

Rio Tinto Simfer

SIMANDOU MARINE SHIPPING PROJECT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Maferinyah Sub-Prefecture, Forécariah Prefecture, Kindia Region, Republic of Guinea



VOLUME 1



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**Maferinyah Sub-Prefecture, Forécariah Prefecture, Kindia
Region, Republic of Guinea**

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ACRONYMS

Acronyms	
ACE	Africa Coast to Europe
ACH	Archaeological Cultural Heritage
ADCP	Acoustic Doppler Current Profiler
ADT	Absolute Dynamic Topography
AEGL	Acute Exposure Guideline Levels
AEP	Annual Exceedance Probability
AFS	Anti-Fouling Systems on ships
AGEE	Guinean Agency for Environmental Assessments
AHAP	Areas of High Archaeological Potential
Al	Aluminium
AIS	Automated Identification System
ALARP	As Low As Reasonably Practicable
ANAM	Merchant Marine and the Maritime Navigation Agency
AoI	Area of Influence
AOO	Area of Occupancy
AQNVMP	Air Quality Noise and Visual Management Plan
ARI	acute respiratory infections
BAP	Biodiversity Action Plan
BMP	Biodiversity Management Plan
BOS	Biodiversity Offset Strategy
BOT	Build-Operate-Transfer
BWM	Ballast Water Management
CAE	Certificate of Environmental Audit
CCKP	Climate Change Knowledge Portal

Acronyms

CCME	Canadian Council of Ministers of the Environment
CD	Chart Datum
CFD	Code Foncier et Domanial
CFP	Chance Find Procedure (CFP)
CFSR	Climate Forecast System Reanalysis
CFSv2	Climate Forecast System Version 2
CHEC	China Harbour Engineering Company
CHMP	Cultural Heritage Management Plan (CHMP)
CHQ	Critical Habitat Qualifying
CHSMP	Community Health and Safety Management Plan
CIOH	Chalco Iron Ore Holdings
CLO	Community Liaison Officer (CLO)
CMIPs	Coupled Model Inter-Comparison Projects
CO ₂	Carbin Dioxide
CPMZC	National Center for the Protection of Marine Environments
CPSES	Prefectural Environmental and Social Monitoring Committees
CR	Critically Endangered
CRCC	China Rail Construction Corporation
CRU	Climatic Research Unit
CSD	Cutter Suction Dredger
CSP	Communities and Social Performance
CTG	La Compagnie du Trans Guinéen
CU	Consumer unit
DD	Data Deficient
DEM	Dust Extinction Moisture
DRA	Detailed Risk Analysis
DSDMP	Dredge and Spoil Disposal Management Plan

Acronyms

DVM	Diel Vertical Migration
DWT	Dry Weight
EAAA	Ecologically Appropriate Area of Analysis
ECC	Environmental Compliance Certificate
ECMWF	European Centre for Medium-Range Weather Forecasts
EEA	European Environment Agency
EERP	Environmental Emergency Response Plan
EHS	Environmental, Health and Safety
EITI	Extractive Industries Transparency Initiative
EN	Endangered
EOO	Extent of Occurrence
EP	Equator Principles
ERP	Emergency Response Plan
ES	Ecosystem Services
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management
ESMS	Environmental and Social Management System
ESS	Environmental and Social Specifications
FSA	Formal Safety Assessment
GBIF	Global Biodiversity Information Facility
GBV	Gender-based violence
GGEEAP	Greenhouse Gas and Energy Efficiency Action Plan
GHG	Greenhouse Gases
GIIP	Good International Industry Practices
GoG	Government of Guinea
ha	Hectares
HAT	Highest Astronomical Tide

Acronyms

HFO	Heavy Fuel Oil
Hmo	Estimated Wave Heights
HOT	Hotelling
HRIA	Human Rights Impact Assessment
Hs	Wave Heights
HSEC	Health, Safety, Environment, and Community
IA	Impact Assessment
IAIA	International Association for Impact Assessment
IBAT	Integrated Biodiversity Assessment Tool
ICE	International Electrotechnical Commission
ICH	Intangible Cultural Heritage
IEMA	Institute of Environmental Management and Assessment
IFC	International Finance Corporation
ILO	International Labour Organization
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPS	Integrated Port Study
ISO	International Standards Organization
ITCZ	Intertropical Convergence Zone
IUCN	International Union for the Conservation of Nature
JMP	Joint Monitoring Programme
KBA	Konkouré Key Biodiversity Area
LAI	Leaf Area Index
LAT	Lowest Astronomical Tides
LC	Least Concern
LCH	Living Cultural Heritage (LCH)
Li	Lithium

Acronyms

LoO	Life of Operations
MAN	Manoeuvring
MARPOL	International Convention for the Prevention of Pollution from Ships
MD	Mechanical Dredger or Backhoe Dredger
MEA	Millenium Ecosystem Assessment
MEDD	Ministry of the Environment and Sustainable Development
MES	Marine Export System
MGO	Marine Gas Oil
MHW	Mean High Water
MHWN	Mean High Water Neaps
MHWS	Mean High Water Springs
MLW	Mean Low Water
MLWN	Mean Low Water Neaps
MLWS	Mean Low Water Springs
MPAEM	Ministry of Fisheries and Maritime Economy
MS	Management System
MSL	Mean Sea Level
mtpa	million tonnes per annum
NA	Not Applicable
NCEP	National Centers of Environmental Prediction
NDH	National Directorate of Hydraulics
NGOs	Non-Governmental Organisations
NMWMP	Non-Mineral Waste Management Plan
NOAA	National Oceanic and Atmospheric Administration
NRS	Nautical Risk Study
O ₂	Oxygen
OAU	Organization of African Unity

Acronyms

OECD	Organisation for Economic Co-Operation and Development
OGPNRF	Office guinéen des parcs nationaux et réserves de faunes
OGV	Ocean-Going Vessels
PACI	Partnering Against Corruption Initiative
PAM	Passive Acoustic Monitoring
PAPs	Potentially Affected Persons
PARC	Resettlement and Compensation Action Plan
PC	Process Contribution
PCB	Polychlorinated Biphenyls
PCCRA	Preliminary Climate Change Risk Assessment
PCH	Potential Cultural Heritage
PDC	Prefectural Development Committee
PDI	Port Development Institute
PEL	Probable Effect Level
PES	Priority Ecosystem Services
PM	Particulate Matter
PPE	Personal Protective Equipment
PRA	Preliminary Risk Analysis
RCM	Risk Control Measures
SEA	Strategic Environmental Assessment
SEIA	Social and Environmental Impact Assessment
SIA	Social Impact Assessment
SIGSA	Simfer Infracore Guinée S. A.
SOLAS	Convention for Safety of Life at Sea (SOLAS)
SSC	Species Survival Commission
SSP	Shared Socioeconomic Pathways
TB	Tuberculosis

Acronyms

TBT	Tributyltin
TEL	Threshold Effect Level
TOC	Total Organic Content
ToR	Terms of Reference
Tp	Peak Wave Periods
TSHD	Trailing Suction Hopper Dredger
TSHDs	Trailing Suction Hopper Dredgers
TSS	Turbidity and Suspended Sediment
TSV	Transshipment Vessel
UKHO	United Kingdom Hydrographic Office
UN	United Nations
USPA	United States Environmental Protection Agency
VSR	vessel speed reduction
VU	Vulnerable
WCS	Winning Consortium Simandou
WEF	World Economic Forum
WHO	World Health Organization
WID	Water Injection Dredger
WMPs	Water Management Plans (WMPs)



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NON-TECHNICAL SUMMARY



0 NON-TECHNICAL SUMMARY

0.1 PROJECT OVERVIEW

Rio Tinto Simfer's Simandou Marine Shipping Project or Simandou Iron Ore Maritime Transport Project (the Project) is an extension of the ship operations for the Winning Consortium Simandou (WCS) Port on the Morebaya River. The Project includes some complementary dredging work. Its main purpose is to expand the throughput capacity of the current port to enable the export of iron ore mined from Blocks 3 & 4 in the Simandou Range and transferred by rail to the coast.

Part of the overall operations and work related to the port of the Simandou mining project has already been assessed in separate Environmental and Social Impact Assessments (ESIAs) including:

- The Port Infrastructure ESIA, which was completed by WCS in 2022 and authorised the same year by the Guinean government. This covered all the land and marine side construction and operation activities required to support the development of the WCS component of the Port, including dredging of the navigation channel. The channel links the port with the ocean-going vessels/iron ore carriers (OGVs) anchorage area to the depth and width required for the operation of barges to be used by WCS.
- The Rio Tinto Simfer shore-based Iron Ore Handling and Export Facilities ESIA (Rio Tinto, 2023) which covered all land-side construction and operation activities including the construction of the wharf.

The current ESIA consists of the following:

- dredging of the berth pocket located at Rio Tinto Simfer's wharf, both during construction and operation of the port
- disposal of dredge spoil generated by the dredging of the berth pocket in a designated location offshore
- the establishment of anchorage areas for OGVs
- the transfer of iron ore by transshipment vessels (TSVs) from the Rio Tinto Simfer wharf through the navigation channel to OGVs at sea
- all other project-related vessel movement through the navigation channel and at sea, including supply vessels, and marine to land bulk fuel transfer operations
- vessel servicing activities
- the establishment of safety zones around the vessels

0.2 PROJECT PROPONENT

Rio Tinto Simfer is responsible for the construction of port infrastructure and is the proponent of this Project.

For the purposes of this ESIA, the term “Rio Tinto Simfer” used in the body of the ESIA and Annexes will refer to, as the context requires:

- Simfer Infraco Guinée S.A. (SIGSA) for activities related to the construction of marine port infrastructure / facilities; or
- Simfer Marine Guinée S.A. for marine shipping activities associated with the construction, operation and closure of mining of Blocks 3 and 4; and
- Simfer Infraco Guinée S.A. and Simfer Marine Guinée S.A. as co-sponsors of the ESIA for the purposes of carrying out the Project.

Rio Tinto Simfer is owned by the Government of Guinea (15%) and Simfer Jersey Limited (85%). Simfer Jersey Limited is a joint venture between the Rio Tinto Group (53%) and Chalco Iron Ore Holdings (CIOH) (47%). CIOH in turn is a joint venture controlled by Chinalco (75%), Baowu (20%), China Rail Construction Corporation (CRCC) (2.5%) and China Harbour Engineering Company (CHEC) (2.5%).

On completion of the construction of the infrastructure components, ownership will be transferred to La Compagnie du Trans Guinéen (CTG), a joint venture between the Republic of Guinea, WCS and Rio Tinto, which will own and operate them.

0.3 PROJECT CONTEXT

The Project is for marine-based activities relating to the function of the Rio Tinto Simfer shipping to and from the Simandou Port at the Morebaya River. The location of these activities will be south of Conakry, Republic of Guinea, in the river and ocean adjacent to the Maferinyah sub-prefecture of Forecariah Prefecture in the Kindia Region of Guinea (Figure 0-1). These activities will occur from the wharf located about 5 km inland from the mouth of the river out to the western extent of the anchorage areas and dredge spoil disposal sites, located approximately 25 km offshore.

Rio Tinto Simfer is developing Blocks 3 and 4 of the Simandou Mining concession in the Simandou mountain range in Guinea’s N’zérékoré Region (shown in Figure 0-1). In parallel, WCS is developing Blocks 1 and 2 of the Simandou mountain range. Together, WCS and Rio Tinto Simfer are developing over 600 kilometres (km) of new multi-use Trans-Guinea railway. The mining developments and railway have been the subject to previous, separate ESIA’s which have been approved or are under review.

