






ESIA of rail infrastructure reinforcement from Sangarédi to Kamsar, Guinea

Non-technical summary

CFB MUA technical committee

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For ERM France SAS

Signed by:

Position: Partner

Date: December 2016

NON-TECHNICAL SUMMARY

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FIGURES

1 INTRODUCTION

This document presents the Non-technical summary (NTS) of the Environmental and Social Impact Assessment (ESIA) conducted by *Chemin de Fer de Boké* ("CFB") for the project to reinforce the existing rail infrastructures from Sangarédi to Kamsar in Guinea in view of transporting the ore produced by the new activities of the three companies: *Guinea Alumina Corporation* ("GAC"), *Compagnie de Bauxite et d'Alumine de Dian-Dian* ("COADB") and *Compagnie des Bauxites de Guinée* ("CBG").

It provides an overview of the ESIA findings, with a focus on the key social and environmental challenges from the activities planned all along the route over which the bauxite will be transported. This summary also presents the approach proposed by CFB and its partners for managing these challenges and, if possible, enhancing the positive impacts of the Project.

The ESIA was produced by CFB with the support of *Environmental Resources Management SAS* ("ERM") in collaboration with *INSUCO* and *Guinée Ecologie*.

This summary is organised as follows:

- Section 2 presents CFB and the Project's three partner companies. It also includes a summary of the Guinean regulatory framework and the international standards that were taken into account in developing the ESIA.
- Section 3 describes the Project and the main alternatives considered.
- Section 4 describes how the Project will translate in terms of employment.
- Section 5 offers a summary of the assessment of the Project's impacts and environmental and social advantages, and summarises the measures that CFB and its partners propose to implement to deal with them.
- Section 6 summarises the way CFB and its partners will implement environmental and social management measures in the Project's Social and Environmental Management Plan ("SEMP").

2 PRESENTATION OF CFB, ITS PARTNERS AND THE ESIA

2.1 CFB

The promoter of the Project to extend the transport capacity of the existing railway is *Chemin de Fer de Boké* ("CFB"), which currently manages these infrastructures. These infrastructures are currently used mainly for transporting ore from the CBG mine currently being operated. The Project will be financed as a joint investment by three mining operators developing bauxite mining projects in the prefecture of Boké, planning to use the rail infrastructure to transport their production from their mining sites to the port of Kamsar:

- *Compagnie des Bauxites de Guinea* ("CBG");
- *Guinea Alumina Corporation* ("GAC")/ *Emirates Global Alumina* ("EGA");
- *Compagnie de Bauxite et d'Alumine de Dian Dian* ("COADB").

2.2 GAC

Guinea Alumina Corporation S.A. (GAC) is registered in Guinea and a subsidiary of Emirates Global Aluminium ("EGA"), a company in co-participation of Mubadala, an investment and development company established by the Government of Abu Dhabi, and the Investment Corporation of Dubai ("ICD") established by the Government of Dubai. EGA obtained full ownership of GAC in June 2013.

Under a different shareholder arrangement, in 2004, GAC signed a concession with the Government of the Republic of Guinea to develop a bauxite mining and refining project in the sub-prefecture of Sangarédi, prefecture of Boké, in the Northwest of Guinea.

2.3 CBG

Compagnie des Bauxites de Guinea (CBG) is a mining company that belongs jointly to the Government of Guinea and Halco Mining (Alcoa, Rio Tinto Alcan and Dadco). Currently, CBG extracts, transports by rail, processes and ships about 16 MTPA of bauxite with 3 % of humidity into its facilities in Kamsar and Sangarédi in the Northwest of Guinea. CBG has existed since 1963, and its facilities have been operating since 1973.

It operates or occupies three sites:

- the mining site of Sangarédi (plateaux of N'Dangara, Sangarédi, Boundou Wandé, Bidikoum, Parawi and Silidara);
- the railway network;
- the Kamsar plant (including the port zone).

2.4 *COBAD*

RUSAL is a group of companies active in the bauxite exploitation field and production of alumina and aluminium. In March 2007, the Russian aluminium producing companies, RUSAL and SUAL, merged their operations with those of the Swiss company Glencore into a single company (United Company of RUSAL).

COBAD (*Compagnie de Bauxite and d'Alumine de Dian-Dian*) was created on 25 March 2005 in Guinea by RUSAL as part of the Dian-Dian project.

2.5 *OBJECT OF THIS ESIA*

The ESIA developed for the Project has the objective of assessing the Project's potential environmental and social impacts both from the standpoint of construction of the new infrastructures and from the increased traffic generated, compared with the current situation.

The pertinent data collected in the context of the previous impact studies carried out by all the Project partners were taken into consideration and integrated in the Project ESIA. Complementary or specific Project data were also collected during field studies by specialised consultants between July and November 2016.

