1 Introduction

1.1 The Purpose of this Document

This document forms part of the report on the Social and Environmental Impact Assessment (SEIA) \(^{(1)}\) of the Simandou Project in the Republic of Guinea. It is one of a series of volumes addressing different components of the Project and relates specifically to the Simandou Mine. The complete SEIA Report comprises five volumes as follows:

- Volume I – Simandou Mine;
- Volume II – Simandou Railway;
- Volume III – Simandou Port;
- Volume IV – Project-Wide Impact Assessment; and

An SEIA is a study into the effects or impacts \(^{(2)}\) of construction, operation and closure of a project on the physical, natural, cultural, social and socio-economic environment. This volume of the SEIA Report describes the Simandou Mine and its positive and negative impacts on the environment and society, and explains how the mine has been designed and how it will be implemented to minimise its adverse impacts and maximise its benefits.

The SEIA has been commissioned by Simfer SA (referred to from here as Simfer) and has been undertaken by a multi-national team led by Environmental Resources Management (ERM) working in close coordination with the wider project team including the engineering team. Details of the SEIA team are presented in Annex 1A: The SEIA Team.

1.2 Overview of the Simandou Project

The Simandou Project is a world-scale mining project comprising:

- the Simandou Mine, an open pit iron ore mine in the Simandou Range in southeastern Guinea, approximately 600 km south east from the Guinean coast and 400 km north east from the Liberian coast, with an anticipated peak production of around 95 million tonnes per annum (mtpa);
- the Simandou Railway, a trans-Guinean railway of approximately 670 km to transport the ore from the mine to the Guinean coast;
- the Simandou Port, a new port located south of Conakry in Forécariah prefecture; and
- various associated developments providing utilities and infrastructure to the Project including construction facilities, supply of materials, power generation, water, access and accommodation.

The first ore shipment is anticipated in 2015, with production expected to increase over the following years to reach around 95 mtpa of saleable ore.

The Simandou Project is being developed by Simfer, a Guinean-registered company. Simfer is a member of the international mining group Rio Tinto, and holds a mining concession to explore for and mine iron ore in the southern part of the Simandou Range. At the time of this report Simfer is owned 5% by the International Finance Corporation (IFC) and 95% by a company owned jointly by the Rio Tinto Group (53%) and Aluminium Corporation of China (Chalco) (47%). IFC is the commercial investment arm of the World Bank.

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\(^{(1)}\) The term SEIA is used in this report in preference to the more conventional term EIA (Environmental Impact Assessment), to make clear that the study includes a full assessment of social as well as environmental issues.

\(^{(2)}\) The terms "effect" and "impact" are used synonymously in the assessment.
In April 2011, the Republic of Guinea and Simfer signed a Settlement Agreement pursuant to which a modified mining concession covering the southern part of the Simandou range was issued to Simfer. The Settlement Agreement also provides inter alia, for the separation of the mining activities from the principal infrastructure activities (the railway and port). The mine will continue to be held by Simfer (also referred to as “MineCo”) and an infrastructure company (“InfraCo”) will be established between the Republic of Guinea and Simfer, to develop and operate the rail and port infrastructure, initially through Simfer or its nominees within the Rio Tinto Group.

The mining resource is located in the southern part of the Simandou Range and covers deposits at Pic de Fon and Ouéléba. Each deposit is approximately 6-8 kilometres in length, 1-1.5 kilometres wide and extends around 500 m below the surface. An overview of the Simandou Project location is illustrated in Figure 1.1 and a brief summary of its history is provided below.

**A Brief Project History**

Reconnaissance fieldwork was carried out at Simandou by the French in the 1950s and by the Japanese in the 1970s. Despite these investigations showing the high potential of the resource, the deposit was not developed owing to its remoteness from transportation corridors and the focus on the other deposits closer to available infrastructure.

Rio Tinto was first introduced to the Project by the Government of the Republic of Guinea in 1996. A Basic Convention (Convention de base) between the Republic of Guinea and Rio Tinto was signed in November 2002 and ratified by law in 2003, setting out all the terms and conditions applicable to the Project. In April 2011 Rio Tinto and the Republic of Guinea entered into a Settlement Agreement (Accord transactionnel) under which inter alia, the parties agreed to modify the Basic Convention on several points (1) and pursuant to which a modified mining concession covering Blocks III and IV and part of Block II of the Simandou Range was issued to Simfer.

Simfer has undertaken a lengthy programme of work to assess the viability of the Simandou Project. This work has included an exploration programme, engineering studies and social and environmental baseline and impact studies.

As part of the exploration programme, geological work started in 1997 and has continued through six levels of study: Target Testing (TT); Conceptual Study (CS); Order of Magnitude study (OoM); Feasibility Study (FS); Value Enhancement Study (VES) and Preliminary Engineering Assessment (PEA). The PEA is now complete and the Project is moving forward into Definitive Engineering (DE) and Detailed Design (DD). As the Project has progressed through these studies, confidence in the mineral resource and the economic viability of the Project has increased. More than 1 300 drill holes and over 260 000 metres of drilling have been completed to determine the location, size and shape of the iron ore resources as well as their metallurgical and mineralogical specifications and therefore their suitability for sale in the export iron ore market.

The evolving programme of social and environmental baseline studies started with site visits, scoping studies and preliminary baseline studies and was followed with more detailed baseline studies for the mine, rail and port components of the Project. Further details of these are provided in Section 1.4.3.

The exploration programme has required the construction of some early infrastructure. To date, activities have involved the setting up of three camps: Canga East on the eastern side of the range, which is the major project base camp for exploration along the Pic de Fon ore body; Ouéléba camp on the summit for project activities along the Ouéléba ore body; and an office and accommodation base in Kérouané. The Project also has a corporate office and logistics base in Conakry, as well as various facilities in Beyla at Prodabek House. In May 1998, a preliminary SEIA was conducted for the exploration programme and in September of the same year an SEIA was produced for the construction of an access road. In 2007, a further SEIA was produced by SNC-Lavalin Environment for preliminary works, including the expansion of the existing Canga East camp, a new access road to Ouéléba, and development of the laterite gravel-covered airstrip near the town of Beyla.