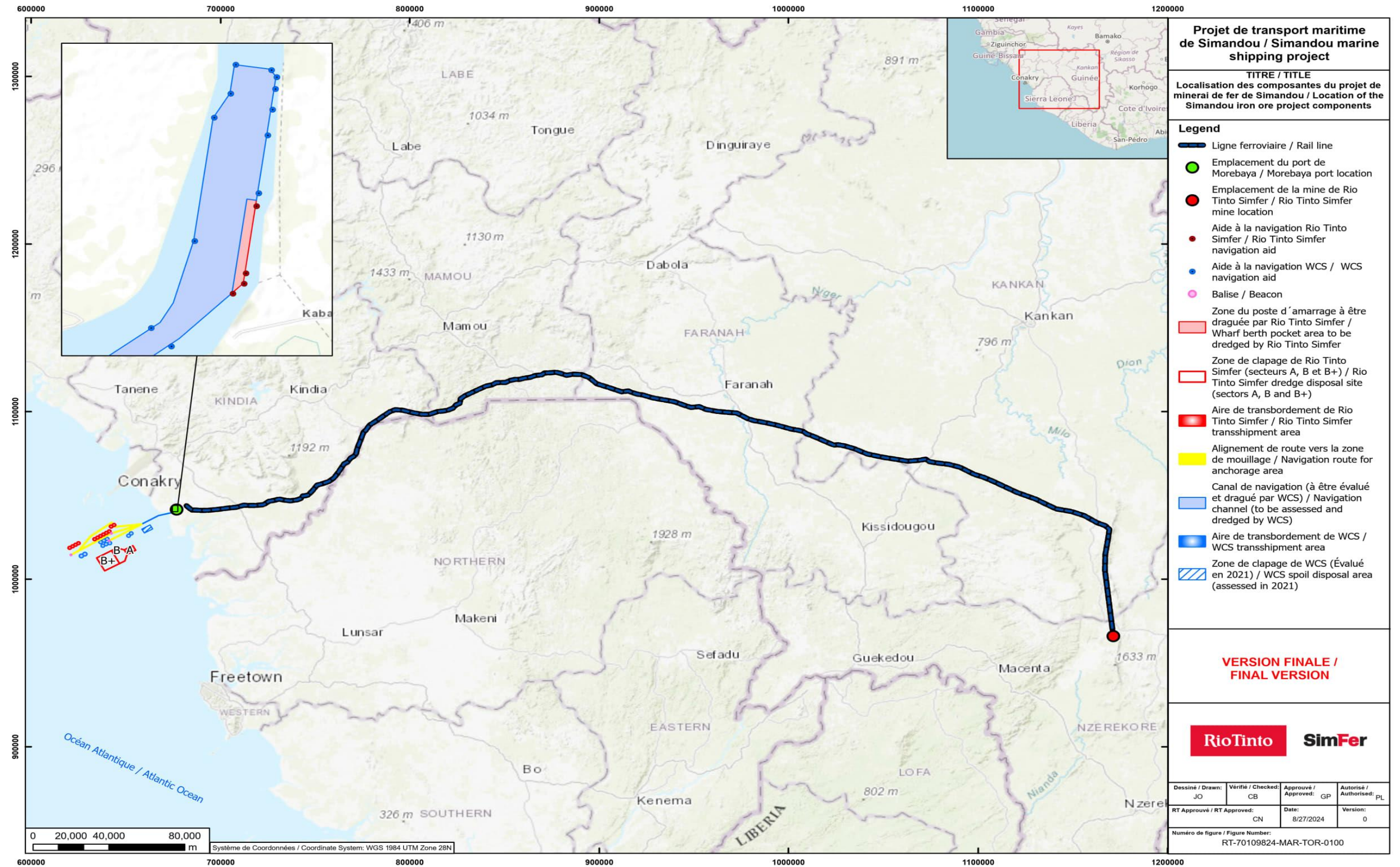


Figure 0-1 Location of the Simandou Iron Ore Project Components

0.4 PROJECT DESCRIPTION

The Marine Shipping activities will occur in the marine environment extending from approximately 5 km upstream of the mouth of the Morebaya River to approximately 55 km offshore, with an alongshore width of approximately 35 km. This includes four main spatial areas in which activities occur, which are shown in Figure 0-2, and are defined as:

- the shipping routes in which Transshipment Vessels (TSVs), and support vessels, as needed, will travel through a dredged channel (being permitted separately), out to sea, to the Ocean-Going Vessels (OGVs)
- the anchorage areas for OGVs
- the export wharf's berth pocket which will require capital and maintenance dredging (area of 11 ha)
- a disposal site where dredge spoil will be placed (area of 14,074 ha)

The Area of Influence (Aol) of the Project is presented in Figure 0-2.

All onshore port activities (and specific marine activities needed to support the onshore activities) and some WCS activities offshore have already been covered through distinct ESIA Applications (Rio Tinto, 2023; WCS, 2022a). In addition, there was a previous Rio Tinto ESIA for port and marine activities (Rio Tinto, 2012a) and cumulative effects assessment for the port activities (as planned at that time) as well as the mine and rail developments (Rio Tinto, 2012b). Those assessments have informed the present study, building upon the baselines collected prior to and since 2012 and updating assessment based on modern technology. This ESIA and its associated project description focus on the remaining and updated offshore activities needed to support the operation of export ships, dredging ships, and other watercraft as required for marine operations.

The Project's construction phase is expected to have a duration of two years, with a start scheduled in June 2025. Once developed, the offshore activities will continue for approximately 45 years of operation, based on the estimated life of mining activities.

For the operations of the dredging ships in the Rio Tinto berth pocket area during construction, crews for vessels associated with dredging will be retained for short-term support. It is estimated that one mechanical (grab) dredger and one split hopper barge will be needed for a week to dredge the berth pocket. These will require specialized personnel and are expected to primarily be international employees. Employees will generally reside on the ships or within the proposed on-land camp, if required. During operation, an estimated 171 workers are expected to be involved in the operation of marine vessels, including onshore and offshore management roles and TSV operators.

The ESIA does not consider a decommissioning phase, as full ownership of the port, inclusive of the newly expanded portion of the port, is anticipated to transfer to the Republic of Guinea between 40 and 50 years after its opening, once anticipated mining operations cease.

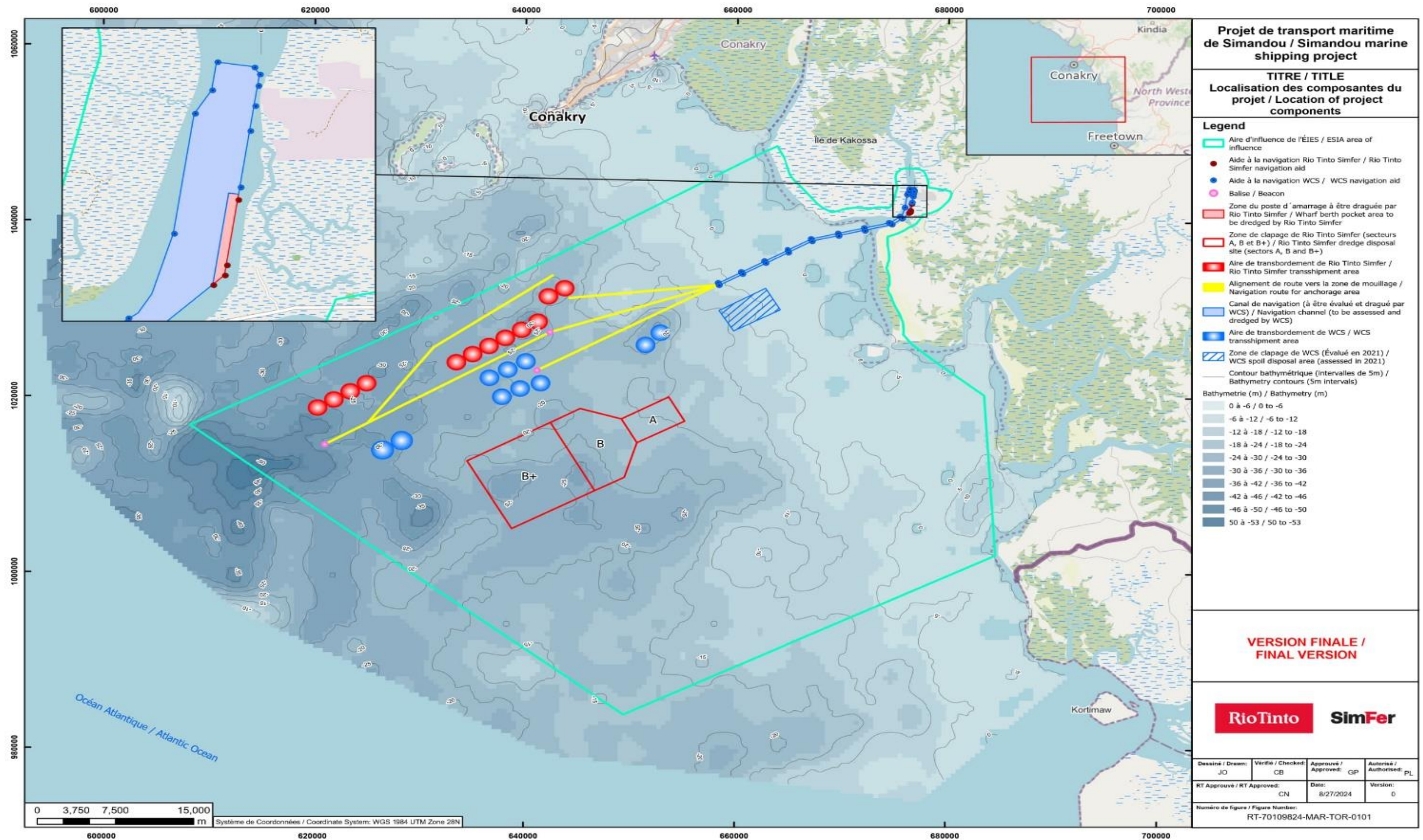


Figure 0-2 Location of Project Components

0.5 PROJECT NEED

The Project is needed as part of the infrastructure to support iron ore export from mining of the Simandou ore body. Potential impacts of the Project are viewed considering the benefits the Project holds for the people of Guinea and for other project stakeholders. These include:

- **Economic Growth:** potential to contribute to Guinea's economic growth and long-term economic development and to generate substantial revenue for the country, allowing for investment in infrastructure, education, healthcare, and other sectors.
- **Job Creation:** creating job opportunities, through enabling the Simandou Iron Ore Project as a whole to boost local employment rates, reduce poverty, and enhance standards of living in the region.
- **Revenue for Stakeholders:** including Guinea, Rio Tinto Simfer and its partners' investors, and international buyers.
- **Premium-Grade Iron Ore** from Simandou will be a vital part of the energy transition, as steelmakers seek to reduce their carbon emissions.

Minimising environmental impact through proper planning and biodiversity conservation will be key components of ensuring the Project's success.

Combined with the development of the Port infrastructure, the mine and rail line, the Project represents a transformative opportunity for Guinea and other stakeholders. With careful planning and implementation, the Project can help bring long-term benefits to Guinea while meeting international standards for sustainability and corporate responsibility.

0.6 ANALYSIS OF ALTERNATIVES

Prior to finalising the Project design, several alternatives were evaluated based on their technical feasibility, environmental and social impacts, and economic viability. These were:

- **The No Project Alternative:** This alternative relies on WCS export vessels or vessels at other ports. This alternative was rejected because other ports are at capacity and the planned WCS marine fleet does not have sufficient capacity to ship additional iron ore mined from Blocks 3 and 4.
- **Shipping Options:** Several shipping approaches were considered including dredging a channel for Ocean Going Vessels (OGVs) all the way to the Morebaya River port, building a very long jetty to deeper waters from Matakang, using barges to transport the ore to offshore OGVs, and using special transshipment vessels (TSVs) for ore transport to OGVs. The preferred option is to use special TSVs to transport ore to offshore OGVs.
- **Dredging Approach:** The dredging activities require the selection of appropriate equipment for the type of material to be dredged, water depth, and the volume of material to be removed. Several dredging equipment options were considered including trailing suction hopper dredger, cutter section dredger, mechanical dredger or backhoe dredger, and water injection dredger. The preferred option is to use one mechanical dredger for the initial excavation of the export wharf berth pocket, and then to use trailing suction hopper dredgers or one mechanical dredger for ongoing maintenance dredging.
- **Dredge Spoil Disposal Site:** Various offshore dredge spoil disposal sites were considered. The preferred option is to maintain the existing disposal site since it offers a large capacity for both initial

and maintenance dredging, minimizes environmental impacts, and has been assessed in detail and previously approved.

0.7 PROJECT STANDARDS

0.7.1 INTERNATIONAL STANDARDS AND REGULATORY FRAMEWORK

Rio Tinto Simfer has committed to conduct its activities in compliance with Guinean legislation and regulatory requirements, as well as other international standards and good practices. National, international, and corporate standards establish a set of design and operational requirements for the Project (and other related operations) to protect the environment and society from adverse impacts and to maximise the Project benefits.

The Environmental Code (Act No. L/2019/0034/AN of 4 July 2019; Republic of Guinea 2019) promulgated by Decree D/2019/221/PRG/SGG of 26 July 2019, promotes the sustainable development, management and protection of the environment and natural capital against all forms of degradation (Article 1). It establishes the administrative and legal framework that enables the Guinean State to fulfil its constitutional obligation to provide a clean and healthy environment for everyone in Guinea.

Section II of Order Amending the Procedure for Environmental Assessments (Bylaw/2023/1595/MEDD/CAB/SGG) defines the procedural steps for environmental studies. This ESIA follows these procedures. The Project has been identified as Category A and is subject to a detailed ESIA. Other key legislation that relates to the construction and operation of the Project includes Guinea's Water Code, Local Authorities Code, Labor Code, Law on the Protection of Wildlife and Hunting Regulations, Merchant Shipping Code, Maritime Code, and Maritime Fishing Code.

0.7.2 BROAD AGREEMENTS

Two key agreements have been established as part of the Investment Framework that will support development of the Project:

- Amended and Consolidated Base Convention - an agreement between Simfer Rio Tinto Mining and Exploration Limited and the Republic of Guinea governing the conditions of development and implementation of the mining project.
- Simandou Build-Operate-Transfer (BOT) Convention - This is an agreement between the state, various entities of the Rio Tinto group (including Simfer S.A.) and other parties, to build, own and operate the rail and port infrastructure necessary for the transportation of iron ore of the Project.

