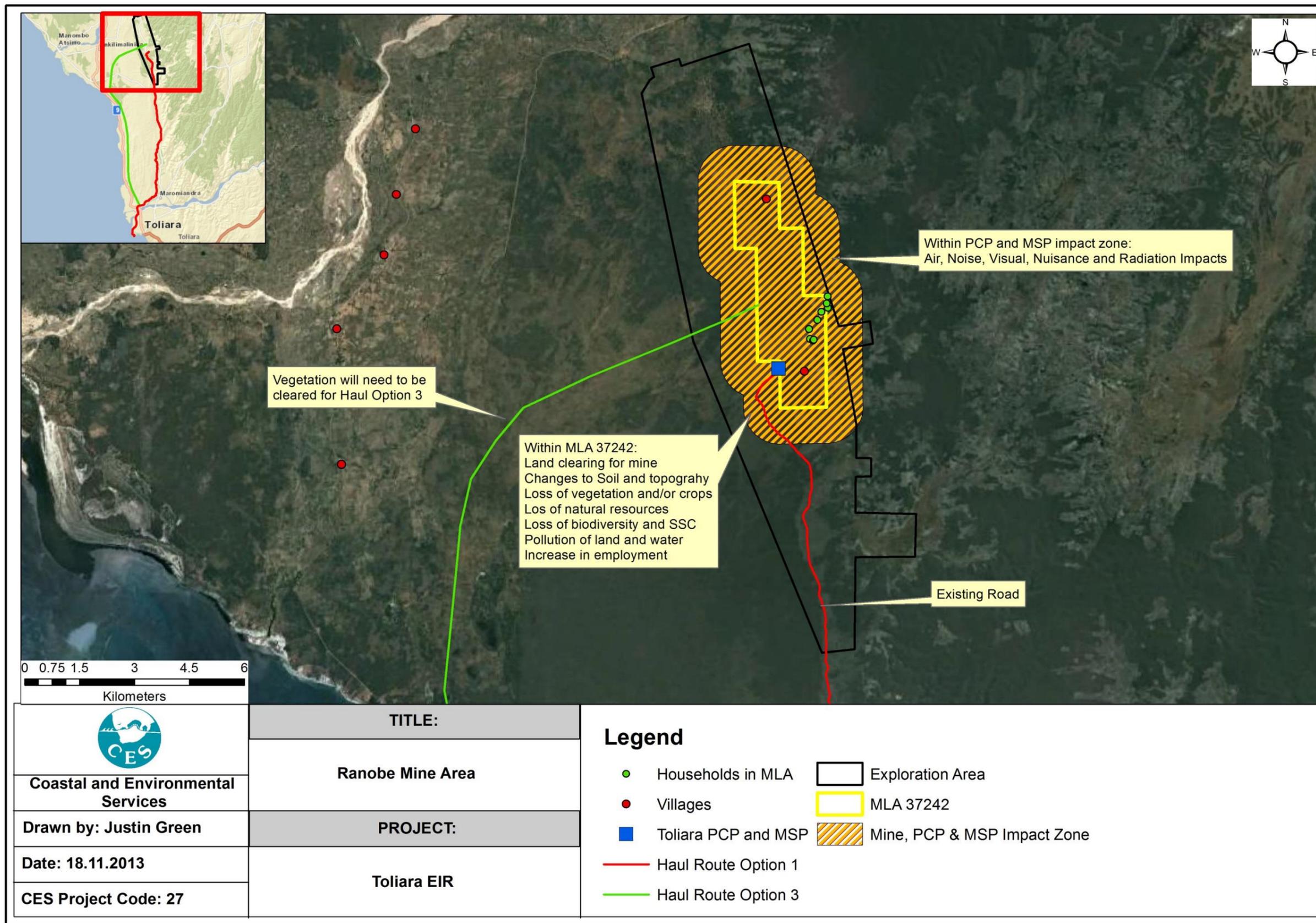


Figure 4.2: Mine Area

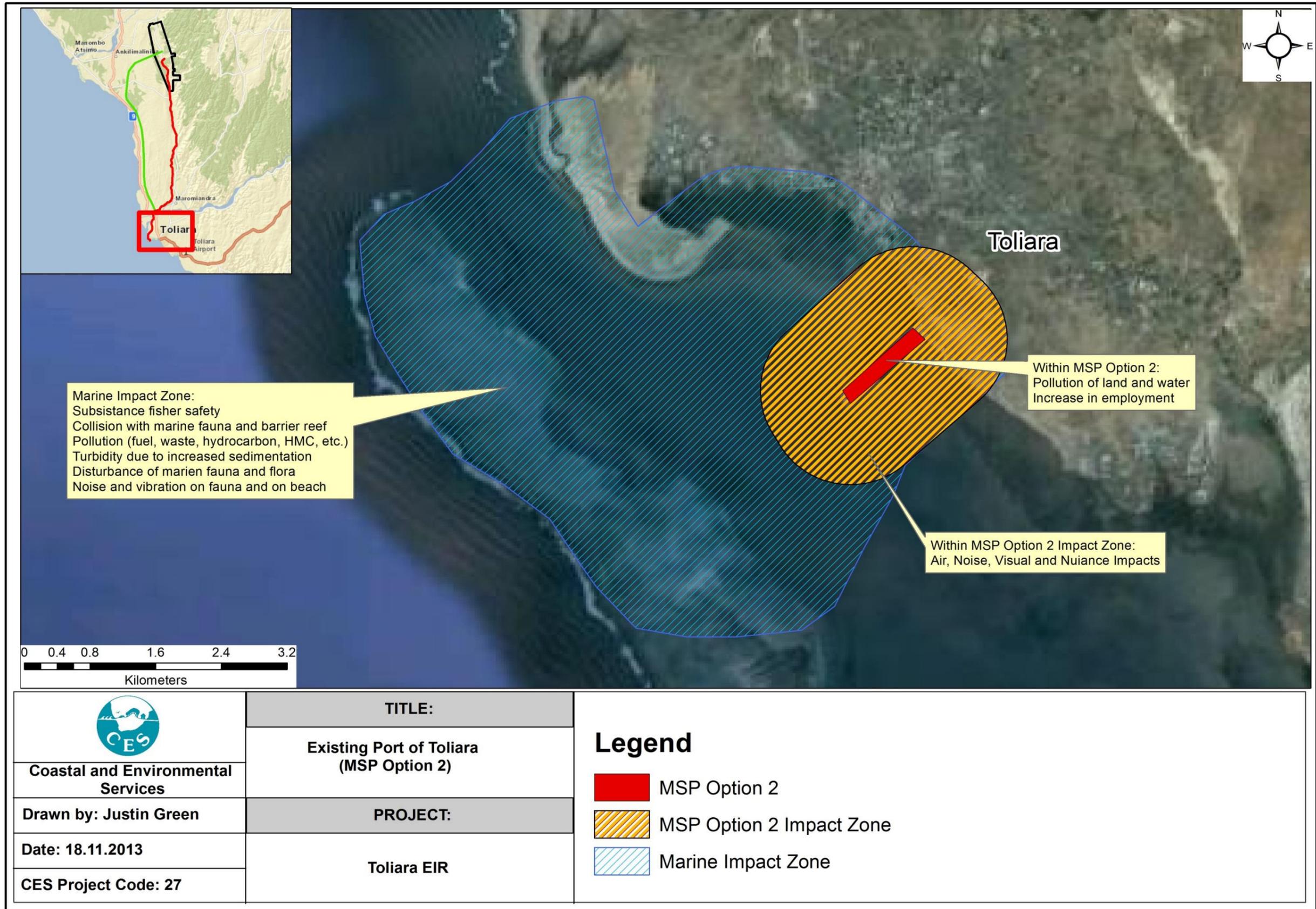


Figure 4.3: MSP Option 2

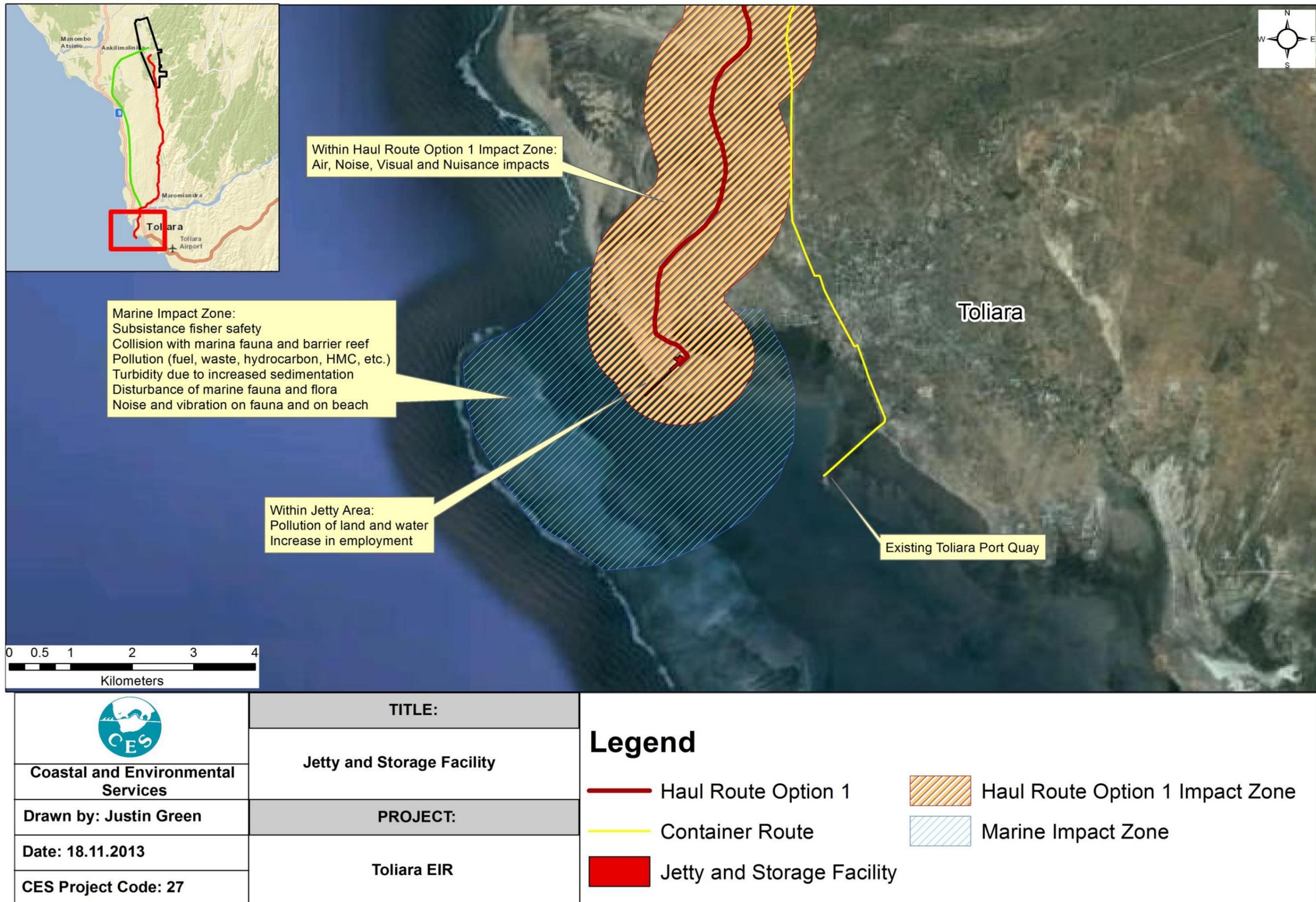


Figure 4.4: Jetty and Storage Facility

5. LEGAL FRAMEWORK, INTERNATIONAL CONVENTIONS, STANDARDS AND CODE OF GOOD PRACTICE

5.1 *The Legislated EIA Process in Madagascar*

The requirements of Malagasy environmental legislation have been translated from the French and Malagasy text of the Compatibility of Investments with the Environment (MECIE) Decree, the purpose of which is to lay down the rules and procedures to be followed to ensure the compatibility of investments with the environment. The EIA process is depicted in Figure 5.1 below.

Article 3 requires that, pursuant to the provisions of Article 10 of Law No 90-033 of December 21, 1990 on the Charter of the Environment, any public or private investment project, whether submitted or not for the authorization or approval of an administrative authority, or likely to cause impacts on the environment, must be the subject of an impact study. These impact studies take the form of either an Environmental Impact Assessment (EIA), or an Environmental Commitment Program (ECP), according to the provisions of Articles 4 or 5.

As per Article 4, the Ranobe Mine Project is an investment that needs to be governed by laws of authorization, approval or agreement, and so triggers an environmental impact assessment (EIA). This results in the need to obtain an environmental permit which is issued after the satisfactory review of the EIA and the submission of a Project Environmental Management Plan (PEMP), which constitutes the environmental specifications of the project concerned. These regulations govern the types of investments listed in Appendix 1 to Decree No 99-954 of December 15, 1999, into which the Ranobe Mine Project falls, as it includes projects involving any installations, works and activities which have potential detrimental effects on the environment due to their technical nature, their scope and the sensitivity of the site. In particular, the following activities, which may be carried out during this project, trigger the environmental process:

- Excavation and earth moving of over 20 000 cubic metres.
- Pumping of water (surface water or groundwater) exceeding 30 cubic metres per hour.
- All mechanized mining activity.
- Any physical or chemical processing of mine substances on the site of exploitation.

Article 7 defines the scope of the EIA process, which consists of the pre-examination of the foreseeable potential impacts of a given activity on the environment; requires the use of all scientific knowledge to anticipate these impacts, and to reduce them to an acceptable level in order to ensure the integrity of the environment, within the limits of best technologies available and at an economically viable cost. The level of acceptability is appreciated in particular on the basis of national environmental policies, legal standards, rejection trigger values, social, cultural and economic costs, and losses of heritage.