(1) An amendment to the Basic Convention has been proposed by Simfer to the Republic of Guinea to incorporate the terms agreed under the Settlement Agreement.
1.3 Policy, Administrative and Regulatory Context

1.3.1 Overview

Major projects can require Environmental Impact Assessments (EIA) for a variety of reasons: typically either as a requirement associated with permitting under national law, or with procedures associated with approval of project financing by international institutions. In this case an impact assessment has been undertaken to satisfy the requirements of both Guinean legislation and the standards set by the IFC as investors in the Simandou Project. It is also corporate policy within the Rio Tinto Group that all new projects should be subject to a comprehensive process of impact assessment during planning and design.

In addition to the requirements relating to impact assessment, the Simandou Project will also comply with all other applicable Guinean legislation including international conventions to which Guinea is a signatory. The Project will also seek to meet IFC standards and guidance regarding environmental and social performance.

An overview of relevant legislation is provided below and further details of these Guinean and international impact assessment requirements are provided in a review of legal requirements and standards relevant to the Project presented in Annex 1C: Legislation, Standards and Administrative Framework.

1.3.2 The Guinean EIA Regulations

The relevant EIA legislation in Guinea is set out in the Code for the Protection and Development of the Environment (Ordonnance N°045/PRG/87 du 28 Mai 1987, modifiée par l’Ordonnance N°022/PRG/89 du 10 Mars 1989, portant Code de la protection et de la mise en valeur de l’environnement) also known as the Environment Code. The Environment Code sets out the fundamental legal principles to ensure the protection of environmental resources and the human environment. Article 82 of Title V of the Environment Code imposes an obligation on developers of projects which are likely to have a significant impact on the environment, to conduct an Environmental Impact Assessment and submit this to the Minister Delegate for the Environment, Water and Forests prior to the construction of the project. This study will enable the Minister to evaluate the direct and indirect impacts of the project on the ecological equilibrium of the environment of Guinea, the quality of life of the people and the protection of the environment.

A Presidential Decree issued under Article 82 of the Environment Code codifying Environmental Impact Assessments (Décret 199/PRG/SGG/89 du 8 novembre 1989 codifiant les études d’impact sur l’environnement - the EIA Decree) sets out the projects which by virtue of their size or nature require an Environmental Impact Assessment (EIA). The projects for which an impact assessment is required are listed in the Annex to the EIA Decree and include:

- 2°: works for the construction and management of ports;
- 4°: mines; and
- 5°: construction of railways.

An EIA is therefore required for all the main components of the Simandou Project, including the mine. According to the Decree the EIA should be inserted into the usual regulatory procedures applying to the project as a complement to other required technical, economic and financial studies, so that environmental considerations are integrated into the administrative decisions regarding the project (Article 6). The Minister Delegate for the Environment, Water and Forests is therefore required to issue a decision on the EIA as part of the procedure for grant of consent by the Ministry of Mines and Geology allowing Simfer to proceed with the Project.


The first step in preparation of an EIA is for the Minister Delegate for the Environment, Water and Forests to approve a project-specific Terms of Reference for the EIA. The Terms of Reference provide details on the project to be assessed, the issues to be addressed, the environmental experts who will conduct the EIA and
the steps to be followed. The SEIA Report for the Simandou Project has been prepared in accordance with Terms of Reference which were approved by the Minister Delegate for the Environment, Water and Forests on 12 October 2011. A copy of these Terms of Reference, the minutes of the meeting at which they were presented to the Ministry, and the letter of approval are presented in Annex 1B: SEIA Terms of Reference.

Other relevant Guinean legislation and international conventions relate to:

- land use and building controls;
- soil, water, air and noise pollution;
- waste management;
- biodiversity, habitats, fauna and flora;
- marine environment, fisheries and maritime affairs;
- protection of other natural resources including forests;
- cultural heritage;
- community health, safety and security;
- human rights and discrimination;
- workers’ rights and conditions of employment; and
- occupational health and safety.

These are reviewed in Annex 1C: Legislation, Standards and Administrative Framework and referenced as appropriate in later chapters of the report.

1.3.3 IFC Requirements

As the IFC is a partner in the Simandou Project the assessment is also being undertaken in accordance with the IFC’s Policy on Social and Environmental Sustainability (1) and the IFC Performance Standard PS1 on Assessment and Management of Environmental and Social Risks and Impacts (2). As noted in Section 1.1 the requirement for EIA under Guinean law has been broadened to provide a Social and Environmental Impact Assessment (SEIA) which meets these international requirements.

Relevant IFC standards (3) and guidelines include the following.

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
- Performance Standard 3: Resource Efficiency and Pollution Prevention.
- Performance Standard 4: Community Health, Safety and Security.
- Performance Standard 5: Land Acquisition and Involuntary Resettlement.
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- Performance Standard 8: Cultural Heritage.
- IFC Access to Information Policy.

(2) The assessment has been conducted in line with the revised IFC Performance Standards released in January 2012.
(3) IFC Performance Standard 7 on Indigenous Peoples will not apply as there are no identified indigenous peoples (as defined in PS7) in the Project area.
• IFC Environmental, Health and Safety (EHS) Guidelines (1), including:
  • general EHS Guidelines;
  • sectoral EHS Guidelines relating to Mining, Railways, Roads, Ports, Power and Waste Management and Construction Materials Extraction; and
  • various supporting Good Practice Notes and Handbooks.