These two agreements, referred to as the "Project Conventions", were executed on 26 May 2014 and took legal effect on 18 August 2014. The conventions outline, among other things, the Project Standards that will be adhered to in its implementation.

0.7.3 RIO TINTO'S HSEC POLICIES

The framework for Rio Tinto's Health, Safety, Environment and Communities (HSEC) corporate policies is provided by Rio Tinto's global code of conduct, The Way We Work (2023), which is available

online at <https://www.riotinto.com/en/sustainability/policies>. This framework sets out Rio Tinto's strong commitment to undertaking its business with integrity. It requires the company to adhere to rigorous standards of corporate governance and contribute to sustainable development. Rio Tinto's focus on sustainable development (specifically on economic prosperity, social wellbeing, environmental stewardship and strong governance and integrity systems) provides the framework in which the business operates.

0.7.4 RIO TINTO VOLUNTARY AGREEMENTS

Rio Tinto also supports several international voluntary agreements including:

- Extractive Industries Transparency Initiative
- Global Sullivan Principles of Social Responsibility
- International Chamber of Commerce Charter for Sustainable Development
- International Council on Mining and Metals Sustainable Development Framework
- International Labour Organisation (ILO) Declaration on Fundamental Principles and Rights at Work
- International Labour Organisation Convention 169: Concerning Indigenous and Tribal Peoples in Independent Countries
- Maritime Labour Convention
- Neptune Declaration on seafarer wellbeing
- Organisation for Economic Co-Operation and Development (OECD) Convention on Combating Bribery of Foreign Public Officials in International Business Transactions
- OECD Guidelines for Multinational Enterprises
- OECD Guidelines for Responsible Supply Chains
- Transparency International – Business Principles for Countering Bribery
- United Nations Global Compact
- United Nations Universal Declaration of Human Rights
- United Nations Guiding Principles on Business and Human Rights
- Voluntary Principles on Security and Human Rights
- World Economic Forum – Global Corporate Citizenship Initiative CEO Statement
- World Economic Forum – Partnering Against Corruption Initiative (PACI) Principles for Countering Bribery

0.8 STAKEHOLDER CONSULTATION

0.8.1 LEGAL FRAMEWORK AND INTERNATIONAL STANDARDS

Public consultation requirements during the ESIA are set out in the Environmental Code and Arrete on the environmental assessment administrative procedure. According to these requirements, public consultation and stakeholder engagement are intrinsic and continuous elements of the ESIA process and a prerequisite to ESIA approval. The responsibility for stakeholder engagement rests with the Project Proponent. At the international level, the ESIA is developed in consideration of Equator Principles (iteration no.4) and other international standards and good practices including International Finance Corporation (IFC) PS 1, which provide specific guidance on stakeholder engagement and public consultation.

0.8.2 PAST CONSULTATION

Since the early 2010's, the Simandou Project has committed to undertaking a process of stakeholder consultation which delivers an inclusive and continuous dialogue between the company and those potentially affected by, and interested in, the Project at the national, regional, and local levels.

Successive consultations have provided opportunity to share information on the Project with local communities. During these consultations, local communities have expressed their concerns and made suggestions for better social integration of the Project.

Four key consultation periods have occurred over the past decade within the port extension project area:

- consultation conducted by Rio Tinto as part of an ESIA for the Simandou project in 2011-2012
- consultation conducted by WCS as part of the 2022 ESIA for their port project
- consultation conducted by Insuco for Rio Tinto in 2023 as part of the resettlement and compensation action plan (PARC) for the port extension project
- consultation conducted by Rio Tinto in October 2023 for the Iron Ore Handling and Export Port Facilities ESIA

0.8.3 STAKEHOLDER CONSULTATION METHODOLOGY

The Project consultation process commenced at the start of the ESIA process, building on previous consultations and existing plans, and has been an ongoing process as the Project develops. The public or community consultations were conducted in two rounds with project stakeholders. The first round of consultations was conducted from 15 - 17 January 2024 with communities from the port area. The second round of consultations was conducted from 12 - 14 March 2024 with the local communities from the port area.

Furthermore, institutional consultations were also conducted as part of the Simandou Marine Shipping ESIA between 12 August and 20 August 2024. Specifically, Rio Tinto Simfer organized institutional meetings with key institutions in charge of administrative oversight of marine environmental activities.

The objectives of these institutional consultations were the following:

- provide an overview of the Simandou Marine Shipping Project

- present Rio Tinto Simfer's approach to meet the requirements of the ESIA Draft Terms of Reference for the Project
- solicit feedback on the Project and the ESIA approach

Following the presentation was a Q&A session to capture and respond to participants' specific questions and recommendations.

0.8.4 CONSULTATION RESULTS

More than 209 people attended the first round of public or community consultations, which included three meetings at the following locations: Senguelen District, Kaback sub-prefecture, and Kakossa sub-prefecture.

More than 162 people attended the second round of public or community consultations, which included three meetings at the following locations: Senguelen District, Kaback sub-prefecture, and Kakossa sub-prefecture.

Concerns raised during this meeting included the following themes:

- Issues related to fishing
- Issues related to agriculture
- Issues related to employment and training
- Issues related to community development and infrastructure
- Issues related to health and quality of life

The results from the public consultations will be used by the Project proponent to add or adjust, as needed, the mitigation measures presented in the Environmental and Social Management Plan (ESMP).

Concerning the institutional consultation meetings a total of 24 participants participated in these various institutional consultations, representing the following institutional entities:

- Fluvio-Maritime Transport Regulatory Authority (Autorité de Régulation du Transport fluvio-maritime)
- Center for the Protection of the Marine Environment and Coastal Zones (Centre National de Protection du Milieu Marin et des Zones Côtières (CNPMMZC)
- Guinean Naval Company (Société Navale Guinéenne)
- CEREMAC-Guinea Research Center (formerly Centre d'Études et de Recherches Scientifiques de Conakry-Rogbané - CERESCOR)
- Merchant Marine and the Maritime Navigation Agency (Agence Nationale des Affaires Maritimes – ANAM)
- Guinean Office of National Parks and Wildlife Reserves (Office Guinéen des Parcs Nationaux et Réserves de Faunes - OGPNRF)
- National Center for Fisheries Sciences (Centre National des Sciences Halieutiques de Boussoura)

The institutional consultations have been documented in specific report, which is summarized in the ESIA and presents their key recommendations.

0.9 SUMMARY OF APPROACH ASSESSMENT

The Project qualifies as a Category A project, requiring a detailed ESIA. The overall approach to the ESIA is illustrated in the flow diagram in Figure 0-3. The methods described below were developed to meet this level of assessment and align with the Terms of Reference (ToR) for the Project.

The Project's Area of Influence (Aol) was defined to broadly screen and assess potential impacts on the social and biophysical environments. The Aol considers the location and scale of project activities, as well as the proximity of existing features on the landscape that are of social, cultural, biological, or economic value. The Aol is approximately 274,190 ha and represents the maximum spatial extent within which potential Project impacts are anticipated and evaluated. Figure 0-2 shows the Project Aol.

On the land side, the Aol is based on an approximate 1 km buffer from the coast and estuary. In addition, it includes the landside components of the port to facilitate an assessment of cumulative effects. The Aol includes villages potentially impacted by the marine components of the Project. Within the marine environment, the Aol is defined as follows:

- The northern limit is aligned with the southern limit of the Soumbouya River opening, including the proposed anchorage areas.
- The southern limit extends about 50 km south of the northern Aol limit to facilitate the assessment of potential cumulative effects associated with channel dredging and dredge waste disposal activities that are being permitted separately by WCS.
- The western limit is 24 nautical miles (about 45 km) from the coast and includes waters in which Guinea may exercise legal control concerning customs, fiscal, immigration or sanitary matters.

The temporal boundaries of the assessment were defined to reflect the construction (24 months; 2024-2026) and operation (approximately 45 years) phases of the Project. Following operations, full ownership of the port, including the newly expanded portion of the port, will transfer to the Republic of Guinea. Consequently, the impact assessment does not evaluate impacts associated with a decommissioning phase.

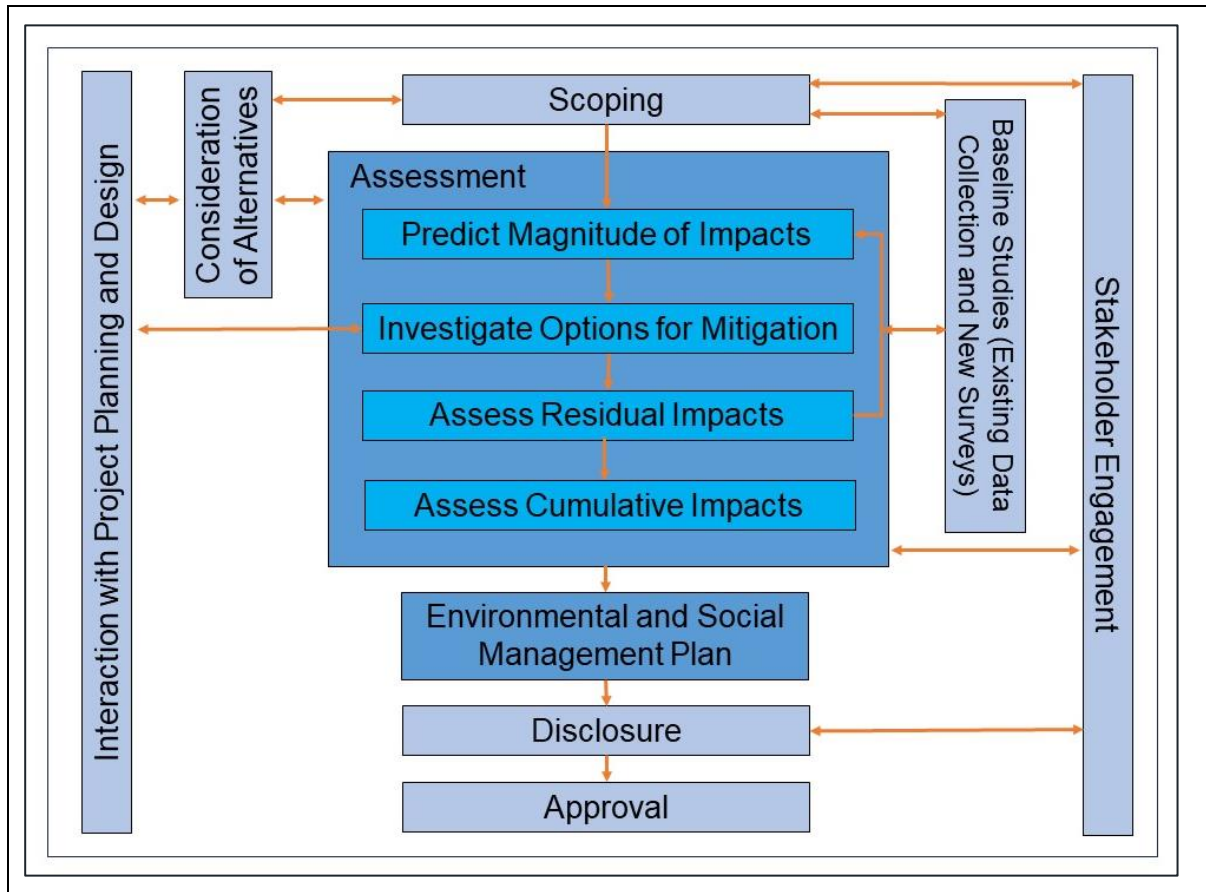


Figure 0-3 Assessment Approach

Baseline characterisation provides context for understanding the Project's potential impacts on environmental (physical and biological) and socio-economic 'receptors' and identifying appropriate mitigation. Considerable work has been invested in studying the Project's Aol between 2012-2023. This work has previously been summarised in several key documents, which the study team relied upon to support the characterisation of the existing conditions in the Project's Aol:

- Rio Tinto 2012 ESIA (Rio Tinto, 2012)
- WCS 2022 ESIA (WCS, 2022)
- Rio Tinto 2023 ESIA (Rio Tinto, 2023)
- Sylvatrop, Communities, Fishes and Fishery Study. Draft report prepared for Rio Tinto, February 2023 (Sylvatrop, 2023a)
- Sylvatrop maritime transport data collection report (Sylvatrop, 2024)
- Insuco draft report of November 2023 on the artisanal fishing activities in the Morebaya estuary (Insuco, 2023a)
- Insuco, 2023, Baseline Field Report on Cultural Heritage, Simandou Project – Port Area (Insuco, 2023)
- HR Wallingford 2016 Feasibility Study (HR Wallingford, 2016)

The impact assessment first considered the potential impacts in a scenario that considers mitigation embedded in the Project but does not consider additional mitigation that could be added to further

reduce impacts. Embedded mitigation refers to the avoidance and minimisation measures that are inherent within the Project design and summarised in the project description.