Under Article 11 of Chapter II, applicable rules and procedures for the MECIE, Section I, methods of assessment of impacts: the EIA, pursuant to Articles 3 and 7, is carried out at the cost and under the responsibility of the proponent, and its contents depend on the importance of works and installations to be undertaken and on their potential impacts on the environment.

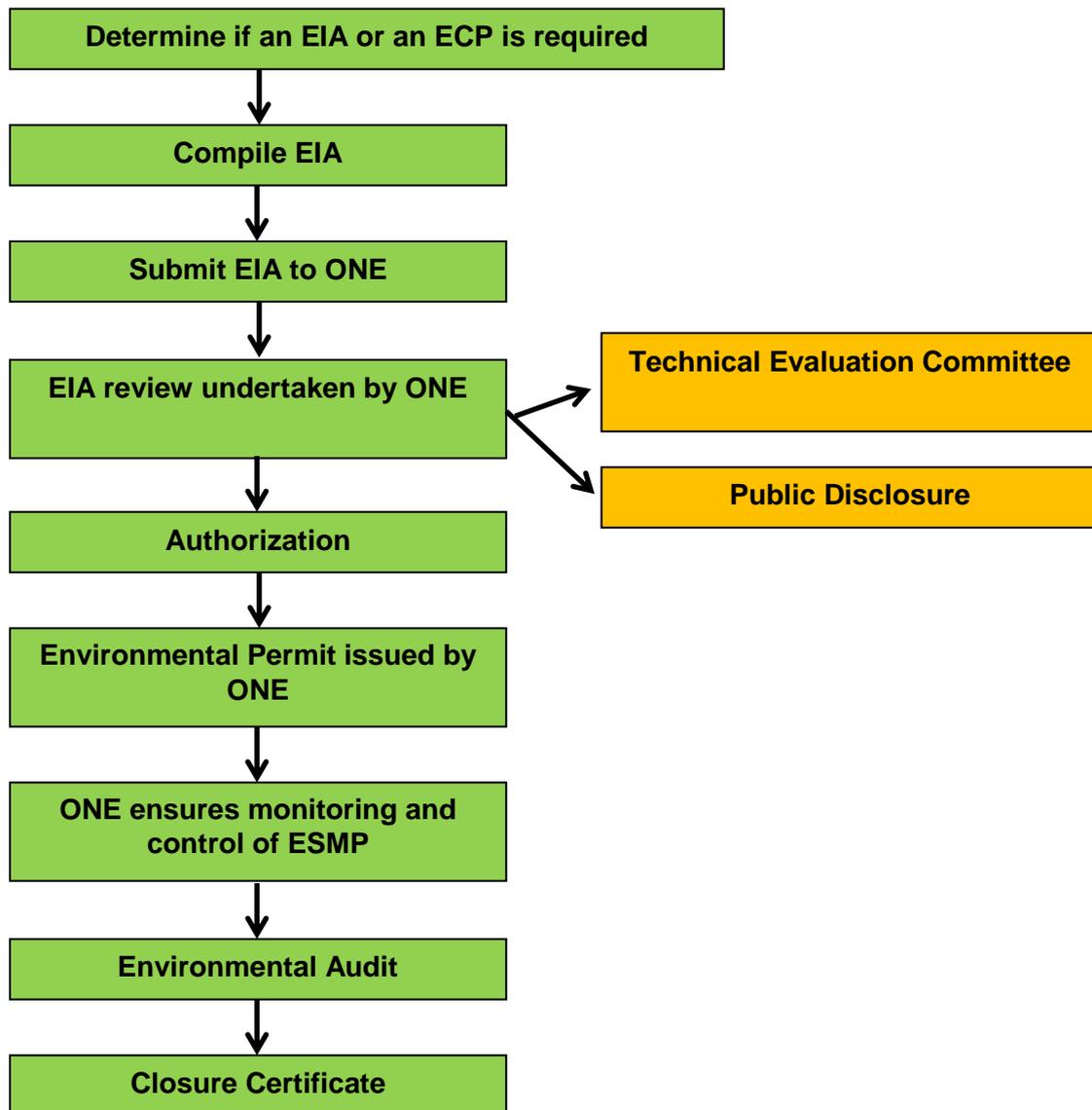


Figure 5.1: The legislated EIA process in Madagascar

According to the Compatibility of Investments with the Environment (MECIE) the contents of the EIA (in terms of Chapter II, Section I, Article 11 of the MECIE) must at least include:

1. A document certifying the legal status of the proposed project site;
2. A description of the investment project;
3. An analysis of the environmental system affected or potentially affected by the project. This analysis must lead to a schematic model emphasizing the main aspects (static or dynamic, local or regional) of the environmental system, in particular those on which the proposed investment is likely to have an impact;
4. A prospective analysis of the potential impacts of the proposed investment on the system described previously;
5. A Project Environmental Management Plan (PEMP);
6. A non-technical summary, written in Malagasy and in French, in order to facilitate public awareness of the information contained in the study, to be attached to the study. The summary must indicate, in substance and in layman's language, the baseline conditions of the site and its environment, the modifications made by the project and the proposed mitigation measures for the negative consequences of the investment for the environment.

Within fifteen working days from the receipt of the EIA report, the report of public review and the technical opinion of the Technical Evaluation Committee (CTE) is released by the authorities, according to Article 27 of Section III (Environmental Review), Number C – “Granting of the Environmental Permit”, the Minister responsible for the environment must pronounce in favour of, or against, the granting of the environmental permit. This permit shall accompany each request for authorization of a listed activity.

5.2 The Equator Principles

The Equator Principles (Box 5.1) are a financial industry benchmark for determining, assessing and managing social and environmental risks to projects. There is close alignment between the Equator Principles and the IFC Performance Standards and Environmental, Health and Safety (EHS) Guidelines, and many financial institutions have committed themselves to the Equator Principles. The Principles represent a voluntary set of environmental and social guidelines for project finance lending. These principles are outlined below and are adhered to in this report.

Box 5.1: The Equator Principles

THE EQUATOR PRINCIPLES (adapted from www.equator-principles.com)

PRINCIPLE 1 – REVIEW AND CATEGORISATION:

The EPFI, as part of its internal social and environmental review and due diligence, must categorise a project based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of the International Finance Corporation.

PRINCIPLE 2 – SOCIAL AND ENVIRONMENTAL ASSESSMENT:

The borrower has conducted a Social and Environmental Assessment process to address the relevant social and environmental impacts and risks of the proposed project. The Assessment should also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed project.

PRINCIPLE 3 – APPLICABLE SOCIAL AND ENVIRONMENTAL STANDARDS:

The Assessment will refer to the applicable IFC Performance Standards, and establish the project's overall compliance with, or justified deviation from, the respective Performance Standards and Environmental Health and Safety (EHS) Guidelines. The EPFI will require that the Assessment process evaluates compliance with the applicable standards as follows:

For Projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the IFC / World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) (Exhibit III [2]).

For Projects located in Designated Countries, the Assessment process evaluates compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. Host country laws meet the requirements of environmental and/or social assessments (Principle 2), management systems and plans (Principle 4), Stakeholder Engagement (Principle 5) and, grievance mechanisms (Principle 6).