1.3.4 Rio Tinto Corporate Policies and Standards

The framework for Rio Tinto’s corporate policies is provided by Rio Tinto’s global code of business conduct; a copy of this is provided in Annex 1D: “The way we work” – Rio Tinto’s Global Code of Business Conduct. This framework sets out Rio Tinto’s continuing 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.

Under this framework Rio Tinto policies relevant to the assessment include:

• Sustainable Development Policy
  (http://www.riotinto.com/documents/ReportsPublications/Sustainable_development_policy.pdf);

• Environmental Policy and Standards;
  (http://www.riotinto.com/documents/ReportsPublications/Employment_policy.pdf);

• Communities Policy and Standards;
  (http://www.riotinto.com/documents/Communities_standard.pdf);

• Human Rights Policy and Guidance;
  (http://www.riotinto.com/documents/ReportsPublications/corpPub_HumanRights.pdf);

• Health Policy;
  (http://www.riotinto.com/documents/ReportsPublications/Occ_health_policy.pdf);

• Corporate Health and Safety Policy and Standards;
  (http://www.riotinto.com/documents/ReportsPublications/Safety_policy.pdf);

• Climate Position Statement;
  (http://www.riotinto.com/documents/ReportsPublications/corpPub_ClimatePosition.pdf);

• Closure Standard; October 2010;
  (http://www.riotinto.com/documents/ReportsPublications/ClosureStandard.pdf); and

• Health, Safety, Environment and Quality Management System Standard.

A full list and access to all the relevant documents is available on the worldwide web (2).

Rio Tinto also supports a number of international voluntary agreements including:

• Extractive Industries Transparency Initiative;

(1) Available at http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines
(2) Available at http://www.riotinto.com/library/3608_policies.asp
- 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;
- Kimberley Process;
- OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions;
- OECD Guidelines for Multinational Enterprises;
- Transparency International – Business Principles for Countering Bribery;
- United Nations Global Compact;
- United Nations Universal Declaration of Human Rights;
- Voluntary Principles on Security and Human Rights;
- World Economic Forum – Global Corporate Citizenship Initiative CEO Statement; and

Together these national, international and corporate standards establish a set of requirements which the Simandou Project will be designed and operated to meet to protect the environment and society from adverse impacts and maximise the benefits through design, construction, operation and closure. An overview of these requirements and the administrative context within which the Simandou Project is to be developed is provided in Annex 1C: Legislation, Standards and Administrative Framework. Where relevant, specific regulations, standards and guidance are referenced in later chapters of this report dealing with topic specific impacts.

1.4 Approach to the Impact Assessment

1.4.1 Overview

The SEIA for the Simandou Mine has been undertaken in accordance with the guidelines and procedures outlined above. A systematic approach of establishing the current environmental baseline, predicting and evaluating impacts and identifying mitigation measures has been followed. The overall approach followed is shown in Figure 1.2 and the key steps are described in the following sections.
1.4.2 Scoping

Scoping is designed to ensure the assessment process is focused on the significant environmental and social impacts which may arise from the project. Scoping identifies the likely significant impacts of the Project that need to be investigated in the SEIA (the scope) and then defines the approaches and methods that will be followed for assessment.

To undertake scoping effectively it is important to clearly define and agree the components of the Project, their area of influence, and the broad types of impacts that needed to be considered in the assessment. This exercise was undertaken and reported in a draft Terms of Reference for the SEIA which was presented to the Government in August 2011. A programme of consultation events was held to ensure that the views of stakeholders were taken into account in agreeing the scope of the study (described further in Section 1.4.7 and Chapter 4: Scoping and Stakeholder Engagement) and the Terms of Reference were approved by the Minister Delegate for the Environment, Water and Forests in October 2011. The final Terms of Reference and the letter of approval are presented in Annex 1B: SEIA Terms of Reference.

A summary of the key points is provided below.

1.4.2.1 Definition of the Project and its Area of Influence

In this SEIA the Project is defined to include all actions and activities which are a necessary part of the mine development. This includes all the main components of the Simandou Mine (mine pits, mineral waste emplacements, mine process plant, ore stockpiles, workshops and associated infrastructure) and also all related and ancillary facilities without which the mine cannot proceed. This includes construction sites, temporary camps, supply bases and roads needed for construction; operational utilities and infrastructure such as power generation, water supply and wastewater treatment; long term workforce accommodation provided by the Project; and waste disposal facilities. It should be noted that a number of advance works are being progressed ahead of development of the main Project and these have been considered in separate...
SEIAs which have already been submitted to and approved by Government. These include temporary construction camps and their associated infrastructure, road improvements and quarries. The impacts of these developments are not specifically assessed in this volume of the report which focusses on the main mine works, but they will be addressed in the Project-wide assessment reported in Volume IV.

The assessment also includes the impacts of other developments or activities which can be expected to follow as a necessary consequence of the mine even if not within the responsibility of Simfer. These are referred to as induced developments. Examples of induced development could include new housing and infrastructure developed by third parties to accommodate Project workers, the movement of people into areas opened up by the Project, and expansion of settlements and growth in farming or hunting by people migrating into an area in search of economic opportunity.

Impacts have been assessed for all phases of the Project from initial site preparation and advance works, through construction and operation, to closure, decommissioning and rehabilitation of sites, and throughout the area of influence of all components of the Simandou Mine. The area of influence varies depending on the type of impact being considered, but in each case it has been defined to include all that area within which it is considered that significant impacts could occur.

Some impacts could extend across national boundaries, for example as a result of changes in animal migration or patterns of nomadic pastoralism, release of emissions affecting environmental quality across a wide area, or changes in river flows in trans-national catchments. The area of influence extends to include consideration of these trans-boundary effects.

1.4.2.2 Types of Impact

The assessment considers both positive and negative impacts on all aspects of the physical, natural, cultural, social and socio-economic environment.