Next, mitigation was applied before estimating residual impacts, which were classified using a pre-defined set of criteria. Prediction confidence was characterized and where uncertainty was present, impacts were overestimated rather than underestimated in line with the precautionary principle.

The impact assessment focused on “receptors”, which were defined as aspects of the biophysical or social environments that may be affected by the Project and have scientific, economic, social, or cultural value. Specifically, social and biophysical receptors deemed to be moderately or highly sensitive to changes caused by the Project were evaluated in the impact assessment. The impact assessment results for each receptor are summarised in the following three subsections.

0.10 PHYSICAL IMPACTS

0.10.1 AIR QUALITY

The air quality baseline was established through a field monitoring survey completed in 2021 during both the wet and dry seasons. The results show that concentrations of air pollutants are lower than the Guinean and World Health Organization (WHO) standards. These findings reflect the low human activities in this area at the time of the survey. Concentrations of airborne particulate matter, however, exceed WHO guideline values but are below the Guinean standards. The area is susceptible to high concentrations of particulates generated from natural sources (sand, dried silt, or sea salt), as opposed to that generated by human activity.

Proposed Project construction activities associated with dredging activities, vessel movement and marine to land bulk fuel transfer operations have the potential to have direct negative impacts on air quality. During operations, direct negative impacts on air quality associated with dredging activities, vessel movement and marine to land bulk fuel transfer operations would continue. Transshipment of ore would also contribute to direct negative impacts on air quality.

Project activities will generate air emissions which will modify existing air quality parameters. After mitigation measures are implemented, the overall residual impact significance on air quality is considered minor during both construction and operations phases.

0.10.2 GREENHOUSE GAS (GHG) EMISSIONS

The most recent and reliable set of data, not impacted by the COVID-19 pandemic, are from 2019. The data reports that the Republic of Guinea was responsible for the emission of 47,520,000 t CO₂e¹, including land use change and forestry. With land use change and forestry excluded, the overall domestic emissions figure is 28,330,000 t CO₂e in 2019.

¹ These are production-based national emissions which includes all emissions from activities within the country's border and excludes land use change and emissions related to the production of imported goods and services.

Proposed Project construction activities associated with dredging activities, disposal of dredge spoils, vessel movement and marine to land bulk fuel transfer operations have the potential to contribute to GHG emissions. During operations, GHG emissions associated with those activities would continue. Transshipment of ore would also contribute to GHG emissions.

The Project will result in a total GHG impact of approximately 18,242 tCO₂e from the construction period (for 2 years) and 9,340,513 tCO₂e from the operation phase (for 45 years). Following IEMA guidance on assessing the significance of GHG emissions, the Project would be regarded as significant, with the level of significance being of moderate adverse impact.

0.10.3 GEOLOGY AND SEISMICITY

At the regional level, the Project is located at the western edge of the West-African Craton in an area covered with sediments from the Cenozoic era that overlie older metamorphic rocks of the craton dating back to the Archean era. At the local level, the Project is in the Morebaya River estuary and on the coast that is low-lying and fronted by a wide coastal shelf, which has formed in response to sea level fluctuations over the last 20,000 years. The nearshore environment is characterised by large quantities of mud that have accumulated in this zone in response to sea level rise since the end of the last glaciation.

The risk of a destructive earthquake (seismicity) is considered low with only a 2% chance of an earthquake occurring within the next 50 years.

Geology and seismicity are considered to have negligible sensitivity to the Project activities. Therefore, these receptors were not carried forward into the project impact assessment.

0.10.4 BATHYMETRY

The seabed within the Project Aol has shallow depths and gentle slopes. The 10 m bathymetric line is approximately 10 km from the coast and the isobaths are almost parallel to the coastline in these shallow waters. At depths greater than 10 m, bathymetric lines no longer run parallel to the coast, but are irregular. One of these irregularities is a trough, located opposite the mouth of the Morebaya River, with depths of up to 22 m.

The transition between the nearshore and the riverbed is characterized by the presence of a trough at the river mouth and depths are uniform between the river mouth and port facilities.

The project will directly impact local bathymetry at both the construction and operation phases through capital and maintenance dredging of the export wharf berth pocket, disposal of dredge spoils, and vessel movement. The direct impacts of both capital and maintenance dredging will increase local water depths within the export wharf berth pocket and immediate surroundings and decrease the depths at the offshore dredge spoil disposal site and its immediate surroundings.

After mitigation measures are implemented, the residual impact significance on bathymetry is considered minor during both construction and operations phases.

0.10.5 HYDROLOGY

The Project is located close to the mouth of the Morebaya River, which has a relatively small catchment area of approximately 450 km² that mainly includes the marshy lowlands within 25 km of the coast. The catchment land use is a mix of rural agricultural and urban developments in the upper reaches. Hydrology is considered to have low sensitivity to the Project activities. Therefore, this receptor was not carried forward into the project impact assessment.

0.10.6 METEOROLOGY AND OCEAN CONDITIONS

Climate

The offshore meteorological climate brings winds from the West to South-west quadrant throughout the year. Close to the coast, these winds are modulated by land-sea breezes and occasional storms during the wet season. The prevailing west/southwest winds are generally light throughout the year. The sea breeze (west) / land breeze (east-northeast) regime results in land breezes that occur during the day and sea breezes that occur in the evenings and night.

Climate is considered to have low sensitivity to the Project activities. Therefore, this receptor was not carried forward into the project impact assessment.

Winds

There exists a seasonality in the winds, the wet season (June to November) being dominated by stronger west / southwest (monsoon) winds than the other seasons. While the occurrence of west / southwest winds remains high during the dry season (December to May), there also exists a strong westerly sea breeze and east to northeast land breeze regime during the dry season.

Winds are considered to have negligible sensitivity to the Project activities. Therefore, this receptor was not carried forward into the project impact assessment.

Waves

The prevailing wave direction in the region is from the south and southwest in all seasons, although the wave heights vary seasonally. The largest and most energetic waves approach from the south and southwest in the wet season. In the dry season, wave directions are more variable and wave heights are generally smaller.

Changes in wave conditions and any associated impacts will only be fully realised upon completion of the construction activities. Accordingly, the Project could directly impact wave conditions during the operations phase through disposal of dredge spoils and vessel movements. Disposal of dredge spoil will decrease water depths and thus potentially affect wave conditions. Vessel movements will generate wakes with their own wave patterns, potentially affecting existing wave conditions. Should the changes in wave conditions in the offshore region be large enough, this could impact the sediment transport regimes and result in potential shoreline change due to changes in wave erosion and wave-driven longshore transport of sediments. Similarly, such changes in wave conditions have the potential

to affect traditional fishing activities (safe transit of fishing vessels and fishing operations). Vessel wakes also have the potential to erode riverbank and mangrove areas in the estuary.

The residual impact significance on waves was not evaluated because it can only be considered in relation with another environmental component that can be affected by the changes to wave conditions, such as the sediment transport regime, coastal erosion, or traditional fishing activities. The residual impact generated by changes in wave regime on these receptors, if any, are discussed in their respective section.

Tides and Water Levels

The water level variability over the continental shelf is predominantly tidal with only a limited contribution due to storm surges and little expected influence of the large-scale oceanic circulation beyond the shelf break. In the Morebaya River estuary, the water level variability is primarily due to tides. In the wet season, these tidal water levels in the estuary are strongly influenced by surface flows from the catchment area.

Tides in the region are semi-diurnal. The spring tidal range is approximately 3.5 m, while the neap tidal range is approximately 1.5 m. The tidal range is primarily determined by the offshore bathymetry.

Tides and water levels are considered to have low sensitivity to the Project activities. Therefore, these receptors were not carried forward into the project impact assessment.

Currents and Water Column Structure

The currents over the continental shelf in the Aol are typically tidally dominated. However, from approximately 10 km offshore and beyond (e.g., at the proposed anchorage sites), the extremes in current speeds are influenced by wind-driven currents associated with squalls. In inner shelf and coastal areas, the tidal current typically flows in a north-northeast direction during the flood tide and south-southwest during the ebb tide.

Current speed and direction in the Morebaya River estuary mouth and within the estuary itself can be variable and may be faster where tidal flows are restricted between sandbanks, which cause localised areas of scour and deposition along tidal river channels. The influence of freshwater flows becomes increasingly dominant upon moving upstream into the Morebaya River estuary, particularly during the wet season.

Changes in currents and water column structures will only be fully realised upon completion of the construction activities. Accordingly, the Project could directly impact currents and water column structures during the operations phase through the disposal of dredge spoil and the presence of the export wharf berth pocket. Disposal of dredge spoil will modify bottom topography thus potentially influencing local seabed currents. The presence of the export wharf berth pocket could result in very localised changes in currents in its immediate vicinity.

The residual impact significance on currents and water column structure was not evaluated because it can only be considered in relation with another environmental component that can be affected by the changes to sediment characteristics. For example, changes in currents could influence sediment transport regime, shoreline change and fishing activities. The residual impact generated by changes

in currents and water column structure on these receptors, if any, are discussed in their respective section.

Sediment Transport Regime

The sediment load within the Morebaya River comprises mainly fine sediments (fine sands, mud, and clay) rather than coarse sand or gravel. Water quality data for the Morebaya River show high suspended sediment concentrations consistent with mud or clay-laden water. Sandbanks in the Morebaya River estuary, including the sand bars on the southern margin of the estuary mouth, are highly dynamic and migrate actively due to variations in tidal and river flows. The size and locations of the sandbanks vary, but their orientation remains consistent with the dominant tidal flows at the mouth of the Morebaya River.

Some changes in sediment transport could potentially occur due to long-term changes in the bathymetry at the dredge spoil disposal site and in the immediate vicinity of the export wharf berth pocket. Other non-project-related changes in the sediment transport regime will be present due to anthropogenic factors such as changes in sediment loads from the river in the region, climate change factors such as sea level rise, winds, currents and waves, and changes in shoreline (use, protection, etc.). The resultant changes in sediment transport regimes due to non-project-related changes are expected to exceed those associated with the Project.

The residual impact significance on sediment load was not evaluated because it can only be considered in relation with another environmental component that can be affected by the changes to sediment characteristics. For example, changes in sediment transport could impact benthic and intertidal habitat and aquatic life. The residual impact generated by changes in sediment transport on these receptors, if any, are discussed in their respective section.

Coastline Morphology and Shoreline Change

The shoreline in the AoI is influenced by different key drivers such as offshore Atlantic Ocean swell, fluvial supply of sediment from the river, human intervention, and long-term sea level rise. In addition to these, large-scale hydro-morphic dynamics immediately adjacent to the coastline such as changing foreshore or mangrove dynamics as well as dynamic responses related to the sedimentary processes that vary along the coastline can have an impact on the shoreline.

Recent assessments based on a review of aerial photographs covering the period of 1967 to 2023 showed an increasing erosion rate since 1967 and that these rates may increase in the future. It was also determined that this phenomenon is mainly associated with natural phenomenon including active coastal dynamics and gradual sea level rise (over the past 56 years). Anthropogenic activities in the Ile Kabak area are also affecting erosion and flooding occurrence for this section of the coastline.

The Project could impact directly coastal morphology and coastline change during the operation phase through the disposal of dredge spoil on a specific site. This could modify bottom topography, thus potentially modifying the wave climate and sediment dynamics inshore of the dredge spoil disposal site. The quantities of material to be deposited on the dredge spoil site from capital dredging is moderate as are the predicted changes in water depth (approximately 8.0 cm to 20.0 cm) on the dredge spill disposal site. Therefore, this is unlikely to influence the wave climate and therefore, unlikely to precipitate any shoreline change.

The residual impact significance on coastline morphology and shoreline change was not evaluated as it can only be considered in relation with another environmental component that can be affected by the change to coastline morphology. For example, changes in coastal morphology could impact fishing activities or coastal villages. The residual impact generated by changes in coastal morphology on these receptors, if any, are discussed in their respective section.

0.10.7 WATER QUALITY AND SEDIMENT QUALITY

Water Quality

Water quality results for the Morebaya River show that the pH ranges between 7 and 8 with a mean temperature of 30°C. Water quality sampling during the dry season detected high levels of pathogenic faecal bacteria and of some heavy metals (copper, cadmium, zinc, arsenic, silver, and chromium; lesser levels of mercury, lead, nickel, and selenium). Water quality sampling during the wet season detected relatively high concentrations of aluminium and iron; however, concentrations for metals were all below the Canadian Council of Ministers of the Environment (CCME) and threshold levels for protection of saltwater life developed under the EU Water Framework Directive priority substance programme.

Water quality results for samples collected from coastal and offshore waters between the Soumbouya River in the north and the Forécariah River in the south indicate a mean pH of 7.9, a mean temperature of 28.2°C, highly variable turbidity in the water column, and very good, dissolved oxygen. High concentrations of some heavy metals (silver, cadmium, total chromium, copper, molybdenum, and zinc; lesser levels of arsenic and nickel) were detected.