PRINCIPLE 4 – ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM AND EQUATOR PRINCIPLES ACTION PLAN:

The developer must prepare and maintain an Environmental and Social Management System, an Environmental and Social Management Plan and an Equator Principles Action Plan to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards.

PRINCIPLE 5 – STAKEHOLDER ENGAGEMENT:

The developer must demonstrate effective Stakeholder Engagement as an on-going process in a structured and culturally appropriate manner with Affected Communities and, where relevant, other stakeholders.

PRINCIPLE 6 – GRIEVANCE MECHANISM:

The borrower should, scaled to the risks and adverse impacts of the project, establish a grievance mechanism as part of the management system. This will allow the borrower to receive and facilitate resolution of concerns and grievances about the project’s social and environmental performance raised by individuals or groups from among project-affected communities.

PRINCIPLE 7 – INDEPENDENT REVIEW:

An independent social or environmental expert, not directly associated with the borrower, will review the Assessment, action plans and consultation process documentation.

PRINCIPLE 8 – COVENANTS:

An important strength of the Principles is the incorporation of covenants linked to compliance with all relevant host country laws, accepted action plans and relevant standards.

PRINCIPLE 9 – INDEPENDENT MONITORING AND REPORTING:

Ensure on-going monitoring and reporting over the life of the loan. The proponent will require the appointment of an independent environmental and/or social expert, or retain qualified and experienced external experts to verify its monitoring information, which would be shared with the funding agency.

PRINCIPLE 10 – REPORTING AND TRANSPARENCY:

Each funding agency adopting the Equator Principles commits to report publicly at least annually about its Equator Principles implementation processes and experience, taking into account appropriate confidentiality considerations.

5.3 International Finance Corporation Performance Standards

The IFC have developed eight performance standards that can be used to identify and manage risk in proposed developments. Box 5.2 below outlines these standards.

Box 5.2: The IFC Performance Standards

Performance Standard 1:	Social and Environmental Assessment and Management Systems
Performance Standard 2:	Labour and Working Conditions
Performance Standard 3:	Pollution Prevention and Abatement
Performance Standard 4:	Community Health, Safety and Security
Performance Standard 5:	Land Acquisition and Involuntary Resettlement
Performance Standard 6:	Biodiversity Conservation and Sustainable Natural Resource Management
Performance Standard 7:	Indigenous Peoples
Performance Standard 8:	Cultural Heritage

This ESIA have been structured to meet the requirements outlined in the IFC’s Guidance Notes on performance standards on social and environmental sustainability (IFC, 2007), as well as the latest amendments to the Performance Standards which came into effect on the 1st of January 2012. The main objectives of the Performance Standards as listed in Box 5.2 above are briefly discussed below:

5.3.1 Performance Standard 1 (PS1): Social and Environmental Assessment and Management Systems

The primary objectives of PS1 are to:

- Identify and assess social and environmental impacts, both adverse and beneficial, in the project’s area of influence.

- To avoid, or where avoidance is not possible, minimise, mitigate or compensate for adverse impacts on workers, affected communities, and the environment.
- To ensure that affected communities are appropriately engaged on issues that could potentially affect them.
- To promote improved social and environmental performance of companies through the effective use of management systems.

The main requirement of this standard is an environmental and social management programme for the duration of the project. From a social perspective the management plans must, at a minimum, address health and safety, security, human resources, community engagement, and labour, and must address social management issues.

All environmental, social and health impacts must be determined and ranked in terms of the risks they pose to the project. All impacts must be avoided and, if this is not possible, they must be minimised. Once the ESIA has been completed a management programme must be compiled which outlines what mitigation measures are to be used, how they are to be implemented and how they will be monitored and evaluated. The management programme must outline the roles and responsibilities associated with implementation and the monitoring requirements. The management programme should identify communication strategies to ensure community engagement throughout the project lifecycle.

Monitoring plans must be periodically reviewed by internal and external parties to ensure compliance and for evaluation purposes.

Because this project will, in addition to adhering to the requirements of Malagasy environmental legislation, be guided by the IFC performance standards, the PEMP required by Malagasy law will be replaced with a more comprehensive Social and Environmental Management Programme (SEMP) in line with the IFC requirements. This will ensure that the requirements of both national and international standards and laws are adhered to.

5.3.2 Performance Standard 2 (PS2): Labour and Working Conditions

The primary objectives of PS2 are to:

- Establish, maintain, and improve the worker-management relationship.
- Promote the fair treatment, non-discrimination and equal opportunity of workers, and compliance with national labour and employment laws.
- Protect the workforce by addressing child labour and forced labour.
- Promote safe and healthy working conditions.
- Protect and promote the health of workers.

Most of these issues will be dealt with in the management plans required in PS1. However, PS2 outlines in detail what working conditions are acceptable and how worker relationships should be managed, and also deals with occupational health and safety for the project (addressed in various management plans).

5.3.3 Performance Standard 3 (PS3): Pollution Prevention and Abatement

The primary objectives of PS3 are to:

- Avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities.
- Promote the reduction of emissions that contribute to climate change.

The primary requirement of PS3 is that technologies and practices which avoid or minimise detrimental impacts of pollution are applied throughout the lifecycle of the project. In addition to the EHS General Health and Safety Guidelines, the IFC has sector-specific guidelines which deal with pollution and human health issues associated with mining (IFC Environmental Health and Safety Guidelines for Mining, (30 April 2007)). These guidelines will be used for this project and will be included in the management plans.

5.3.4 Performance Standard 4 (PS4): Community Health, Safety and Security

The primary objectives of PS4 are to:

- Avoid or minimise risks to and impacts on the health and safety of the local community during the project lifecycle from both routine and non-routine circumstances.
- Ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimises risks to the community's safety and security.

The major requirement in terms of PS4 is that all risks and impacts to the surrounding community are assessed and managed appropriately. This includes issues such as infrastructure and equipment safety, hazardous material storage and handling, hazards associated with the natural environment (such as floods and landslides), community exposure to disease, and emergency preparedness and response.

5.3.5 Performance Standard 5 (PS5): Land Acquisition and Involuntary Resettlement

The primary objectives of PS5 are to:

- Avoid or at least minimise involuntary resettlement wherever feasible by exploring alternative project designs and layouts.
- Mitigate adverse social and economic impacts from land requisition or restrictions on affected persons' use of land by (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected.
- Improve or at least restore the livelihoods and standards of living of displaced persons.
- Improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.

Physical resettlement is limited within the proposed project area, but the mining activities will result in extensive economic displacement (i.e. agricultural land, grazing land, tombs, use of natural resources etc.). Compliance with this performance standard will require ensuring that people are fairly compensated for loss of access to this area. A Resettlement Action Plan will be completed prior to any resettlement and/or compensation taking place. This is will done upon completion of the ESIA.

5.3.6 Performance Standard 6 (PS6): Biodiversity Conservation and Sustainable Natural Resource Management

The primary objectives of PS 6 are to:

- Protect and conserve biodiversity.
- Promote the sustainable management and use of natural resources through the adoption of practices that integrate conservation needs and development priorities.