Positive or beneficial impacts are those which are considered by the SEIA team, taking into account the views of external stakeholders, to present an improvement on the environmental or social situation without the mine (the baseline) or to introduce a new desirable condition. Negative or adverse impacts are the reverse.

When discussing different aspects of the environment, the assessment distinguishes between impacts on resources, that is, features of the environment such as soils, water resources, habitats etc which are valued by society for their intrinsic worth and / or their social or economic contribution, and impacts on receptors, that is people and communities, and plant and animal species who may be affected by the mine.

1.4.2.3 Timeframe

The impact assessment has addressed impacts with different temporal characteristics:

- permanent impacts that will arise from irreversible changes in conditions such as the removal of physical features during construction;
- temporary impacts that will arise during short term activities such as construction and decommissioning but will stop when the activities end; and
- long term impacts that will arise over the operation of the mine or occur as the environment recovers after its closure.

1.4.2.4 Routine and Non-Routine Impacts

Development of the mine also raises the potential for impacts to arise from both planned and unplanned events. The SEIA has therefore assessed both:
• **routine** impacts resulting from planned activities within the mine; and

• **non-routine** impacts arising from:
  
  • unplanned events within the mine such as accidents involving spills of hazardous substances; and
  
  • natural hazards and other external events affecting the mine such as landslip and flooding.

The impact of non-routine events has been assessed in terms of the **risk**, that is the product of the consequence of the event and the probability of occurrence (risk = probability x consequence).

1.4.2.5 Direct and Indirect Impacts

Impacts can also be characterised according to whether they are **direct** (primary) impacts arising from activities associated with the Project, or **indirect** (secondary and higher order) impacts that follow on as a consequence of direct impacts. An example of a direct impact would be the adverse impact on human health or crops resulting from changes in air quality caused by emissions from the ore processing plant. This could have secondary (indirect) impacts by affecting the livelihoods of people who are dependent on crops for subsistence.

1.4.2.6 Cumulative Impacts

The potential for the mine to have **cumulative** impacts with other activities and with other known or committed developments (for example other major mining projects, or developments such as hydroelectric generation, agriculture or artisanal mining), taking place in the area at the same time is also included in the scope of the assessment. Where other developments are already underway or committed they have been addressed by incorporating them into the future baseline for the mine (ie the "No Project" situation against which the impacts of the Project are assessed). Where other developments are still in planning but have yet to be formally approved the impacts of these will be considered in the overall cumulative impact assessment for the Simandou Project which will be presented in Volume IV of the SEIA Report due to be published later in 2012. This will enable a full picture to be provided of the possible future situation.

1.4.3 Assessment

The assessment of impacts has followed an iterative process considering the following five aspects:

1. **Baseline** – What is the current environmental and social situation and how will this develop in the absence of the Project?

2. **Prediction of Impact Magnitude** – How will conditions in the environment and society change as a consequence of the Project?

3. **Evaluation of Significance** – Is the impact significant? If so, how significant is it?

4. **Mitigation** – If an impact is significant, what can be done to avoid, reduce, remedy or compensate for adverse effects or enhance benefits?

5. **Residual Impact** – After mitigation is taken into account, what will be the residual impact? How significant will this be?

The approach to each of these steps is outlined below.

1.4.3.1 Baseline Studies

To provide a baseline against which the impacts of the Simandou Mine can be assessed, an important part of the SEIA has been to establish the conditions that would prevail in the absence of the mine. A wide range of baseline studies were undertaken for the mine and its area of influence over the years up to and including 2011. These included:
collection of data from existing sources including government agencies, research organisations, publications, maps, satellite images and aerial photographs;

consultations with stakeholders; and

field studies.

A full list of the field studies is presented in Annex 1E: List of Baseline Studies. The terms of reference for these were reviewed and approved by the National Monitoring Committee set up for the Simandou Project SEIA. Details of sources and survey methods and the key results of baseline surveys related to the mine are described in the later chapters of this report dealing with specific aspects of the Project's environmental and social impacts. The results of surveys completed up to 2010 are presented in the Social and Environmental Baseline Study for the Simandou Mine (1).

When assessing the impacts of projects, it is necessary to consider whether the baseline environment is likely to change from the existing situation as a result of background changes in population, land use and economic activity, and through other developments independent of the project being assessed. The baseline for the mine has therefore been defined by considering how current environmental and social conditions will develop in the future without the mine (the “No Project” scenario).

1.4.3.2 Predicting the Magnitude of Impacts

The impact assessment describes what will happen to the environment and society (communities) by predicting the magnitude of impacts and quantifying this to the extent practicable. The term “magnitude” is used here to encompass various possible dimensions of the predicted impact including:

- the nature of the consequence (how resources and / or receptors are affected);
- the size, scale or intensity of the effect;
- the geographical extent and distribution of the effect;
- the temporal extent (duration, frequency, reversibility) of the effect; and
- where relevant, the probability of the effect occurring as a result of non-routine events.

The impact assessment also identifies where there is uncertainty about the occurrence or scale of the impact (2).

Magnitude therefore describes the actual change that is expected to occur in a resource or receptor as a result of the Project (e.g., the area and duration over which air or water becomes polluted and the level of increase in concentration of the pollutant, the area of habitat that is lost, the number of people who are displaced).

Magnitude is predicted using a range of different methods, depending on the nature of the impact: for example, noise and air quality impacts are usually predicted using standard mathematical models; direct impacts on land use and habitats can be calculated from analysis of land cover and land use in the project footprint; landscape impacts can be predicted using visualisations. However, some impacts are less amenable to mathematical or physical representation, for example impacts on economic development, community welfare and traditional ways of life. In these cases prediction relies upon the professional knowledge and experience of experts applied to field data and information obtained through stakeholder engagement. The specific approach employed for each type of potential impact from the mine is presented in each of the specialist topic chapters of this Report.