The Project can directly impact water quality during both the construction and operation phases through the release of contaminants (metals, hydrocarbons), organic material and nutrients from suspended fines during dredging operations and dredge spoil disposal, accidental spills or leaks of contaminants during vessel movements, vessel servicing, and marine to land bulk fuel transfer operations, and release of ore into the water during transshipment operations.

After mitigation measures are implemented, the residual impact significance on water quality is considered minor during the construction phase. During operations, the residual impact significance is considered minor during dredging and disposal of spoils, minor during fuel transfer operations and transshipment operations, and moderate during vessel movement and vessel servicing.

The residual impact significance on water turbidity is considered minor during the construction phase due to capital dredging activities. During operations, the residual impact significance on water turbidity is considered minor during maintenance dredging activities and negligible during vessel movements.

Sediment Quality

Sediment sampling surveys were undertaken between 2008 and 2012, and in 2021. The 2021 sediment sampling survey focussed more closely on the Project AoI. When compared with results from other studies in Africa (Mediterranean, Guinean Gulf, and Indian Ocean), arsenic is the only metal with higher concentrations. The source of potential arsenic contamination is unknown; however, arsenic was used during the twentieth century as an insecticide on fruit trees and in other agricultural practices in the area, which may have contributed to the presence of arsenic in sediments. Other than this potential source, there are no major anthropogenic sources in the area. As such, the higher

arsenic concentrations likely represent natural baseline mineralogy. The sediment quality in the Morebaya River is generally good.

The project can directly impact sediment quality during both construction and operation phase during capital and maintenance dredging, dredge spoil disposal, vessel movements, vessel servicing, marine to land bulk fuel transfer operations, and transshipment of iron ore. In addition to the above potential impacts, changes in sediment quality may have indirect impacts on benthic aquatic life.

After mitigation measures are implemented, the residual impact significance on sediment quality is considered minor during the construction phase. During operations, the residual impact significance is considered minor during disposal of dredge spoils, transshipment of iron ore, and fuel transfer operations. The residual impact significance is considered moderate during vessel movements and servicing.

0.10.8 AMBIENT NOISE

The ambient noise baseline was established through a field survey completed in 2021 at two monitoring locations associated with local villages. Ambient noise levels were found to be within normal levels for daytime and slightly above expectations during nighttime, although noise sources during the night were generally from natural sources (wind, insects, and other animals).

The project will directly impact ambient noise levels during both construction and operations phase during capital and maintenance dredging, vessel movements, marine to land bulk fuel transfer operations, and transshipment of iron ore.

After mitigation measures are implemented, the residual impact significance on ambient noise is considered moderate during both the construction and operations phases.

0.10.9 UNDERWATER NOISE

Existing underwater noise was established for the Rio Tinto ESIA project in 2012 and for the WCS Port in 2021. Results of field measurements and simulations show that the underwater coastal study area is quiet. The Morebaya River is relatively free from commercial shipping noise. The continental shelf that extends from the port site acts as a barrier to offshore noise travelling into the river, particularly for noise generated by maritime traffic. In addition, the soft bottom and sandy banks of the river help to reduce underwater noise propagation.

The project will directly impact underwater noise levels during both construction and operations phase during capital and maintenance dredging, dredge spoil disposal, and vessel movements.

After mitigation measures are implemented, the residual impact significance on underwater noise is considered negligible during both the construction and operations phases.

0.11 BIODIVERSITY

0.11.1 PROTECTED AREAS

The Project and its Aol do not overlap with any protected areas with national or international legal status. The closest legally protected area is the Scarcies River Estuary Marine Protected Area, which is about 8 km south of the Aol in Sierra Leone. Two Ramsar sites representing wetlands of international importance, Ile Blanche and Konkouré, are about 15 km and 30 km north of the Aol, respectively. Konkouré overlaps with the Konkouré Key Biodiversity Area (KBA), which extends to within about 20 km of the Aol.

0.11.2 HABITATS

The Project Aol consists of marine habitats (98.2%), coastal habitats (0.5%), and terrestrial habitats (1.3%). Natural and modified habitats are both present in the Aol. Natural habitats are areas containing viable assemblages of plants and animals that are largely of native origin, and where human activity has not altered the area's species composition or primary ecological functions. Modified habitats are areas that have been substantially altered by human activity and/or where a large proportion of the plant and/or animal species are non-native in origin. Natural and modified habitats exist along a continuum ranging from relatively pristine natural habitats to intensely managed or converted modified habitats. All marine habitats in the Aol were considered natural, whereas terrestrial habitats occur in a matrix of natural and modified habitats. Overall, the Aol consists of 98.7% natural habitat and 1.3% modified habitat.

Marine Habitat

Marine habitat consists of inshore and estuarine habitat, and offshore neritic habitat. Inshore and estuarine habitat refers to areas of continuous shallow water (< 20 m) along the coastline or within the estuary of the Morebaya River and its connected channels. It covers 69.4% of the Project Aol. Inshore and estuarine habitat are further classified into four habitats based on sediment texture: muddy substrate, sandy substrate, rocky reef, and undesignated soft substrate. Inshore and estuarine habitats are considered critical habitat because they support seven Critical Habitat Qualifying (CHQ) fish species.

Proposed Project construction activities have the potential to negatively impact inshore and estuarine habitats through habitat loss, reduced habitat quality, and habitat fragmentation from dredging activities, disposal of dredge spoil, vessel movement and servicing, marine to land bulk fuel transfer operations, and the presence of vessels. Aquatic invertebrates (i.e., plankton and macroinvertebrates) within inshore and estuarine habitats will be negatively affected by sensory disturbances and increased mortality risk from these same activities. During operations, inshore and estuarine habitats would continue to be negatively affected by habitat loss, reduced habitat quality, and habitat fragmentation.

After mitigation measures are implemented, the most important residual impact to inshore and estuarine habitats during construction is the direct loss of 10.8 ha of benthic inshore and estuarine habitats due to dredging of the wharf berthing pocket and the direct disturbance of up to 1,595.3 ha of benthic habitat from deposition of dredge spoil. The total impacted area is 1,606.1 ha, representing 0.8%

of inshore and estuarine habitat in the Project Aol. These residual impacts will continue through the operations phase. The residual impact significance is considered minor during both construction and operations phases.

Offshore neritic habitat refers to areas of continuous deep water (> 20 m) above the continental shelf. This habitat extends from the intertidal zone to the edge of the continental shelf. Water depths in offshore neritic habitat in the Aol vary between -20 m to -53 m. It covers 28.7% of the Project Aol. Offshore neritic habitat is further classified into two habitat types, offshore pelagic and offshore benthic habitat. Offshore neritic habitats are considered critical habitat because they support seven CHQ fish species.

Offshore neritic habitat is not expected to be impacted during the construction phase. Dredging activities for the wharf berthing pocket and the dredge disposal site are located outside of this habitat type. During operations, offshore neritic habitats could be negatively affected by habitat loss, reduced habitat quality, and habitat fragmentation from disposal of dredge spoil, vessel movement and servicing, the presence of vessels and vessel workers, and transshipment of iron ore. Aquatic invertebrates inhabiting offshore neritic habitats could be negatively affected by sensory disturbances and increased mortality risk from these same activities.

After mitigation measures are implemented, the residual impact significance on offshore neritic habitat is considered negligible during construction and minor during operations.

Coastal Habitat

Coastal habitat consists of mangroves, sandy habitat, mudflats, and salt pans. Mangroves cover 0.2% of the Project Aol and are distributed along the shorefront of the Guinean coast and within the Morebaya estuary and connected channels. They can extend up to several tens of kilometres inland, and in the case of the Morebaya, scattered mangroves are observed up to 45 km from the estuary mouth.

Proposed Project activities will not remove mangroves. Construction activities have the potential to negatively impact mangroves through reduced habitat quality associated with dredging activities, disposal of dredge spoil, vessel movement and servicing, and marine-to-land bulk fuel transfer operations. Indirect mangrove degradation may occur from altered water quality, accidental chemical contamination (leaks and spills), changes to sediment transport, or introduction of invasive species. These potential impacts will continue through the operations phase.

After mitigation measures are implemented, the residual impact significance on mangroves is considered minor in both construction and operations phases.

Sandy habitat includes areas of bare sand, such as beaches and littoral sandbars. They also include grass-covered sandy areas, which are typically arranged as linear formation (sandbars). These sandbars alternate with mudflats and together these features constitute the seafront plains between the mouths of estuaries. Sandy habitat covers <0.1% of the Project Aol.

Proposed Project activities will not remove sandy habitat. Construction activities have the potential to indirectly degrade sandy habitat through reduced habitat quality associated with dredging activities, vessel movement and servicing, and marine-to-land bulk fuel transfer operations. These potential impacts will continue through the operations phase.

After mitigation measures are implemented, the residual impact significance on sandy habitat is considered minor during both construction and operations phases.

Mudflats are a type of non-vegetated wetland concentrated in the intertidal zone formed by input of mud and silt transported by tidal waters. They are rich in organic matter, cover 0.2% of the Project Aol and are mostly distributed along the coastline or water channels in close association with mangroves.

Salt pans are flat areas covered in salt and other minerals, forming because of the evaporation of salt water. They cover 0.1% of the Project Aol and include bare salt pans and grassy salt pans. Both types of formations tend to be distributed along the edges of mangroves.

Mud flats and salt pans are both considered to have low sensitivity to the Project activities. Therefore, these habitat types were not carried forward into the project impact assessment.

Terrestrial Habitat

Terrestrial habitat contains both natural and modified habitats. Natural terrestrial habitat in the Project Aol includes granite inselbergs, relic forest and savannas. Granite inselbergs are granite outcrops forming small hills on the landscape. There is one named granite inselberg site in the Project Aol, known as the Moofanyi Inselberg. Covering <0.1% of the Project Aol, the Moofanyi Inselberg is located just north of the WCS port facilities.

Relic forest covers <0.1% of the Project Aol. This habitat type includes relic forest patches and the Kakiwondi relic forest patch. Relic forest patches are small patches of lowland evergreen forest often at the head of watercourses. These wooded areas are remnant patches from a forest that was once denser and cleared for agriculture purposes. The Kakiwondi relic forest patch is a horseshoe-shaped forest patch adjacent to the Moofanyi Inselberg, approximately 450 m north of the WCS port facilities.

Three types of savanna occur in the Project Aol: treed savanna, shrub savanna, and grass savanna. Savanna habitats cover <0.1% of the Project Aol.

Modified terrestrial habitats within the Project Aol include community woodlands, flooded grasslands, palm plantations, rice field, and young fallow. Modified terrestrial habitats cover 1.3% of the project Aol.

Terrestrial habitats are considered to have negligible sensitivity to the Project activities. Therefore, these habitat types were not carried forward into the project impact assessment.

0.11.3 AQUATIC LIFE

The Project Aol has been confirmed to support at least 331 species of aquatic vertebrate fauna. Additionally, 53 species of macroinvertebrates and 117 species of plankton have been confirmed in the Project Aol. Most species with the potential to occur in the Project Aol are common species with stable populations; however, several rare and threatened species were either recorded, or have the potential to occur, within the Project Aol.

Plankton

Phytoplankton biomass in the estuary was lower compared to the open sea. Biomass was generally higher in the wet season compared to the dry season. Phytoplankton was dominated by diatoms in the Morebaya estuary, coastal water, and the open sea.

Zooplankton diversity and biomass in the Morebaya estuary was similar in the wet and dry seasons. The zooplankton biomass and density does not show any difference between coastal and open ocean water.

As indicators of aquatic ecosystem health, impacts to plankton are best understood via changes in their physical environment. Therefore, Project impacts on plankton were evaluated in conjunction with inshore and estuarine habitats, and with offshore neritic habitats.

Macroinvertebrates

Macroinvertebrates were surveyed within the Morebaya River, its tributaries, and the open ocean of the Project Aol. A diverse macroinvertebrate community is present at baseline. The macroinvertebrate community in the Project Aol is considered healthy with a high level of species richness, diversity, and abundance.

As indicators of aquatic ecosystem health, impacts to invertebrates are best understood via changes in their physical environment. Therefore, Project impacts on macroinvertebrates were evaluated in conjunction with inshore and estuarine habitats, and with offshore neritic habitats.

Marine Mammals

Four mammals have the potential to occur in the estuarine habitat in the Project Aol. Three of these species, including the African clawless otter, Therese's Shrew, and the Spotted-necked Otter are not threatened. The fourth species, the West African Manatee, is classified as Vulnerable by the International Union for the Conservation of Nature (IUCN).

West African Manatee occurs along the coast of West Africa, including Guinea. It is listed in Appendix II of CITES (Convention on International Trade in Endangered Species of Fauna and Flora) and is a fully protected species based on Guinea's national wildlife legislation (Republic of Guinea, 2018). It is found in coastal marine waters, brackish estuaries, and adjacent rivers. Manatees are known to use mangrove habitat in Guinea and are confirmed present within the Project Aol during both the wet season and dry season. Anecdotal information from local villagers suggests that West African manatees are frequently observed in mangrove habitats surrounding rivers further south of the Project Aol and feeding in mangrove channels, particularly during the wet season. They have also been reported in the main channel of the Morebaya River, although further upstream than the Project Aol.