In order to conform to PS6 the study has to consider ecosystem goods and services afforded by the natural environment in the study area. This assessment has to include an investigation into provisioning services, regulating services and cultural services. A biodiversity monitoring plan will be produced at a later stage to demonstrate how the project will monitor the plant and animal biodiversity in the study area to ensure it is properly managed and conserved within designated ecological corridors. This plan will outline the monitoring and evaluation required to manage the designated ecological corridors. Biological offsets will be considered as a primary means to mitigate negative impacts on the biological environment.

5.3.7 Performance Standard 7 (PS7): Indigenous Peoples

Indigenous peoples are recognised by the IFC as social groups with identities that are distinct from dominant groups in national societies and are amongst the most marginalised and vulnerable segments of the population. The population in the Project's area of influence does not fall into this category, and therefore PS7 does not apply to the Project.

5.3.8 Performance Standard 8 (PS8): Cultural Heritage

The primary objectives of PS8 are to:

- Protect cultural heritage from adverse impacts of project activities and support its preservation.
- Promote the equitable sharing of benefits from the use of cultural heritage in business activities.

PS8 defines cultural heritage broadly to include tangible forms of cultural heritage (property and sites having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values, as well as unique natural environmental features that embody cultural values, such as sacred groves), and intangible forms (cultural knowledge, innovations and practices of communities embodying traditional lifestyles).

The value of cultural heritage will be respected throughout the project's life. Care will be taken to ensure that all the cultural practices in which the communities participate are not impacted negatively as a result of the project.

5.4 IFC Sector Specific Guidelines

The IFC EHS Guidelines for Mining (30 April 2007) are applicable to this project. The guidelines detail industry-specific impacts and ways in which to manage them. They cover environmental, occupational health and safety, community health and safety, and performance indicators and monitoring.

5.5 Other Applicable Madagascar Laws

5.5.1 Introduction

This legal summary presents the relevant Malagasy environmental legislation that the Ranobe Mine Project must adhere to as provided by the Ranobe Mine Project team. Large sections of the laws do not apply to the project and are thus not discussed (for example laws governing hydroelectric projects). In addition large sections of the law are not relevant to the impact assessment (although they may apply to other aspects of the project) and have therefore also not been included.

5.5.2 Ordinance number 62-165 dated 11 October 1962 regarding permitting for the construction of buildings and allotments.

This ordinance deals with ensuring that urban areas develop in a harmonious and organised manner. The law deals with building authorisations and permissions for allotments. It is applicable to urban areas with more than 2 000 inhabitants. All construction activities require a permit, including public works programmes. Certain small projects may be exempted from this requirement by the Ministry for Public Works.

The ordinance describes the right to inspection of various government departments, fines for inhibiting inspections, and the interruption to works as a result of non-compliance with the building permit. Building contractors, architects and other professionals in charge of the construction work will be held liable for non-compliance with the permit conditions. The competent authority may order that non-compliant buildings are taken down or amended to ensure compliance with the permit. Fines may be imposed for every day that the building remains non-compliant and should corrective actions not be taken within stipulated timeframes, the Department of Public Works can undertake the work on behalf of the proponent at their risk and cost. All housing estates must comply with the ordinance. Decrees will state the conditions to which certain authorisations are granted, notably the financial responsibility of the proponent for certain public works required as a result of the existence of the building.

5.5.3 Law number 98-029 date 20th January 1999 – the Water Law

The water law recognises the scarcity and importance of water as a national resource that must be conserved, improved, and managed sustainably, carefully and rationally. Water is recognised as part of the national communal heritage of Madagascar. The lack of water in the south and west of Madagascar is acknowledged, and the role of the State in policing and managing water resources throughout the country is stated.

Surface water is defined in article 6 as all pluvial water, all above ground flowing water, all water contained in canals, rivers, navigation channels, canalised rivers, certain irrigation channels, saline lakes linked to the sea, lakes, bogs, and wetlands. Surface water is considered to form part of public land.

Groundwater is defined in article 8 as all water contained in aquifers and below ground wells. Any springs are also considered as part of the groundwater.

Surface and groundwater abstraction are covered in articles 10 and 11. No changes to a water course may be undertaken without prior permission from the National Authority for Water and Sanitation (Autorite Nationale de L'Eau et de L'assainissement - ANDEA). Groundwater abstraction is limited to personal use up to a specific volume and as long as that use poses no pollution threats to the resource. Groundwater abstraction is managed by ANDEA.

Pollution is discussed in articles 12 and 13. Pollution of surface and groundwater must be avoided at all times. In cases where pollution takes place the polluter pays principle will be applied. Pollution is defined as all runoff, effluent, direct or indirect introduction of all types and more generally any action which could provoke or result in the degradation of water by modifying its physical, chemical, biological, bacteriological or radioactive characteristics in the ground or surface water.

Waste is discussed in articles 14-18. Article 15 states that any person who produces or stores wastes that could have a negative impact on soils, flora and fauna, air or water, human health or the environment is required to ensure its proper treatment and elimination.

Article 16 states that any industrial waste that is released into circulation must be treated and this treatment must guarantee that it does not pose a threat to the environment. All costs associated with the transport, treatment and elimination of the waste are to be covered by the industry producing the waste.

All industries that produce, import or treat wastes are required to provide the authorities with information concerning the origin, nature, characteristics, quantities, destinations and state of wastes produced, treated or passed on to a third party.

Article 18 states that decrees outline the conditions under which wastes can and cannot be discharged into water, or more generally to alter the quality of surface or groundwater.

Sanitation regulations are presented between article 19 and 22. Article 20 states that all companies must ensure the treatment of all waste water, and this treatment must ensure that the receiving water quality is maintained or improved. Article 21 states that all discharges into public sewers must have prior approval from the authorities. The characteristics of the effluent will need to be determined by an accredited laboratory. Article 22 states that all water containing industrial effluents must be kept separate from storm water runoff. However if it can be demonstrated through the analyses obtained from accredited laboratories that mixing storm water and industrial effluents ensures sufficient treatment so that no harm is caused to the receiving environment, mixing may be permitted.

Articles 23 to 27 discuss the conservation and protection of natural water resources and the environment. Article 24 states that it is forbidden to dispose of insalubrious material into water that could affect the quality or quantity of that receiving water. Article 25 states that forest or herbaceous cover must be maintained where these exist to minimise impacts of erosion and siltation on existing infrastructure. Specific measures must be implemented to ensure that erosion and siltation are minimised when clearing takes place to protect water quality, hydraulic regimes and to prevent major flooding.

Articles 32 and 33 deal with industrial water uses. This states that all possible measures must be taken to minimise the water requirements of the industrial activity and to preserve the environment.