(1) Rio Tinto (2010); Social and Environmental Baseline Study: Simandou Project - Mine Component; SNC Lavalin Environment.
(2) A distinction is made here between the probability of impact arising from a non-routine event such as a seismic event or fire, and the uncertainty inherent in making predictions about what will happen in the future. This is different from estimating the probability of an unplanned event occurring. Uncertainty can be expressed by describing the predicted outcome using a range rather than a single value, by placing confidence limits around the prediction, or by estimating the likelihood of the prediction being correct.
Where there is uncertainty about impacts, or where impacts could arise from non-routine events, the prediction of magnitude takes into account the risk of the impact, that is, its probability of occurrence as well as its consequences.

The magnitude of impacts is graded taking into account all the various dimensions described above to determine whether an impact is of negligible, small, medium or large magnitude:

- a negligible impact is generally within the range of natural variation observed in the existing environment;
- a small impact will show a perceptible difference from baseline conditions;
- a medium impact will be a clearly evident change from baseline conditions; and
- a large impact will be a change which is sufficient to be dominant in comparison to baseline conditions.

This scale is defined differently according to the type of impact and depending on the circumstances and is explained for each impact in the relevant chapter of the report. For quantifiable impacts such as noise, numerical values are used whilst for others a more qualitative classification is adopted.

1.4.3.3 Evaluating Significance

The next step in the impact assessment is to take the information regarding the magnitude of impacts, and explain the importance of the predicted impacts for the environment and society. This allows regulators and other stakeholders to understand how important issues are when considering the acceptability of the Project. This is referred to as “evaluation of significance”.

There is no statutory or agreed definition of significance. However, for the purposes of the Simandou Project SEIA, the following practical definition is used:

An impact is judged to be significant if, in isolation from, or in combination with other impacts, it should, in the judgement of the SEIA team, determined by reference to relevant standards and guidelines and expert consideration, be reported in the SEIA Report so that it can be taken into account in the decision on whether or not the Simandou Project should proceed, and if so under what conditions.

This recognises that evaluation requires an exercise of professional judgement and that judgements may vary between parties involved in the process (including regulators, experts, affected people and the general public). The evaluations presented in this SEIA Report are based on the expertise and experience of the SEIA Team, as informed by reference to legal and international standards and policy, current good practice, and the views of stakeholders as expressed through the consultation process (see Chapter 4: Scoping and Stakeholder Engagement).

The evaluation leads to grading of the significance of impacts as follows.

- **Not Significant**: these are impacts which are not considered to be of concern for decision-making.

- **Minor significance**: minor impacts are identified so that the decision-maker and other stakeholders are aware of them. They are not considered to require specific attention in the decision on approval of the Project and adequate mitigation is considered achievable using normal good practice, but monitoring may be needed to confirm that impacts do not exceed predicted levels.

- **Moderate significance**: moderate impacts are considered to require careful attention in decision-making and specific mitigation and monitoring measures should be identified to ensure adverse impacts are as low as reasonably practicable and beneficial impacts are delivered.
- **Major significance**: major impacts warrant substantial consideration, when compared with other environmental, social or economic costs and benefits, in making decisions on whether or not to allow a project to go ahead. Specific mitigation measures and monitoring should be identified to ensure impacts are as low as reasonably practicable.

- **Critical significance**: critical impacts will entail exceedance of legal standards or other widely accepted norms established for protection of the environment and people, and should be avoided.

Criteria for evaluating the significance of impacts are clearly defined for each type of impact, taking into account whether the Project will exceed numerical standards, adversely affect protected or valuable resources, or conflict with policy.

Where numerical standards are not available or provide insufficient information on their own to allow evaluation of impacts, significance has been evaluated taking into account the magnitude of the impact and the value or sensitivity of the affected resource or receptor. To assist with this, the magnitude of impacts and the value / sensitivity of resources and receptors are graded and the matrix shown in Table 1.1 is used to determine significance.

**Table 1.1 Evaluation of Significance**

<table>
<thead>
<tr>
<th>Value of Resource / Sensitivity of Receptor</th>
<th>Magnitude of Impact</th>
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<tbody>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Within the normal range of natural variation</td>
</tr>
</tbody>
</table>

| Negligible | No specific value or importance attached to the resource. Receptor is not sensitive to the type of change | Not Significant | Not Significant | Not Significant | Not Significant |
| Low        | Resource is locally valued / important. Receptor shows slight sensitivity to the type of change | Not Significant | Not Significant | Minor           | Moderate         |
| Medium     | Resource of regional / national importance. Receptor shows moderate sensitivity to the type of change | Not Significant | Minor           | Moderate         | Major            |
| High       | Resource of national / international importance. Receptor shows high sensitivity to the change | Not Significant | Moderate        | Major            | Critical         |

Note: the colour coding shown represents negative or adverse impacts, however, the grades can be equally applied to positive or beneficial impacts.

Resource value and receptor sensitivity are graded in a similar way to magnitude, as negligible, low, medium or high as set out in Table 1.1. The value of a resource is judged by taking into account its quality and its importance as represented for example, by local, regional, national or international designation, its importance to the local or wider community, or its economic value. The sensitivity of receptors, for example a household, community or wider social group, takes into account their likely response to the change and their ability to adapt to and manage the impact. The specific criteria and definitions of grades used to determine value and sensitivity are defined in the following chapters of the report dealing with each type of impact.

It must be noted that the distinctions between grades cannot be considered as clear cut and judgments as to magnitude, value or sensitivity, and significance, involve careful weighing up of a range of factors by the SEIA Team. The outcomes of this process are reported in the impact assessment.
1.4.3.4 Mitigation

Impact assessment is designed to ensure that decisions on projects are made in full knowledge of likely impacts on the environment and society. A vital step within the process is the identification of measures that can be taken to ensure adverse impacts are as low as reasonably practicable and positive impacts are maximised. This is achieved by undertaking an assessment to identify where significant impacts could occur and then working with the wider project team to identify technically and financially feasible ways of mitigating them.