Twenty-two cetaceans have also been identified as potentially present in the Project Aol. Five of these species have been recorded in the Project Aol, including Minke Whale, Bryde's Whale, Humpback Whale, Bottlenose Dolphin, and Long-beaked Common Dolphin. All confirmed species are considered Least Concern according to the IUCN Red List of Species. Of the remaining 17 species potentially present, three are classified as threatened, including one Vulnerable (Sperm Whale), one Endangered (Sei Whale) and one Critically Endangered (Atlantic Humpback Dolphin).

Proposed Project construction activities have the potential to negatively impact marine mammals through habitat loss, reduced habitat quality, sensory disturbances, and habitat fragmentation from dredging activities, disposal of dredge spoil, vessel movement and servicing, marine to land bulk fuel transfer operations, and the presence of vessels. Marine mammals will also be at increased mortality risk from dredging, and vessel movement. During operations, marine mammals would continue to be negatively affected by habitat loss, reduced habitat quality, sensory disturbance, and habitat fragmentation. Marine mammals will also continue to be at increased mortality risk.

After mitigation measures are implemented, the residual impact significance on marine mammals is considered minor during construction phase and moderate during operations.

Fish

Multiple fish surveys were conducted in the Morebaya River, the estuary, and coastal and open waters of the Project Aol. According to the fish surveys conducted, and the literature, 624 fish species have the potential to occur within the Project Aol, of which 132 have been confirmed to be present in the Project Aol.

In the estuary, the seven most common species caught during baseline surveys were Bonga, Bobo croaker, Atlantic mudskipper, Giant African threadfin, West African ilisha, Atlantic bumper, and Large head hairtail.

Among the fish species confirmed to be present in the Project Aol, 18 are threatened according to the IUCN, of which 11 are Vulnerable (Gray Triggerfish, Bluespotted Triggerfish, Bull Shark, Daisy Stingray, Royal Threadfin, Bluefish, Law Croaker, West African Goatfish, Milk Shark, Madeiran Sardinella, Ocellate Torpedo), three are Endangered (Oceanic Manta Ray, Cassava Croaker, Shortfin Mako), and four are Critically Endangered (Blackchin Guitarfish, Lusitanian Cownose Ray, Common Guitarfish, Scalloped Hammerhead).

An additional 74 fish species potentially present within the Project Aol have been identified as threatened by the IUCN, of which 46 species are considered likely to occur according to their habitat preferences and depth ranges.

Proposed Project construction activities have the potential to result in direct and indirect negative impacts on fish and fish habitat within the Morebaya River as well as inshore and estuarine habitats. The presence of vessels during the construction phase could also create levels of sensory disturbances and potentially increase mortality risk for fish. During operations, fish and fish habitat would continue to be potentially negatively affected by dredging activities.

After mitigation measures are implemented, the residual impact significance is considered moderate for CHQ fish species and minor for non-threatened fish species. The residual impact significance ranking applies to both the construction and operations phases.

Reptiles

A total of 10 aquatic reptiles could potentially occur within the Project Aol, of which eight were recorded present during field surveys. Aquatic reptiles include crocodiles, marine and freshwater turtles, and freshwater snakes. Of the 10 aquatic reptiles, nine are classified as threatened by the IUCN, which

includes three species of crocodiles, five species of marine turtles, and one species of freshwater turtle.

The three species of crocodiles potentially present in the Project Aol are West African Crocodile (vulnerable), African Dwarf Crocodile (vulnerable), and Slender-snouted Crocodile (critically endangered). West African Crocodile was frequently observed during all crocodile surveys within and near the Project Aol. African Dwarf Crocodile is considered rare in the Project Aol, and Slender-snouted Crocodile has not been confirmed present.

Five of the eight existing species of marine turtles worldwide are present in Guinean coastal waters. No sea turtles were observed during field investigations; however, interviews with local communities and local fishermen confirmed species presence. All five species are threatened according to the IUCN; three species are Vulnerable (Olive Ridley turtle, Loggerhead turtle, Leatherback turtle), one is Endangered (Green turtle), and one is Critically Endangered (Hawksbill turtle). The most frequently documented turtle by local fishermen is the Olive Ridley Turtle followed by the Hawksbill Turtle and the Green Turtle. In Guinea, the Leatherback turtle is recognized as threatened and is protected under Guinean law. In addition, marine turtles are protected by the Convention for the Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (UNEP Abidjan Convention and CITES).

One species of freshwater turtle, the African Softshell turtle, has the potential to occur in the Project Aol. It is listed as Vulnerable and ranges widely in Africa and the eastern Mediterranean, including the coastal regions of West Africa from about Senegal to Angola. This species has not been observed in the Project Aol during surveys.

Proposed Project construction activities have the potential to negatively impact aquatic reptiles through reduced habitat quality, habitat fragmentation, sensory disturbances, and increased mortality from dredging activities, disposal of dredge spoil, vessel movement and servicing, marine to land bulk fuel transfer operations, and the presence of vessels. During operations, aquatic reptiles would continue to be negatively affected by reduced habitat quality, reduced habitat fragmentation, sensory disturbance, and increased mortality.

After mitigation measures are implemented, the residual impact significance on aquatic reptiles is considered minor during both the construction and operations phases.

Birds

A total of 190 bird species potentially occur in the Project Aol. Of these, field surveys confirmed the presence of 186 bird species. Five species that have either been confirmed or may occur in the Project Aol are classified as globally threatened by the IUCN, including three Vulnerable (Leach's Storm-petrel, Desertas Petrel, Black-legged Kittiwake) and two Endangered (Zino's Petrel, Timneh Parrot). Of these species, the Timneh Parrot is the only bird species that was confirmed present in the Project Aol during field surveys.

Birds are considered to have low sensitivity to the Project activities. Therefore, they were not carried forward into the project impact assessment.

0.11.4 ECOSYSTEM SERVICES

Ecosystem services in the Project Aol provide important services to local populations, including provisioning, regulating, cultural, and supporting services. Ecosystem services were used to identify Priority Ecosystem Services (PES). One ecosystem service was assessed as a PES: Fishing and Fishery Resource. As a PES, this receptor is considered to have high sensitivity to changes from the Project. Project impacts on fishing and fishery resources are summarized in Section 0.9.3 (Fish) and in Section 0.10.4 (Economic Activities and Livelihood).

0.12 SOCIAL

0.12.1 ADMINISTRATIVE DIVISIONS AND GOVERNANCE

The terrestrial portion of the Project Aol is in the administrative region of Kindia, headed by a Governor. This region is divided into five prefectures: Kindia, Dubreka, Forécariah, Telimele, and Coyah. The terrestrial portion of the Project Aol is in Forécariah prefecture.

The Forécariah prefecture covers approximately 4,500 km². It is governed by a prefect. The Forécariah prefecture includes six sub-prefectures which are also rural communes. The terrestrial portion of the Project Aol extends over Maferinyah, Kaback, and Kakossa sub-prefectures.

The sub-prefecture of Maferinyah, which covers an area of 500 km², comprises 11 districts, 45 rural sectors, and 112 villages, including Senguelen, where the project site is located.

The continental waters and the marine area of the Project Aol are part of Guinean territorial waters and contiguous waters. They are under the responsibility of a centralized national institutional body, the Maritime Prefecture (*Préfecture maritime*), abbreviated Premargui. The Premargui is headed by the Maritime Prefect (*Préfet maritime*). The Maritime Prefect is the State's Representative at sea. The Maritime Prefect is a General Officer of the Navy (*Officier Général de la Marine*) or a high-rank civil servant.

Administrative Divisions and Governance are considered to have negligible sensitivity to the Project activities. Therefore, this component was not carried forward into the project impact assessment.

0.12.2 LAND AND WATER USE

The Project Aol and its extension encompasses a relatively large maritime area and a much smaller terrestrial area. In the terrestrial area, the land use is characterized by a mix of villages and hamlets, agricultural lands, natural areas, and the port area. The maritime area is used for transportation and fishing.

The Project Aol and its extension include 36 villages and hamlets, of which 19 settlements (11 villages and 8 hamlets) are within the Aol boundary and 17 settlements (16 villages or hamlets and 1 village) lie within its extension.

Watercourses are an important geographical feature of the Project Aol. Artisanal fishing occurs in the Morebaya River, its tributaries and at sea. Annual flooding of the rice paddies (both freshwater and seawater) also provides conditions to support important rice cultivation.

The Morebaya River and its tributaries are also used for transportation of goods and people. River transportation is often used for transportation from one village to the other by local communities. Additionally, the river mouth is a navigation corridor for artisanal fishermen operating at sea along with transportation to Conakry.

In addition to artisanal fishing, industrial fishing could potentially occur in the Project Aol. Industrial fishing, especially by foreign vessels, is prevalent in Guinea. It includes legal and illegal practices in the Guinean waters.

The inland area of the Project Aol and its extension is used as rice fields, vegetable gardens, mixed plantations, and oil palms of all ages of maturity. Natural areas consist of mangroves and rocky outcrops plus grasslands. There are large areas of fallow / uncultivated land within this area.

Proposed Project construction activities have the potential to negatively impact land and water use directly through loss of fishing grounds, disturbance of maritime navigation routes, and increase of hazardous navigation conditions and risk of accidents. Construction activities also have the potential to negatively impact land and water use indirectly through loss of lands and land-based assets, reduction of fishery resources, and water use conflicts. Potential Project impacts will continue during the operations phase.

After mitigation measures are implemented, the residual impact significance on land and water use is considered moderate during both the construction and operations phases.

0.12.3 POPULATION PROFILE AND SOCIAL ORGANIZATION

Three sub-prefectures are included in the Project Aol: Kaback, Kakossa, and Maferinyah. These sub-prefectures are part of the Forécariah prefecture within the Kindia region. The population within the Project Aol is concentrated in the Morebaya estuary.

The coastal area of the Forécariah prefecture is one of the most populated in Guinea, with an average population density of about 260 inhabitants / km². This density is high compared to other areas in Guinea. In 2021, the population of the Forécariah prefecture was close to 300,000 inhabitants. The 2021 population for the three subprefectures were:

- Kakossa: about 12,000 people
- Kaback: about 24,000 people
- Maferinyah: over 60,000 people

Various ethnic groups are present in the Project Aol. Eleven major ethnic groups of different origins have been identified: Soussou, Konianke, Malinke, Temene, Peulh, Kissi, Baga, Eboulom, Meinde, Mandenya and Bambara. Soussou, however, constitute the main ethnic group (86% of households in the area).

Proposed Project construction activities have the potential to negatively impact population and social organization directly through an increase of hazardous navigation conditions and risk of accidents, and through a risk of major accidental events in local communities. Construction activities also have the potential to negatively impact population and social organization indirectly through water use conflicts. Potential Project impacts will continue during the operations phase.

Fire and explosion are particularly hazardous to the health of workers and neighbouring communities. These accidents present risks of injury and death. In addition, explosions and fires cause noxious

atmospheric emissions with an impact that can extend beyond the communities located in the immediate port vicinity.

The villages in the Project Aol that can be directly impacted in the event of an explosion or fire are Bamboukhoun and Senguelen. These villages are located within the 500 m safety perimeter defined for infrastructure at risk of explosion or fire.

After mitigation measures are implemented, the residual impact significance on population profile and social organization is considered minor during both the construction and operations phases.

0.12.4 ECONOMIC ACTIVITIES AND LIVELIHOOD

The main economic activity and source of revenue of the coastal communities in the Project Aol is artisanal fishing and associated activities. For the communities further inland, agriculture is the main economic activity and means of subsistence. One main trend in the Project Aol is the combination of a main economic activity with other activities. While 92% of the household heads indicated that fishing is their main economic activity, survey data indicates that only a small minority of fishermen (5.9%) devote themselves entirely to fishing. Most of them either combine fishing with agriculture and small animal breeding or combine these activities with others such as trade.

Agricultural activities include rice growing, vegetable gardening, arboriculture, and livestock rearing. Rice growing and vegetable gardening are the two dominant agricultural activities. Surveys conducted in 2022 indicated that close to 45% of the surveyed households grow rice and 40% grow vegetables. Livestock farming is conducted by over 10% of the surveyed households. It is mainly a small-scale family activity, with medium-sized ruminants (goats, sheep) and poultry. Arboriculture is conducted by less than 5% of the surveyed households.

Other economic activities and means of subsistence within the Project Aol include trade, salt farming, artisanal crafting and other services, hunting and gathering, and salaried employment.

Proposed Project construction activities have the potential to positively impact economic activities and livelihood directly through development of business opportunities related to vessel servicing. National-level businesses (e.g. national suppliers, national traders, national transporters, or other national-level service providers, etc.) are likely to benefit, as demand for almost all types of goods and services will increase significantly.

However, at the local village level, construction activities also have the potential to negatively impact economic activities and livelihood indirectly through loss of lands and land-based assets, loss of fishing grounds, changes to fishery resources, disturbance of local communities' maritime navigation routes, loss of agricultural revenues and other land-based revenues, loss of artisanal fishing revenues, sense of exclusion from the benefits of the Project, and increase in women poverty. Potential Project impacts will continue during the operations phase.