5.5.4 Ordinance number 93-002 dated 4th May 1993 regarding regulations for fisheries and aquaculture

The ordinance contains a number of definitions regarding fishing and aquaculture, and details the management committees involved in local fisheries management, as well as the role of the Ministry of Fisheries. It details the management and control methods available to the Ministry to manage fisheries (gear restrictions, season closures, marine protected areas etc.) and types of illegal fishing gear. Licensing and permitting requirements are outlined with particular regard for native and non-native fishing vessels. The hygiene requirements for fish processing factories are described, as well as the requirements for businesses that treat and stock fish products. This includes inspections at offloading points, in factories, at public markets and in retail outlets. All export materials are required to obtain a certificate of origin and a sanitary permit. Finally, the policing, breaches in law and penalties are discussed.

5.5.5 Decree number 64-291 dated July 1964 which states the regulations regarding the delineation, use of, conservation and policing of public property

This decree describes the delineation, classification and alignment of public property. Possible uses of public property include temporary uses (for example during construction), which are permissible but prior approval must be obtained from the ministry in charge of public property. All requests for such a use must include a description of the activity to be undertaken and the length of time the activity will require. If the land is located near a military

land, the Ministry of Defence must be consulted regarding using the land.

The decree further describes the processes to be followed for declassifying public property and how public property is policed.

5.5.6 Decree number 310 dated 2nd February 1964 regarding alignment methods

This decree states that any person wishing to construct a building or fence along a public access road is required to request a survey of the public access road prior to requesting permission for construction. The decree contains two examples of how to apply for the survey and outlines the process that must be followed by all parties.

5.5.7 The urbanisation and housing law, dated 1963, 1265 pages

The law details the roles of the Minister of Public Works, how services are organised and what consultative organisations are included in consultations regarding urbanisation and housing. It outlines the processes and different categories which different building types fall into. In the case of the Ranobe Mine Project, all the major construction associated with the project (in other words, the primary and secondary concentrators, mineral separation plant, haul road and marine loading facilities) will all require special permission for construction. The law contains many details regarding the safety and sanitary requirements for various types of buildings which will need to be conformed with. The permits for these activities will need to be obtained by the building contractors after the EIA phase is complete. The annex to the law describes what needs to be included in the application for a construction permit.

Decree no. 180 dated January 1964 states that any staff related housing plans must be approved by the Ministry for Public Works prior to obtaining a construction permit.

5.5.8 Law number 99-021 dated 19th August 1999 regarding the management and control of industrial pollution

This law outlines that it is the State's aim to ensure the protection of the environment and the conservation of biological ecosystems and natural resources from all causes of degradation or alteration by pollutants.

Polluting substances may, as a result of their nature and concentration, result in an imbalance in the receiving environment (for example water, air and soil) and create dangers or inconveniences, impacts of all kinds on either the surrounding area, or on health, security, sanitation and public health, agriculture, places of national heritage including monuments and sites.

Industrial pollution is deemed to have taken place when the quantitative and qualitative changes to the environment as a result of the presence of a polluting substance resulting from an industrial activity are detected. Industrial pollution includes all wastes, emanations and nuisances of all kinds that are generated either directly or indirectly by industrial activities.

All industrial activities must safeguard the environment through cleaner technologies and technologies that result in a reduction, treatment and elimination process of any wastes produced.

Liquid wastes must be managed in accordance with the licence provided by the competent authority which will ensure that effluent discharge is limited as far as possible and that it is properly treated prior to release. Solid wastes are divided into non-hazardous wastes and hazardous (special) wastes. Non-hazardous wastes should be minimised, recovered,

recycled, incinerated, buried or composted. Hazardous wastes must be dealt with in accordance with the licence provided by the competent authority.

The proponent is obliged to take the environmental impact that the industrial operation may have into account in the economic planning stage. The proponent is required to:

- Participate in local environmental protection;
- Hold a valid waste licence for the operation;
- Be aware and incorporate technical advances into the operation to reduce wastes produced by the industrial activity;
- Continually adjust to and conform with changes in the national environmental legislation and good management practices; and
- Allow the competent authority access to relevant information that demonstrates the operation is using good management practice to minimise wastes.

All proponents are required to monitor their waste management. An inter-ministerial decree will detail the nature of the requirements of each industrial operation.

Environmental guidelines will be developed to be applied to the receiving environment in due course but while these are being developed, the norms and standards recommended by international organisations that are affiliated with the United Nations are to be used as a standard reference.

5.5.9 Inter-ministerial decree number 12 032/2000 regarding the regulation of the mining section with respect to the protection of the environment

The Minister of Environment decides whether or not to award an environmental licence based on the findings of the technical evaluation committee (Comite technique d'évaluation CTE), and issues the Quitus Environnemental². The National Office for the Environment (Office National pour L'Environnement ONE) ensures cohesion between sectors regarding the technical contents of analyses, standards, and the efficacy of attenuation and rehabilitation methods in the elaboration and assessment of EIAs and environmental management plans (Plan de Gestion Environnemental du Projet PGEP). The ONE, together with the branch in charge of environment in the Ministry of Mines (known as the 'cellule', cell), compile an individual list of management, mitigation and rehabilitation measures for each mining project depending on the type of mining project. In addition, the ONE forms part of the CTE, which provides technical comments on whether to award the Quitus Environnemental.

The Decree de MECIE³ and other subsequent directives contain details of the methodologies to be followed during an EIA. The ultimate objective of the rehabilitation plan which is submitted as part of the EIA, is to ensure that the mine footprint is left in a healthy, stable condition and that the environment has been restored to a level that allows the land to be used for other activities that is compatible with all other forms of life and activities in the region. The mitigation measures and rehabilitation plan must aim to:

- Ensure the safety of the mine locations during and after mining operations have been completed.
- Reduce negative effects of the mining operation on the atmosphere and water sources and courses to an acceptable level.

² The Quitus Environnemental is the administrative acceptance and recognition that the permit holder has completed all rehabilitation to the required standard and restores the environmental responsibility for the permit area to the state.

³ Decree no. 99- 945 dated 15 December 1999 regarding the compatibility of Investments and the Environment.

- Integrate the mine and associated infrastructure into the area by using development approaches that are appropriate to the flora and fauna of the area.
- Reduce erosion, water leaks, chemical leaks and other mining accidents, and negative impacts on faunal habitats.
- Reduce negative impacts of the operation (shocks, noise, dust etc.) on the local human populations and animal populations that live nearby to the operation.
- Avoid the introduction of parasites and alien vegetation.
- Support rapid re-colonisation of cleared areas using indigenous species or species that are compatible with the rehabilitation area.

A budget for the rehabilitation must be submitted as part of the EIA, and sufficient funds to cover the rehabilitation must be kept in a Malagasy bank account as a guarantee of the rehabilitation.

The PGEP of the project must outline the monitoring and surveillance mechanisms to be used to monitor the effectiveness of the rehabilitation and mitigation measures.

The terms of reference for the environmental audit at the end of the project will be assessed as part of the evaluation of the EIA. These will be annexed to the environmental permit for the project and will enable the Quitus Environnemental to be obtained at the end of the project, once the audit has been completed to the satisfaction of the authorities.

The Ranobe Mine Project must adhere to the specific conventions outlined in the law because of the size of investment into the project. The convention shall specify:

- The terms of reference for the EIA;
- The manner in which the proponent will contribute to the cost of the evaluation of the EIA;
- The methods and timeframes for the evaluation of the EIA in parallel with its completion; and
- The practical details regarding the type and timing of the public participation in the EIA.