Where a significant negative impact is identified, a hierarchy of options for mitigation is considered to identify the preferred approach.

- 1st: Avoid – remove the source of the impact, for example by relocating a component of the Project to avoid a sensitive site, avoiding a harmful activity or changing a technology.
- 2nd: Reduce – reduce the impact, for example by controlling the source, such as the emission of dust or noise, or installing a barrier between the source and the receptor, such as a noise screen.
- 3rd: Remedy / Restore – repair the damage after it has occurred, for example by cleaning up accidental spills or rehabilitating a habitat that has been damaged.
- 4th: Compensate / Offset – replace a lost or damaged resource with a similar or a different resource of equal value, for example by resettling people whose homes are lost, compensating farmers for loss of production, or creating or reconstructing a habitat with equivalent biodiversity value.

Mitigation also includes measures to provide or enhance positive benefits from the Project, such as increasing local employment opportunities, or improving the chances of employment being taken up by local people by setting up training in the required skills.

In considering options for mitigation various approaches are considered including the following:

- changes in the design of the mine, for example relocating structures, incorporating pollution abatement measures into the design, and designing structures to minimise their visual impact;
- selection of particular approaches and methods for construction, for example segregating and recycling construction waste, managing site run-off to protect adjacent streams, using quiet equipment and training workers to follow good and safe construction site practices;
- adoption of measures to control impacts during operation, for example, water spraying of dusty areas, installing dust covers, using oil interceptors, adoption of emergency spill plans and traffic management;
- planning site closure and restoration to avoid long term adverse impacts and provide benefits for the community, for example managing mine water to maintain water supplies, restoring land to provide new biodiversity areas or agricultural land, and training the community to establish sustainable businesses that can continue after mine closure.

All these types of measures were considered in the impact assessment. Mitigation proposals were discussed and agreed with Simfer and all planned measures are laid out in a Social and Environmental Management Plan (SEMP) for the Project. This is briefly described in Section 1.4.5, introduced further in Chapter 26: Managing Social and Environmental Impacts, and presented in full in Volume V: Simandou Project Social and Environmental Management Plan.

1.4.3.5 Assessing Residual Impacts

Once all feasible mitigation measures were identified, impacts were re-assessed, taking into account the mitigation commitments adopted by the Project. Where significant residual impacts remained after mitigation, further options were examined in consultation with the Project team. This process continued until
impacts were considered to be as low as reasonably practicable. The significant impacts remaining at the end of this process are described as **residual impacts** in this SEIA Report.

The significance of residual impacts is evaluated in the same way as during the initial assessment (see Section 1.4.3.3).

If the impact assessment process has been successful, the majority of residual impacts should be of no more than moderate significance. Residual impacts of major significance should only arise where there are special circumstances preventing their mitigation and there should be no residual impacts that are of critical significance unless these are being addressed by offsetting.

1.4.4 Dealing with Uncertainty

The SEIA has been based on the project information presented in Chapter 2: Project Description, but in some instances the design is still subject to development during the final design work which is now underway. The SEIA is based on the best information available at the time of assessment. Where there are aspects of how the mine will be designed, built, operated or closed which are still to be finalised, working assumptions have been made to allow impacts to be assessed. These assumptions have been made in consultation with Simfer and have been selected to provide predictions of the reasonable worst case in terms of environmental and social impact. Where assumptions have been made these are detailed and the nature of any resulting uncertainty in the assessment of impact is identified.

The general approach has, therefore, been to take a conservative and cautious view of the likely impacts of the mine. Several areas of additional study to be undertaken during detailed design and before construction starts are identified within the SEIA Report and these will be used to inform the development of detailed mitigation and monitoring plans.

1.4.5 Social and Environmental Management Plan

To ensure that the mitigation identified through the SEIA is implemented, planned measures are clearly described in the Social and Environmental Management Plan (SEMP) for the Project. The SEMP is presented in Volume V: Simandou Project Social and Environmental Management Plan, and defines the following for each phase of the development (detailed design, construction, operation, closure), and for each environmental and social aspect:

- a clear statement of the measures that will be taken to mitigate adverse impacts and provide benefits;
- the source of the requirement; and
- how delivery of mitigation will be monitored and checked.

The SEMP will be delivered through a Simandou Health, Safety, Environmental and Communities Management System operating under the overarching framework of Rio Tinto’s Health, Safety, Environmental and Quality Management System Standard (HSEQ-MS Standard). This is a single, consolidated standard that reflects international good practice, fully incorporates the requirements of ISO 14001 (1), and defines Rio Tinto requirements relating to the systems and procedures to be used by all operations to ensure effective management of environmental and social impacts and risks. Further details are presented in Chapter 26: Managing Social and Environmental Impacts and Volume V: Simandou Project Social and Environmental Management Plan.

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1.4.6 Design Interface

1.4.6.1 Consideration of Alternatives

A key part of SEIA is the examination of feasible alternatives that could achieve the Project objectives with less impact on the environment and society. These could range from small scale deviations in the siting of mine components to major site or route alternatives, development of alternative technologies for mine processes or alternative working methods for construction, operation or closure.

A number of key alternatives have been considered during the development of the Simandou Mine. A summary of these is provided in Chapter 3: Alternatives. Alternatives considered for the railway and port elements of the Project are described in the other volumes of the SEIA Report.

1.4.6.2 Interface with the Engineering Team

The SEIA team has worked with the wider Project team (including the engineering team) throughout the SEIA process to gather information on the design, construction, operation and closure of the mine. As impacts have been investigated, the results have been discussed, alternatives have been investigated and feasible mitigation measures have been integrated into the mine where possible. This process of interaction with the engineering team has been successful in selecting a number of alternatives with lesser impacts than the original proposals. It has also identified a wide range of technically and financially feasible mitigation measures and these have been integrated into the Project and included in the SEMP.