After mitigation measures are implemented, the residual impact significance on economic activities and livelihood is considered moderate during both the construction and operations phases.

0.12.5 SOCIAL INFRASTRUCTURE AND PUBLIC SERVICES

Within the Project Aol, there are four health posts (Kaleiyre, Matakang, Menyire and Senguelen) and a private clinic in Senguelen. Additionally, Maferinyah, 30 km from Senguelen along an unpaved road, has an upgraded health centre and a national training and research centre for rural medicine. The inhabitants of the Project Aol do not have access to the minimum healthcare services set out under the WHO standard. Diagnosis in the healthcare facilities can lead to cases being referred to a better-equipped facility. Travel distances, however, can be considerable, particularly in the rainy season and with no means of transport other than motorcycle cabs. The health centres have motorcycles, and there are no ambulances.

Within the Project Aol, the top three means of land transportation are walking, motorcycling, and cycling. Maritime transport of goods and passengers from local communities is important in the Project Aol, given the numerous rivers and tributaries, and lack of bridges in the area.

Surveys conducted in 2023 showed that 97% of village households within the Project Aol use water collected and stored during the rainy season in large containers or from wells. It is used for cooking, hand washing, laundry, and dishwashing. Drinking water for most households is generally purchased in water sachets from local shops. Villages within the Project Aol have a drinking water supply shortage.

An analysis of the diseases suffered by the local population showed that the most common disease is malaria. Furthermore, two other dominant diseases, salmonellosis, and helminthiasis, are spread by drinking contaminated water. In many cases, poor water quality is the result of pollution of the water sources by the local population itself, caused by a lack of hygiene and sanitation.

The social infrastructures and public services in the Project Aol are deficient, notably the schools, the healthcare services, the law enforcement services, the roads, the water access, sanitation, waste, etc. However, the Project vessels' workers will be accommodated onboard the vessels or in workers camps, and they will not be using the social infrastructure and public services in the Project Aol. Therefore, the social infrastructure and public services are considered to have low sensitivity to the Project activities. They were not carried forward into the project impact assessment.

0.12.6 WOMEN AND VULNERABLE GROUPS

Women living in the Project Aol, particularly in fishing communities, are more economically empowered relative to women in other rural areas of Guinea. Their role in fish trading allows women in fishing villages to take a more participatory role in the monetary economy than their counterparts in agricultural villages and has helped give them a level of economic independence. There are several factors, however, that clearly demonstrate the vulnerable status of women such as:

- Traditionally women do not inherit or own land although the national Guinean legislation promotes equality and allows for land ownership by women.
- Women often play a limited role in decision-making at household, community, and national levels.
- Women generally have low levels of social development when measured in terms of literacy, educational attainment, or general health conditions.
- The HIV/AIDS rate is higher amongst women than men.
- Access to education is highly unequal, with only 44% of children attending school being girls in the Project Aol. The primary school completion rate for girls is also significantly lower (45.7%) compared to boys (62.7%). Additionally, the proportion of women with access to secondary

education is notably low (5.4%) compared to men (24%). Gender-based disparities in education can limit opportunities for women and contribute to early marriages and motherhood. The elderly are also recognised as being vulnerable. Lack of access to modern healthcare for the elderly may be an important factor in terms of their vulnerability.

The notion of "youth" in Guinea encompasses not only age but also social status and autonomy. A young person's social status and independence are closely tied to specific milestones, such as reaching adulthood (around 20-25 years), inheriting land, and marriage. Until these milestones are achieved, young individuals typically remain dependent on their parents. The period between the end of childhood and the ability to set up their own households can be characterized by personal and social instability. During this phase, young individuals may lack access to resources and face uncertainties about their future. Engaging in economic activities during this transitional period can be challenging. The primary option for many young people may be rice-growing, which may not provide sufficient income or opportunities for economic independence.

Proposed Project construction activities have the potential to negatively impact women and vulnerable groups indirectly through loss of land and land-based assets, loss of fishing grounds, changes to fishery resources, loss of agricultural revenues and other land-based revenues (e.g. salt farming), loss of artisanal fisheries revenues, and an increase in women poverty. Potential Project impacts will continue during the operations phase.

After mitigation measures are implemented, the residual impact significance on women and vulnerable groups is considered moderate during both the construction and operations phases.

0.12.7 HUMAN RIGHTS AND LABOUR CONDITIONS

Human Rights

Guinea has committed itself to protecting Human Rights both through legislation as well as through regional and international conventions or standards which the country has adopted. In addition to the legislation in Guinea and international conventions, Rio Tinto has also an extensive range of policies that outline its commitment to respect human rights. They are presented in detail in Section 7.3 of the ESIA.

Recognised rights in Guinea are as follows:

- the right to take part in government
- the right to an education
- the right to marriage and family
- the right to a fair trial
- the right to land ownership
- the right to strike

The following rights are protected through additional Guinean legislation:

- the right to childhood
- the right to work in a just and favourable environment
- the right to social security

Land Rights

Rural land in Guinea is typically organized by reference to customary (i.e. traditional) laws. Customary laws in Guinea generally recognize the family, lineage or community that first founded a village and exploited the surrounding land as the ultimate owner of agricultural land. As time passes, the village's land is subdivided, and new families are granted the right to farm specific plots of land and to pass on this right to their children. Village land that is not exploited by a particular family or household can be used by all community members for the purpose of hunting or picking wild fruits, leaves, or crops.

Occupational Safety and Health Obligations

The Labour Code contains general provisions regarding occupational safety and health. No orders, however, have been issued regarding the specific safety requirements for certain occupations or for certain methods of work called for in the Labour Code.

Employers are required to develop facilities and regulate workflow to preserve the health and safety of workers. They are responsible for providing employees with personal protective equipment at no cost. All workers, foreign and migrant, have the right to refuse to work in unsafe conditions without penalty. Despite legal protection against working in unsafe conditions, many workers fear retaliation and do not exercise their right to refuse to work under unsafe conditions.

The low level of skills and training in health and safety issues means that risks of accident and injury are high. In the construction sector, the prevalence of unskilled workers recruited on a short-term basis and the lack of training means that accidents and injuries are common.

Protection Against Discrimination

There are few protections against discrimination in the Guinean Labour Code and it is generally not in line with international standards on the prohibition of discrimination in employment. Among the main potential grounds for discrimination covered by international standards and not included in Guinean legislation are sexual orientation, disability, HIV/AIDS status, age, social origin, and membership of a minority group.

Child Labour

The law prohibits child labour in the formal sector. The minimum age for employment is 16. Exceptions allow children to work at age 12 as apprentices for light work in such sectors as domestic service and agriculture, and at 14 for other work. According to the Report on Trafficking in Persons in Guinea published by the US State Department in 2022, Guinea is a transit country for West African children subjected to forced labour in artisanal gold mining throughout the region. A small number of girls from West African countries migrate to Guinea, where traffickers exploit them in domestic service, street vending, and to a lesser extent sex trafficking.

According to the Report on Trafficking in Persons in Guinea published by the US State Department in 2022, traffickers exploited men, women, and children in forced labour in agriculture. Traffickers exploited boys in forced labour in begging, mining, fishing, and on coffee, cashew, and cocoa

plantations. Some government entities and NGOs alleged that forced labour was most prevalent in the informal mining sector.

Labour Conditions

Guinean legislation regarding working hours (40 hours per week, except for drivers and security guards), overtime (8 hours per week / 100 hours per year), and paid leave (30 working days per year) is generally in line with international standards. The statutory minimum wage is GNF 550,000.00 (64 \$US) per month.

Proposed Project construction activities have the potential to negatively impact labour conditions directly through an increase in work accidents. Construction activities also have the potential to negatively impact labour conditions indirectly through an increase of hazardous navigation conditions and risks of accidents, and water use conflicts. Potential Project impacts will continue during the operations phase.

After mitigation measures are implemented, the residual impact significance on human rights and labour conditions is considered minor during both the construction and operations phases.

0.12.8 CULTURAL HERITAGE

Archaeological Cultural Heritage (ACH)

The intertidal / riverine / marine areas were not surveyed during the 2023 fieldwork. Due to the lack of baseline data for the intertidal / riverine zone, the archaeological potential, particularly for waterlogged material and that relating to riverine/maritime activity and trade, is considered high.

The United Kingdom Hydrographic Office (UKHO) Marine Wrecks and Obstructions data indicates five potential shipwrecks (ACH resources) recorded within the Project Aol; all are to the south of the proposed dredge spoil disposal site. The wreck site of the SS Criton, a steam-powered cargo ship which sank in 1941, is recorded approximately 9.6 km to the south of the proposed dredge spoil disposal site. It is recorded on the UKHO dataset as a 'dangerous wreck' presumably due to the potential presence of live ammunition, although its existence is considered 'doubtful'. No evidence of the wreck was detected during the 2011 marine survey.

Another 'dangerous wreck' is recorded approximately 4.2 km to the south of the proposed dredge spoil disposal site. According to the UKHO, the existence of this wreck is also considered 'doubtful'. It was first detected in 1990 and most recently in 2012. No evidence of the wreck was detected during the 2011 marine survey. Three further shipwrecks are recorded in the southern extent of the marine Aol. Three of these are noted as 'dangerous', and two are also 'doubtful'.

Based on the proximity of the Project Aol to Conakry and busy shipping lanes, there is potential for other, as yet unrecorded, maritime archaeological remains of (unknown) cultural heritage value and significance to be present within the Project Aol.

Proposed Project construction activities have the potential to negatively impact ACH resources directly or indirectly through dredging of the berthing area at the wharf, disposal of dredge spoils, vessel movement, vessel servicing, presence of vessels and navigation aids, and marine to land bulk fuel transfer operations. Potential Project impacts will continue during the operations phase.

After mitigation measures are implemented, the residual impact significance on ACH resources is considered minor during the construction phase assuming an average cultural heritage value of moderate for ACH resources. The residual impact significance increases to moderate if previously unknown ACH resources of higher cultural heritage value are disturbed. The residual impact significance for ACH resources for the operations phase is same as for the construction phase.

Living Cultural Heritage (LCH)

A total of 28 Living Cultural Heritage (LCH) resources were recorded within the Project Aol. LCH resources include five genie sites, ten cemeteries and 13 religious buildings. There is potential for additional unidentified features of cultural and sacred importance to exist throughout the Project Aol.

Proposed Project construction activities have the potential to negatively impact LCH resources indirectly through vessel movement, vessel servicing, marine to land bulk fuel transfer operations, presence of vessels and navigation aids, and presence of an exclusion safety zone. Potential Project impacts will continue during the operations phase.

Indirect impacts to LCH resources could also occur through a change in the environmental setting of individual sites, through increased noise, air quality and visual impacts associated with construction phase activities (e.g. the presence and movement of vessels and light from navigation aids).

After mitigation measures are implemented, the residual impact significance on LCH resources is considered minor during the construction phase assuming an average cultural heritage value of moderate for LCH resources. The residual impact significance increases to moderate if LCH resources of higher cultural heritage value are disturbed. The residual impact significance for LCH resources for the operations phase is same as for the construction phase.

Intangible Cultural Heritage (ICH)

During the 2023 community consultations, no specific occurrences of ICH connected directly with the Morebaya River were identified. However, as an important economic practice, particularly within the coastal and riverine regions of the Project Aol, fishing and the collection of shellfish such as mangrove oysters, may be interlinked with existing cultural practice. There are several religious beliefs, rituals and deities associated with the act of fishing and seafaring, as well as the natural landscapes encountered including the ocean, the rivers, rocky shorelines or outcrops and specific animals found within them. Consequently, there is potential for riverine or coastal places of sacred / cultural importance to fishing and farming communities, associated with ceremonial activities (and taboo), yet to be fully identified throughout the marine-side Aol. These may relate to legends, stories and oral histories connected to the local marine and riverine environment.

Proposed Project construction activities have the potential to negatively impact ICH resources indirectly through vessel movement, vessel servicing, marine-to-land bulk fuel transfer operations, the presence of vessels and navigation aids, and the presence of an exclusion safety zone. Potential Project impacts will continue during the operations phase.

After mitigation measures are implemented, the residual impact significance on ICH resources is considered minor during both the construction and operations phases.

0.12.9 LANDSCAPE

The Project is located from 5 km inland along the Morebaya River to 60 km out to sea. Both comprise waterbodies with their immediate terrestrial surroundings. The Morebaya River is sinuous and relatively narrow with banks that are occupied by vegetation of variable density and height. It is a busy navigation route. The riverine landscape has a natural character and small-scale features.

The seacoast landscape merges with the vast expanse of the Atlantic Ocean and the important offshore navigation routes of the Guinean coast. Its terrestrial surrounding comprises large areas of mud flats and rice fields. The seacoast landscape has a natural character and grand scale features.