The means by which a request for a specific convention can be applied for are detailed between article 46 and 49.

Article 50 states that seven hard copies of the EIA must be lodged with the Cadastral section of the Ministry of Mines. The cadastral section will determine whether the EIA is acceptable (complete) within 2 working days and notify the proponent. If accepted, the cadastral section will distribute the copies of the EIA within the Ministry of Mines and the ONE. The submission must be accompanied by:

- Proof of payment of the required contribution to the evaluation of the EIA by the proponent; and
- Proof of the size and sum of the investment.

The PGEP including all plans for rehabilitation, as well as the financial guarantee for the rehabilitation must be implemented within 60 days of approval of the EIA and PGEP. Oversight and monitoring of the implementation of the PGEP is undertaken by the ministry for environment, the environmental branch in the Ministry for Mines and the ONE.

5.5.10 Decree number 200-107 stating the conditions of application of law number 99-022 dated 19 October 1999 regarding the Mining Law.

Article 5 of the mining law states that the permit holder must, where qualifications between two candidates are the same, prioritise employing Malagasy people over other nationalities.

It also states that the proponent must put in place theoretical and practical training courses for the Malagasy employees at their cost. The proponent must favour the advancement of Malagasy workers in the company at all levels, in relation to the individual's capacity.

The mining environment is administered by the following organisations:

- The branch in charge of the environment within the Ministry of Mines (the cell);
- The Ministry of Environment and all organisations attached to it, including the competent environmental authorities delegated to deal with protected environments; and
- The Autonomous Provinces and the Communes.

The environment branch within the Ministry of Mines has the coordinating role between proponent and above listed bodies.

The Environmental Impact Assessment (Etude d'Impact Environnementale (EIE)) must be submitted to the Ministry of Mines. The timeframes for obtaining a decision on an EIA are detailed in the environmental legislation dealing with mining. The environmental authorisations and protection measures required are listed under heading X, first chapter of the Mining law. In addition to producing the EIE (and this being approved), the proponent must ensure that all environmental legislation is respected, specifically:

- While undertaking mining activities the proponent is obliged to define, evaluate and implement appropriate measures aimed at minimising and repairing all foreseeable damages that the mining activity is likely to have on the environment;
- The proponent is only permitted to undertake those activities that were approved in the PEE and EIE. Permission and authorisation to undertake any activities not included in these documents must be obtained prior to commencing any such activities;
- Rehabilitation work can either be undertaken as the project progresses or at the end of the mining activities; and
- The proponent is obliged to have a rehabilitation plan in place.

Methods for environmental protection and rehabilitation are described in the inter-ministerial decrees.

The proponent is required to ensure adequate closure of the mine, even if mining is terminated prior to the expiry date of the lease for whatever reason.

The protection of workers is discussed in chapter IV of the mine law. The proponent must ensure the safety of workers as outlined in their permits and any other applicable labour law. This includes proper organisation of the workforce, emergency drills, regular inspections, maintenance, registers and training courses for workers, compilation of work related accidents which must be submitted to the authorities. Workers are required to abide by the safety regulations imposed by the mine, use all protective gear and follow security instructions, immediately inform management in cases of unusual circumstances or broken equipment. The health and hygiene of the workers will be maintained through a set of methods to be determined by the Ministry of Labour and the Ministry of Mines for each mine. In addition to these, the proponent must ensure that the sanitation requirements of the workforce are met and that sufficient medical care systems are in place, put in place hygiene and health regulations that are periodically reviewed, install appropriate medical centres, ensure that the equipment and medicines are available, perform medical examinations on workers and provide them with the reports, and generate individual health files on workers. Workers are required to adhere to hygiene and health systems in place, voluntarily allow themselves to be examined, and immediately alert the mine in case of illness or unusual symptoms.

Heading XI discusses the relationship between mining right holders and landowners. This section discusses the obligations of the rights holder regarding obtaining permission from land owners, signing contracts for the use of the land, agreeing on compensation with the land owners. In addition the law recognises the rights of two other types of land users: traditional occupants - defined as people belonging to a local community who through customary rights recognised by the administration in charge of estates, occupies sections of land on a permanent and peaceful basis without having a title deed to that land – and usufructuaries – defined as people who only harvest fruit, wood, and practice other similar activities in land located within the permit boundary without holding a title deed or forming part of the traditional occupants. The rights holder is required to enter into a lease agreement with land owners and land users of the land that falls within the permit area. The rights holder must obtain permission from the land owners and land users to use or remove wood or water from the area within the permit area. The permit holder can engage in similar accords with land owners and land users that fall outside the permit area for activities that are required by the project, such as the erection of power lines or haul roads, for example. The land owner has the right to negotiate in good faith a lease with the rights holder for his land. He can be compensated for assets on the land that he will lose as a result of his exclusion from the land. The land owner is required to make himself known as soon as he hears of the official procedure being undertaken to rent his land. Failure to do so within four months of the official procedure commencing results in him losing the right to lease his land and compensation for any assets on the land. Traditional occupants and people in possession of usufructuary status have the same rights as land owners, but must organise themselves into representative groups and elect a community representative. Failure to make themselves known once they hear of the official process within four months of the start of the process results in a loss of these rights.

Heading XII chapter 2 states that special permits are required to transport mined product on national roads.

5.5.11 Law number 98-026 dated January 1999 regarding the revision of the roads charter

This law states that all investments in roads requiring rehabilitation construction work or requiring the use of nearby materials are required to undergo an EIA in accordance with the Mecie Decree.

5.5.12 Law number 90-033 regarding the Malagasy environmental charter

Article 10 of this law states that any public or private project likely to affect the environment must be assessed by an EIA. The EIA must consider the scale of the development the technical aspects of the project and the sensitivity of the environment in which the project will take place.

The charter recognises the inseparable relationship between conservation of the environment and sustainable economic development of the local population. In order to ensure that the needs of these two objectives are harmoniously met, an environmental action plan has been developed and will be put into action through several sectorial strategies including:

- Developing tools to educate, sensitise and train people in environmental management and protection;
- Water basin management with a particular focus on avoiding erosion;
- Land tenure and land rights, with emphasis on ownership and responsibility for land;
- Biodiversity protection and management;
- Development of ecological tourism;

- Improvement of living standards in rural and urban areas;
- Putting in place tools for environmental management, protection and ongoing monitoring; and
- Developing institutional framework for the environment.

In order to ensure that this takes place, strategies have been developed per region, including the southern region. The main restorative actions required for the southern region are listed as:

- Restoration of security;
- Preservation of vegetation and enhancement of useful species;
- Re-vegetation of areas affected by erosion through native species with the ultimate aim of increasing water infiltration into soils and groundwater resources;
- Increasing the occurrence of wind breaking hedges such as those used in valamahafaty to create a hedged farmland landscape;
- Introduction or selection of drought resistant species (sorghum, millet, niebe); and
- Intensification of animal husbandry using locally adapted species.