Simfer is committed to continuing this process of working with social and environmental specialists during later stages of detailed design, construction, operation and closure of the mine, to keep the impacts as low as is reasonably practicable. The SEMP will be regularly updated with any additional mitigation as the Project progresses.

1.4.7 Stakeholder Engagement

Good practice in SEIA requires active consultation with relevant regulatory bodies, experts, affected communities and other interested and affected parties (collectively referred to as stakeholders) at all stages of planning and implementation. An SEIA Stakeholder Engagement Plan (SEP) setting out the approach to engaging with all the project stakeholders during the SEIA for the Simandou Project was prepared and published in August 2011 (1). This has now been updated to address the next stages in stakeholder engagement and is presented in Annex 1F: Simandou Project Stakeholder Engagement Plan. The SEIA stakeholder engagement approach is part of a wider project communications strategy which deals with all aspects of how the whole Simandou Project interfaces with stakeholders. This includes a specific procedure for dealing with any grievances which may arise during the planning or implementation of the project, presented in Annex 1G: Simandou Project Grievance Procedure.

A programme of scoping consultations was undertaken during the course of the SEIA studies. This was designed to inform stakeholders about the developing plans and give them an opportunity to express their views on the Simandou Project and its potential impacts. These views were then taken into account in the impact assessment. The consultations also sought to identify useful information on the baseline situation and on vulnerable resources and receptors in the study area. This programme involved the following activities:

- a national stakeholder conference held in Conakry in September 2011;
- two rounds of stakeholder engagement conferences in towns within each of the prefectures affected by the Project, conducted in September / October 2011 and February 2012. Round 1 focussed on

providing information about the Project and the SEIA and Round 2 on hearing stakeholders’ comments and concerns;

- establishment of an SEIA webpage on the Simandou website where people can access information about the Project and the impact assessment and submit comments either directly or via a Simandou SEIA email address (see Section 1.6); and

- written communication with a wide range of governmental and non-governmental organisations with potential interests in the Project and the SEIA, inviting them to access and comment on the Project and the Terms of Reference for the SEIA.

The results of this programme are summarised in Chapter 4: Scoping and Stakeholder Engagement and a more detailed report is presented in Annex 4A: Simandou Project Stakeholder Engagement Report. The results of the programme have been taken into account in the assessment of environmental and social impacts in the later chapters of the SEIA Report.

Following the submission of this SEIA Report to Government a further programme of stakeholder engagement will be undertaken. The SEIA findings will be published and there will be opportunities for all stakeholders to express their views on the mine and its impacts. The SEIA Report will be made widely available for public comment and its findings communicated to affected communities through a wide variety of means (see Section 1.6). All comments made on the Simandou Mine, its impacts and the proposed mitigation measures will be considered in completing the detailed design, finalising the methods for construction and operation, and updating and implementing the SEMP.

1.5 Structure of the Report

The remainder of this Report is organised into four main parts as follows.

The first part comprises this introductory chapter and three further general chapters relating to the project and the scope of the assessment.

- Chapter 2: Project Description, describes the Simandou Mine, including the background to the development and gives details of its design, construction, operation and closure.

- Chapter 3: Alternatives, describes the alternatives considered in planning the Project and explains the reasons (including environmental and social considerations) for selection of the proposed Project.

- Chapter 4: Scoping and Stakeholder Engagement, summarises the results of scoping and stakeholder engagement carried out during the studies, presents the resulting scope of the SEIA, and outlines the plans for further stakeholder engagement during the next stages of the Project.

The second part comprises a series of chapters covering the environmental aspects of the assessment including the physical, natural and cultural environment, under the following impact headings:

- Chapter 5: Geology, Soils and Mineral Waste;
- Chapter 6: Water Environment;
- Chapter 7: Noise and Vibration;
- Chapter 8: Air Quality;
- Chapter 9: Local Climate;
- Chapter 10: Greenhouse Gas Assessment;
- Chapter 11: Resources and Non-Mineral Waste Management;
- Chapter 12: Biodiversity;
- Chapter 13: Cultural Heritage; and
- Chapter 14: Landscape.
Each environmental impact chapter provides:

- an introduction to the topic and to the sources and types of impact addressed in the chapter (ie the scope);
- definition of the study area, and a description of relevant laws and guidance and the methods used to characterise the baseline and to predict and evaluate impacts (including a note of any difficulties or limitations);
- a description of the baseline relevant to the topic;
- an assessment of the impacts based on the existing project design;
- a discussion of the measures proposed to mitigate significant adverse impacts (and to enhance benefits) and an assessment of the residual impacts after mitigation; and
- a summary of the findings.

The third part focuses on the social impacts of the Project. The structure differs from the environmental chapters in that an overarching description of the socio-economic and community baseline for the Project is provided in an introductory Chapter 15: Socio-Economic and Community Baseline. This is then followed by a series of chapters exploring different types of socio-economic and community impacts as follows:

- Chapter 16: National Economy;
- Chapter 17: Employment and Economic Development;
- Chapter 18: In-Migration;
- Chapter 19: Land Use and Land-Based Livelihoods
- Chapter 20: Social Structures and Community Life;
- Chapter 21: Community Health, Safety and Security;
- Chapter 22: Labour and Working Conditions;
- Chapter 23: Ecosystem Services; and
- Chapter 24: Human Rights.

Where there is specific baseline information relevant to the impact topic this is provided, in addition to the general baseline information in Chapter 15: Socio-Economic and Community Baseline, in the individual chapters, for example in relation to community health and safety.

The fourth and final part comprises two chapters.