The Project Aol includes inhabited strips of mostly rural land about 1 km wide on each side of the Morebaya River and along the seacoast. Settlements are scattered along this rural landscape. Most of these settlements are fishing villages or hamlets and the other villages, which are located further inland, are farming villages.

Proposed Project construction activities have the potential to negatively impact landscape directly through change in the environmental setting and/or access to culturally important sites, and loss of landscape character. Potential Project impacts will continue during the operations phase.

After mitigation measures are implemented, the residual impact significance on landscape is considered negligible during both the construction and operations phases.

0.13 CLIMATE CHANGE RESILIENCE

A Preliminary Climate Change Risk Assessment (PCCRA) has been conducted for the Project, as required by Equator Principles 4, to better understand the anticipated consequences of climate change on the people, the economy, and the environment associated with this Project. The general process followed for the PCCRA is based on the ISO 31000 Risk Management Standards which are used worldwide and are well recognized in the scientific community. The PCCRA adopts a phased approach to establish the climate context through identification, analysis, and evaluation of the Project's key climate and weather-related vulnerabilities and risk. Recommendations are made to develop any further control and adaptation measures that may reduce those risks.

The Project's level of exposure to the climate hazard (i.e., the likelihood of change) was determined based on historical weather data where available, a literature review of climate hazards, and an analysis of scenarios for projected future climates. Results of the analysis indicate that there is an increase in temperatures expected, as well as an increase in extreme rainfall events, a decrease in annual precipitation, an increase in drought, and an increase in coastal hazards (due to an increase in sea surface temperatures and sea level rise).

Potential impacts were identified for the Project and then mapped to climate hazards to determine initial Project risks. Risks were evaluated based on the likelihood of the risk occurring, the severity of the potential impact, and the planned control measures. Initially, the vulnerability assessment was undertaken for a total of 19 potential impacts during the construction and operation phase of the Project, based on sensitivity and adaptive capacity. Exposure (likelihood of change) to various climate hazards was assessed for the Project. Using vulnerability and exposure ratings, the likelihood associated with each of the potential impacts was evaluated. The likelihood of potential impacts and

severity scores were further used for the risk assessment. No impacts with a risk rating of high or very high were identified. As such, no additional control measures are required.

0.14 CUMULATIVE IMPACTS

Cumulative effects will occur between the Project and several other planned or reasonably foreseeable projects and activities that may affect similar physical, biological, and social receptors. A two-step approach to cumulative effects assessment was used. In the first step, the Project was combined with projects linked to the overall Simandou development: WCS Navigation Channel Dredging, WCS Marine Shipping, Rio Tinto Simfer and WCS Wharf Construction. These projects are collectively referred to as the joint shipping project. In the second step, effects from other reasonably foreseeable projects were assessed qualitatively. This step considered the Rio Tinto Simfer and WCS On Land Port, Matakang Deep Water Project, Konta Port, World Bank Integrated Artisanal Fishery Project, World Bank-funded Aquaculture Facility Project, and the Conakry Oil Depot Project.

Table 0-1 presents a summary of the Project residual impact significance ratings as described in Sections 0.8 through 0.10, the assessed cumulative effects significance rating of the joint shipping project, and a qualitative description of cumulative effects of other planned or reasonably foreseeable projects.

Table 0-1 Cumulative Effects Assessment

Receptor	Project Residual Impact Significance Rating	Joint Shipping Project Cumulative Effects Significance Rating	Other Planned and Reasonably Foreseeable Project Cumulative Effects
Air Quality	Construction: Minor Operations: Minor	Construction: Minor Operations: Moderate	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
GHG Emissions	Construction: Moderate Operations: Moderate	Construction: Moderate Operations: Moderate	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Bathymetry	Construction: Minor Operations: Minor	Construction: Moderate Operations: Minor to Moderate (activity-dependent)	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
General Water Quality	Construction: Minor Operations: Minor to Moderate (activity-dependent)	Construction: Minor Operations: Minor	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Salinity	Not Assessed	Operations: Moderate	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Turbidity and Suspended Sediments	Construction: Minor Operations: Negligible to Minor (activity-dependent)	Construction: Moderate Operations: Negligible to Moderate (activity-dependent)	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.

Receptor	Project Residual Impact Significance Rating	Joint Shipping Project Cumulative Effects Significance Rating	Other Planned and Reasonably Foreseeable Project Cumulative Effects
Sediment Quality	Construction: Minor Operations: Minor to Moderate (activity-dependent)	Construction: Minor Operations: Minor to Moderate (activity-dependent)	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Ambient Noise	Construction: Moderate Operations: Moderate	Construction: Moderate Operations: Moderate	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Underwater Noise	Construction: Negligible Operations: Negligible	Construction: Negligible Operations: Negligible	Projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Inshore and Estuarine Habitats	Construction: Minor Operations: Minor	Construction: Moderate Operations: Moderate	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Inshore and Estuarine Habitat	Construction: Minor Operations: Minor	Construction: Moderate Operations: Moderate	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Offshore Neritic Habitats	Construction: Negligible Operations: Minor	Construction: Minor Operations: Minor	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.

Receptor	Project Residual Impact Significance Rating	Joint Shipping Project Cumulative Effects Significance Rating	Other Planned and Reasonably Foreseeable Project Cumulative Effects
Mangroves	Construction: Minor Operations: Minor	Construction: Minor Operations: Minor	Cumulative effects will increase, and projects are anticipated to change cumulative effects significance rating for the joint shipping project. from minor to moderate.
Sandy Habitats	Construction: Minor Operations: Minor	Construction: Minor Operations: Minor	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Marine Mammals	Construction: Minor Operations: Moderate	Construction: Moderate Operations: Moderate	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Aquatic Reptiles	Construction: Minor Operations: Minor	Construction: Moderate Operations: Moderate	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Fish	Construction: Minor / Moderate (species dependent) Operations: Minor / Moderate (species dependent)	Construction: Moderate / Major (species dependent) Operations: Moderate / Major (species dependent)	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.

Receptor	Project Residual Impact Significance Rating	Joint Shipping Project Cumulative Effects Significance Rating	Other Planned and Reasonably Foreseeable Project Cumulative Effects
Ecosystem Services	<p>Effects for fishery resources are expected to be the same as those summarized for fish and for economic activities and livelihood.</p> <p>Effects for water regulation and control are expected to be the same as those summarized for mangroves.</p> <p>Effects for sacred components are expected to be the same as those summarized for cultural heritage.</p>	<p>Effects for fishery resources are expected to be the same as those summarized for fish and for economic activities and livelihood.</p> <p>Effects for water regulation and control are expected to be the same as those summarized for mangroves.</p> <p>Effects for sacred components are expected to be the same as those summarized for cultural heritage.</p>	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Water and Land Use	<p>Construction: Moderate</p> <p>Operations: Moderate</p>	<p>Construction: Moderate</p> <p>Operations: Moderate</p>	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Population and Social Organization	<p>Construction: Minor</p> <p>Operations: Minor</p>	<p>Construction: Minor</p> <p>Operations: Minor</p>	Cumulative effects will increase, and projects are anticipated to change cumulative effects significance rating for the joint shipping project. from minor to moderate.
Economic Activities and Livelihoods	<p>Construction: Moderate</p> <p>Operations: Moderate</p>	<p>Construction: Moderate</p> <p>Operations: Moderate</p>	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.

Receptor	Project Residual Impact Significance Rating	Joint Shipping Project Cumulative Effects Significance Rating	Other Planned and Reasonably Foreseeable Project Cumulative Effects
Social Infrastructure and Public Services	Construction: None Operations: None	Construction: Minor Operations: Minor	Cumulative effects will increase, and projects are anticipated to change cumulative effects significance rating for the joint shipping project. from minor to moderate.
Women and Vulnerable Groups	Construction: Moderate Operations: Moderate	Construction: Moderate Operations: Moderate	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Human Rights and Labour Conditions	Construction: Minor Operations: Minor	Construction: Minor Operations: Minor	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Cultural Heritage	Construction: Minor Operations: Minor	Construction: Minor to Moderate (ACH/ICH: Minor; LCH: Moderate) Operations: Minor to Moderate (ACH/ICH: Minor; LCH: Moderate)	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.
Landscape	Construction: Negligible Operations: Negligible	Construction: Minor Operations: Minor	Cumulative effects will increase but projects not anticipated to change cumulative effects significance rating for the joint shipping project.

0.15 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This ESIA has been prepared for Rio Tinto Simfer in accordance with the requirements of the Guinean regulations on Environmental Impact Assessment (Order A/2023/1595/MEDD/CAB/SGG – Portant procédure administrative D'évaluations, or ESIA Administrative Procedure, which amends Order A/2022/1646/MEDD/CAB/SGG); and, with the requirements of the International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (IFC, 2023). A key requirement of both is the development of an Environmental and Social Management Plan (ESMP) for managing the impacts arising from the Simandou Marine Shipping Project. It describes the measures identified in the ESIA that will be implemented to avoid or mitigate the adverse impacts of the Project and enhance its positive impacts.

The scope of this ESMP covers the design, construction, and operation phases of the Project. As described in the Project Approach, the ESIA does not evaluate impacts associated with the decommissioning, closure, or rehabilitation of the Project as full ownership of the port is anticipated to transfer to the Republic of Guinea, once the anticipated mine operations cease.

The ESMP will be delivered through the Project's Environmental and Social Management System (ESMS) that will operate under the overarching framework of Rio Tinto's Management System (MS) Standard and Communities and Social Performance (CSP) Standard. These standards reflect international good practice and are consistent with the requirements of ISO 14001:2015.

The ESMP includes several Project-specific management plans to mitigate the Project's impacts and the cumulative impacts of the joint shipping project. The management plans include:

- Physical Environment Management Plans:
 - Air Quality, Noise and Vibration
 - Underwater Noise
 - Environmental Emergency Response
 - Greenhouse Gases and Energy Efficiency Action Plan
 - Non-Mineral Waste
 - Water
 - Dredging and Spoils Disposal
 - Coastal
- Biodiversity Management Plans:
 - Biodiversity
 - Mangroves
 - Invasive Species
 - Marine Mammal and Sea Turtle
 - Bushmeat and Wildlife Trade
 - Biodiversity Action Plan
 - Biodiversity Offset Strategy
 - Biodiversity Monitoring and Evaluation
- Social Management Plans:
 - Community Health and Safety
 - Occupational Health and Safety
 - Community Safety and Security
 - Marine Traffic
 - Fisheries

- Cultural Heritage
- Grievance Mechanism
- Human Rights Management Framework
- Stakeholder Engagement Plan
- Resettlement and Compensation Action Plan

0.16 NAUTICAL RISK STUDY

0.16.1 CONTEXT

A Nautical Risk Study (NRS) for the combined "marine" and "shipping" activities linked to the operation of both mining concessions, Rio Tinto Simfer and Winning Consortium Simandou (WCS) have been prepared as part of the Project. The study covered only the operational phase of the facilities.

The main objectives of the NRS were to:

- identify accidental risks associated with different types of vessels (e.g., transport of hazardous materials, fishing) in the new port facility
- assess the risk during berthing and manoeuvring within the port
- assess the risk in the event of uncontrolled drifting of a ship in the area
- assess the risk in the event of grounding of a vessel operating in the area
- assess the level of risk in relation to the criteria of the risk acceptance matrix, quantifying the probability of the main events of concern and assessing their severity
- define mitigation measures to reduce the level of risk, if necessary

0.16.2 RESULTS OF THE NRS

The NRS analysis covered 24 scenarios identified as being of significant criticality. These scenarios were studied according to possible hazards and associated to potential targets (human, environmental, or material). In all, 80 hazardous phenomena were studied in the 24 scenarios. Of these, 37 hazardous phenomena had human consequences, 21 hazardous phenomena had environmental consequences and all 80 hazardous phenomena had economic consequences. A significant proportion of these consequences are of high criticality, requiring technical or organizational risk reduction measures. This criticality is referred to as "As Low As Reasonably Practicable" (ALARP). This risk reduction is achieved through technical and organizational mitigation measures.

The risk management presented in the NRS is based on the best practices inherent in maritime traffic. The resulting recommended measures can be grouped into two categories:

- A structured framework for navigation, including a control centre for all maritime operations and preparation for navigation to ensure good manoeuvrability of the various vessels:
 - Selection of pilots competent in this environment (good knowledge of the river).
 - Precise monitoring of weather conditions.
 - Selection of tugs adapted to extreme situations.
- Accident preparedness:
 - Ensuring the availability of emergency equipment to limit the environmental consequences of potential collisions. This equipment must be capable of containing, recovering and storing the pollutants emitted, or in cases where recovery is impossible, ensuring effective dispersion that minimizes environmental impact.

- By setting up an internal operations plan detailing the procedures to be followed in the event of a ship accident. These procedures must be tested and adapted on an ongoing basis to any changes to the site.

The nautical risk study also highlighted the sensitivity of fishing activities and the risk of vessels colliding with fishing boats. It will therefore be necessary to actively monitor fishing vessel traffic, particularly in the channel, and to manage marine traffic risks in the area.



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