The law outlines the roles and responsibilities of various organs of state and bodies in rolling out the environmental charter over various time periods through three sets of programmes (I-III).

5.5.13 Law no. 97-107 date 8th august 1997 detailing the revision of the forestry legislation

The first article of the law defines a forest as all areas with the following attributes:

- Areas covered in trees or woody vegetation other than those planted to produce fruit, fodder or for decoration;
- Areas covered in trees and bushes along water courses and lakes and eroded areas; and
- Lands used to produce fruit as the principle product. Forest products are defined as all natural products obtained from forests.

The second article details types of land that are considered to form part of the forest including:

- Non-forested areas such as forest clearings, or areas that have been cleared for forest management purposes such as roads and other infrastructure;
- Lands that have been cleared for forestry purposes such as clearing for soil rehabilitation and conservation, biodiversity conservation, water course management;
- Lands that have been cleared of forest within the past five years without permission;
- Marshlands and aloe habitats;
- Natural and pure habitats for fruit producing trees such as mango trees; and
- Mangroves, sacred woods and raphieres (heart of Ravinala palm).

Article 4 states that the following are not considered forests:

- Reforestation in non-forestry areas;
- Woody gardens, avenues and urban parks, nurseries not located on forestry lands;
- Tree cultivation that is aimed at short term harvesting, not located on forestry land, registered as such with the forestry administration;
- All lands used to produce agricultural produce, except if the land is covered in naturally grown trees or reforestation; and

- Grazing lands as defined by law.

The law states that all forests can become forestry areas. This is determined by a forestry commission. Thus most forests (particularly forests in national parks, forest reserves, state owned land etc.) fall under the law. Some forests may be exploited in a sustainable manner once a suitable harvesting plan has been developed for it by the forestry authority and once a permit has been issued to do so.

Article 48 recognises that certain forestry corridors may need to be under special management for specific management outcomes. These include soil and water conservation, soil rehabilitation, ecological, social, or cultural corridors, sacred forests, buffer borders to protection global heritage areas or biospheres, and protective corridors for industries such as mines. These corridors are formed by the state either through its initiative or as a result of a request.

The creation of special management corridors can result in the expropriation of land or through the creation of a convention passed by the forestry administration.

5.6 International Environmental Conventions

International Environmental Conventions	Ratified
Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES)	1975
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basal Convention)	1999
Convention on Biological Diversity (CBD)	1996
United Nations Framework Convention on Climate Change (UNFCCC)	1999
Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNCCD)	2003
United Nations Convention to Combat Desertification	1997
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	9 Proclaimed RAMSAR sites (1998-2012)
Protocol for the Protection of the Ozone Layer (Montreal Protocol)	1996 (Accession)
African Convention on the Conservation of Nature and Natural Resources	
Convention concerning Safety and Health in Mines	Member since 1960
Stockholm Convention on Persistent Organic Pollutants	2005
Cartagena Protocol on Bio-safety to the Convention on Biological Diversity	2003
Vienna Convention for the Protection of the Ozone Layer	1996
Convention of the Law of the Sea	2001
International Convention for the Prevention of Pollution of the Sea by Oil, 1954, as amended in 1962 and 1969	1965
Convention on Fishing and Conservation of the Living Resources of the High Seas	1966
Convention on the High Seas	1962
Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water	1965
African Convention on the Conservation of Nature and Natural Resources	1971
Convention on the Conservation of Migratory Species of Wild Animals	1979
Convention concerning the Protection of the World Cultural and Natural Heritage	1983
Protocol concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region	1985
Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region	1985
Protocol concerning Co-operation in Combating Marine Pollution in cases of Emergency in the Eastern African Region	1985
Framework Convention on Climate Change	1996
Agreement establishing the African Development Bank	1976

Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (art.XI)	1987
Agreement for the Establishment of the Indian Ocean Tuna Commission	1996

6. PRESENTATION OF THE STRUCTURE OF THE EIE

6.1 Structure of this report

The content of the various sections of this Environmental and Social Impact Assessment is summarised below.

Volume 1 include details and experience of the proponent, the proponent's environmental and sustainable development policies, an overview of the project and its location and a detailed motivation and justification for the project. It also contains maps that spatially represent the biophysical, social, economic, waste and infrastructure related impacts assessed for the various sections of this project. In addition to this, this volume outlines the requirements of prevailing Malagasy legislation as well as relevant international principles, performance standards and guidelines.

Volume 2 describes the proposed mining project, including the mining process, the mineral separation and processing plants and infrastructural requirements for water and power. In addition to this it also describes the ancillary infrastructure, such as the airstrip, housing etc. required for the daily operations of the mine. It also describes the requirements of prevailing Malagasy legislation as pertaining to mining activities and infrastructure. Furthermore, this Volume describes the site specific physical, biological and social environments and assesses the impacts of the proposed mining project on these environments. Lastly, it provides a description of the alternatives to the proposed mining development or parts of the proposed development. It also includes a comparative assessment of viable alternatives.

Volume 3 describes the proposed haul road options, including the quarries required to produce construction material, and the proposed causeway. It also describes the requirements of prevailing Malagasy legislation as pertaining to the haul road. Furthermore, this Volume describes the site specific physical, biological and social environments and assesses the impacts of the proposed construction and operation of the haul road and causeway on these environments. Lastly, it provides a description of the three haul road alternatives and the alternative of constructing a new causeway instead of utilising the existing bridge across the Fiherenana River.

Volume 4 describes the proposed new port development, including the jetty and storage facilities. It also describes the requirements of prevailing Malagasy legislation as pertaining to the port development. Furthermore, this Volume describes the site specific physical, biological and social environments and assesses the impacts of the proposed construction and operation of the jetty and storage facility on these environments. Lastly, it provides a description of the alternatives of constructing a new port versus the utilisation of the existing Toliara Port Quay.

Volume 5 presents a synthesis of the project after all mitigation measures have been applied, detailing the residual impacts. This Volume also presents the provisional and indicative Phase 1 Resettlement Action Plan (RAP) process applicable to the Ranobe Mine Project. Lastly, this Volume provides an Environmental and Social Management Plan as well as a monitoring programme for the proposed project.

Volume 6 consists of the Air Quality Assessment.

Volume 7 consists of the Botanical Specialist Report.

Volume 8 consists of the Economic Assessment Report.

Volume 9 consists of the Faunal Baseline Assessment.

Volume 10 consists of the Ichthyology and Aquatic Habitat Assessment

Volume 11 consists of the Land and Natural Resource Use Assessment

Volume 12 consists of the Marine Ecology and Fisheries Assessment

Volume 13 consists of the Radiation Assessment

Volume 14 consists of the Rehabilitation and Offset Strategy

Volume 15 consists of the Sediment Transport Assessment

Volume 16 consists of the Social Impact Assessment

Volume 17 consists of the Specialist study on noise impacts

Volume 18 consists of the Visual Impact Assessment

Volume 19 consists of the Waste and Wastewater Assessment

Volume 20 consists of the Water Assessment

Volume 21 provides a description of the stakeholder engagement process undertaken to date and the various issues and response trails completed from stakeholder engagement activities.