- Chapter 25: Mine Closure, discusses the plans for closure of the mine at the end of its working life and the impacts and mitigation measures planned for that period.
- Chapter 26: Managing Social and Environmental Impacts, the final chapter in the report, explains how social and environmental impacts and risks from the Project will be managed, including an introduction to Rio Tinto’s social and environmental management system and the Simandou Project SEMP. Full details of this are presented in Volume V of the SEIA.

Supporting information is provided in annexes presented in Volume IB (annexes are numbered in accordance with the chapter which they support).
Table 1.2 identifies where in the SEIA Report the information required by the Guinean EIA Order (Arrêté 990/ NRNE/SGG/90) is located.

Table 1.2 Meeting the Requirements of the EIA Order (Arrêté 990/ NRNE/SGG/90)

<table>
<thead>
<tr>
<th>Information required by Order 990</th>
<th>Location in Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the Project including its objectives, location, cost, date of investment and schedule for implementation.</td>
<td>See Chapter 1: Introduction and Chapter 2: Project Description.</td>
</tr>
</tbody>
</table>
| Analysis of the baseline state of the environment, in particular elements susceptible to being affected by the development (sites, natural riches, landscape, socio-economic way of life and culture of the people), including the following parameters:  
  - geology and pedology;  
  - hydrogeology;  
  - hydrology;  
  - natural environment, fauna and flora;  
  - landscapes and sites (monuments);  
  - noise, odours, air pollution;  
  - traffic and infrastructure;  
  - socio-economic activities. | See subsection 3 in the following chapters:  
  5.3: Geology, Soils and Mineral Waste;  
  6.3: Water Environment;  
  7.3: Noise and Vibration;  
  8.3: Air Quality;  
  9.3 Local Climate;  
  10.3 Greenhouse Gas Assessment;  
  11.3 Resources and Non-Mineral Waste Management;  
  12.3 Biodiversity;  
  13.3 Cultural Heritage;  
  14.3 Landscape;  
  Chapter 15: Socio-Economic and Community Baseline  
  16.3: National Economy;  
  17.3: Employment and Economic Development;  
  18.3: In-Migration;  

Analysis of the effects of the Project on the environment and in particular on landscape and sites, fauna and flora, natural environment, biological equilibrium, and the amenity of the neighbourhood (noise, vibration, odours etc), health and public hygiene, and cultural heritage.

As above but see subsection 4 et seq in each chapter.

The reasons for choice of the site and of proven and appropriate technologies for the site and the works.

See Chapter 2: Project Description and Chapter 3: Alternatives.

Measures envisaged by the proponent to prevent, reduce and if possible compensate for damaging effects and an indication of their cost and effect.

As above but see subsection 5 in each chapter. All costs of mitigation are included in the planned budget for the Project. The effect of mitigation measures is described.

### 1.6 Next Steps

The submission of this SEIA Report to the Government of the Republic of Guinea will be followed by a programme of disclosure and stakeholder engagement designed to provide all interested parties with an opportunity to understand and comment on the proposals and their impacts. This will include the following activities.

- The SEIA Report and accompanying leaflets and summary material will be published on the Simandou website at [http://www.riotintosimandou.com/index_seia.asp](http://www.riotintosimandou.com/index_seia.asp) (French) and [http://www.riotintosimandou.com/ENG/index_seia.asp](http://www.riotintosimandou.com/ENG/index_seia.asp) (English) and will be available to download at no cost (a CD copy may also be requested).

Hard copies of the report will be available for inspection at the following locations in Guinea and internationally:

- Simfer SA
  Immeuble Kankan
  Cité chemin de fer
  BP 848 - Conakry
  République de Guinée

- the Simandou Info Shop in Beyla and further Project Info-shops as these are opened over forthcoming months;

- Rio Tinto Iron Ore Europe
  17, Place de Reflets
  La Défense Courbevoie
  92097 Paris
  France

- Rio Tinto plc
  2 Eastbourne Terrace
  London W2 6LG
  United Kingdom
Publication of the report will be announced in newspaper advertisements and through press and media announcements in Conakry and across the prefectures affected by the Project.

A national stakeholder conference and series of local stakeholder conferences will be held in each of the prefectures affected by the Project. These will be widely publicised in local media and invitations will be sent to the regional, prefectural, sub-prefectural and local administrative authorities, to community leaders, and to community-based and non-governmental organisations.

The SEIA Team will also make direct contact with government departments and non-governmental organisations inviting their comment on the Project and its impacts.

In addition to these activities led by the SEIA Team, the Project will also assist the Ministry of the Environment, Water and Forests in organising formal public hearings as required by the Guinean EIA Regulations. The IFC will also disseminate the SEIA report through its own website in accordance with its policy on access to information.

Throughout the period of consultation a formal comment and feedback system will operate. All comments made by interested parties, whether in person, by mail or email, will be recorded in a Stakeholder Register and will be considered by the Project team in finalising the proposals. A report on the outcome of the consultation process will be prepared and published. Where questions are raised that require an individual response, this will be provided and if any parties raise a grievance or complaint this will be managed through the established Simandou Grievance Procedure (see Annex 1G: Simandou Project Grievance Procedure).

Comments and questions can be submitted to the Project team by various routes:

- by email to simandou.eise@riotinto.com;
- by writing to:
  Equipe Communautés - EISE
  Simfer S.A
  Immeuble Kankan, Cité Chemin de Fer
  BP 848 Conakry, République de Guinée

  or to:

  Simandou SEIA
  ERM
  Exchequer Court
  33 St Mary Axe
  London, EC3A 8AA
  United Kingdom

- by raising a point of asking a question at a stakeholder event; or
- by leaving a written comment at a stakeholder event or at a Simandou Info-shop or Info-post.

Comments can be submitted on a pre-printed comment form or in any other format. A copy of the comment form is included in Annex 1F: Simandou Project Stakeholder Engagement Plan and is available on the website.