The main studies considered in the framework of this ESIA were:

- CBG's Environmental and Social Impact Assessment (ESIA) of the mine extension project in December 2014;
- COADB's Environmental and Social Impact Assessment (ESIA) of the Dian-Dian mine, December 2014;
- GAC's Addendum to the Environmental and Social Impact Assessment (ESIA) for the GAC Bauxite exportation Project in Guinea, October 2015;
- GAC, Environmental and Social Impact Assessment (ESIA) for the MBS (Market Bauxite Samples) Project in Guinea, June 2016

2.6 *THE GUINEAN REGULATORY CONTEXT*

Regulations on environmental impact assessments (EIA) in Guinea are defined by *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 (Order N°045/PRG/87 of 28 May 1987 modified by Order N°022/PRG/89 of 10 March 1989 defining the code for protection and valorisation of the environment)*. In addition, the *décret présidentiel 199/PRG/SGG/89 du 8 novembre 1989 codifiant les études d'impact sur l'environnement* (*Presidential decree 199/PRG/SGG/89 of 8 November 1989 defining the rules for environmental impact*

assessments) defines projects subject to an EIA and its approval by the ministry in charge of environment. Lastly, *arrêté ministériel 990/ MME/SGG/90, du 31 mars 1990, définissant le contenu, la méthodologie et la procédure de l'étude d'impact sur l'environnement (Ministerial act 990/MME/SGG/90 of 31 March 1990 defining the content, methodology and process for environmental impact assessments)*, establishes the content, methodology, and procedures to be complied with when carrying out an environmental impact assessment.

The General Guide for Impact Studies, published in February 2013 has clarified the approval process of the SEIA. The entire submission and permitting procedure is managed by the *Bureau Guinéen d' Etudes et d'Evaluation Environnementale* (BGEEE – the Guinean environmental directorate). Formal review of the permitting documentation is undertaken by the *Comité Technique d'Approbation Environnementale* (CTAE), an ad-hoc multi-disciplinary team composed of representatives of various ministries relevant to the Project. The final environmental compliance certificate is issued by the Ministry in charge of environment. Final approval is under the responsibility of the ministry in charge of the Project – in the case of GAC, the ministry of mines. The Guidelines for Environmental and Social Impact Assessment for Mining Operations of February 2013 (*Directive de réalisation des études d'impact environnemental et social des opérations minières*) sets out specific guidelines with regards to the procedure and the content of and environmental and social impact assessment for mining projects.

2.7 *INTERNATIONAL STANDARDS FOLLOWED BY THE PROJECT*

Even though CFB is not considering financial support by International Financial Institutions (IFI) like *International Finance Corporation* ("IFC") and the African Development Bank ("AfDB") for this specific Project, GAC and CBG have a financing plan for their mining projects calling upon some of these institutions. GAC and CBG want to make sure that any activities associated with their projects meet IFC's Environmental and Social Performance Standards ("PS") as well as the AfDB's Integrated Safeguards System ("ISS") and Operational Safeguards ("OS"). These standards are therefore considered in generating this ESIA.

The IFC's relevant Performances Standards for the Project are:

- PS1: Assessment and management of environmental and social risks and impacts.
- PS2: Labor and working conditions.
- PS3: Efficient use of resources and pollution control.
- PS4: Health, Safety, and Security of Communities.
- PS5: Land Acquisition and Involuntary Resettlement.
- PS6: Biodiversity conservation and sustainable management of living natural resources.
- PS8: Cultural heritage.

The AfDB's relevant Operational Safeguards (OS) for the Project are:

- OS 1: Environmental and Social Assessment;
- OS 2: Involuntary resettlement, land acquisition, population displacement, and compensation;
- OS 3: Biodiversity and ecosystem services;
- OS 4: Pollution prevention and control, hazardous materials and efficient use of resources;
- OS 5: Work, health, and safety conditions.

Furthermore, the Directives concerning the Environment, Hygiene and Safety (EHS) of April 2007 of the *International Finance Corporation (IFC)* of the World Bank Group and the relevant AfDB standards have been used to complement the specific directives on the management of effluents and wastes, and to complement the Guinean regulatory standards when the IFC or AfDB standards are stricter than the national standard.

3 THE PROJECT

3.1 OVERVIEW

The Project consists in increasing the transport capacity of the rail line of the *Agence Nationale d'Aménagement des Infrastructures Minières* ("ANAIM") between Kamsar and Sangarédi by doubling certain rails sections.

The rail line passes through five sub-prefectures (SP): Kamsar, Kolaboui, la Commune Urbaine de Boké, Tanéné and Sangarédi, extending about 130 km from Kamsar to Sangarédi. The current railway is installed in a corridor 50 m wide on land owned by the ANAIM. The new tracks are to be installed inside this corridor.

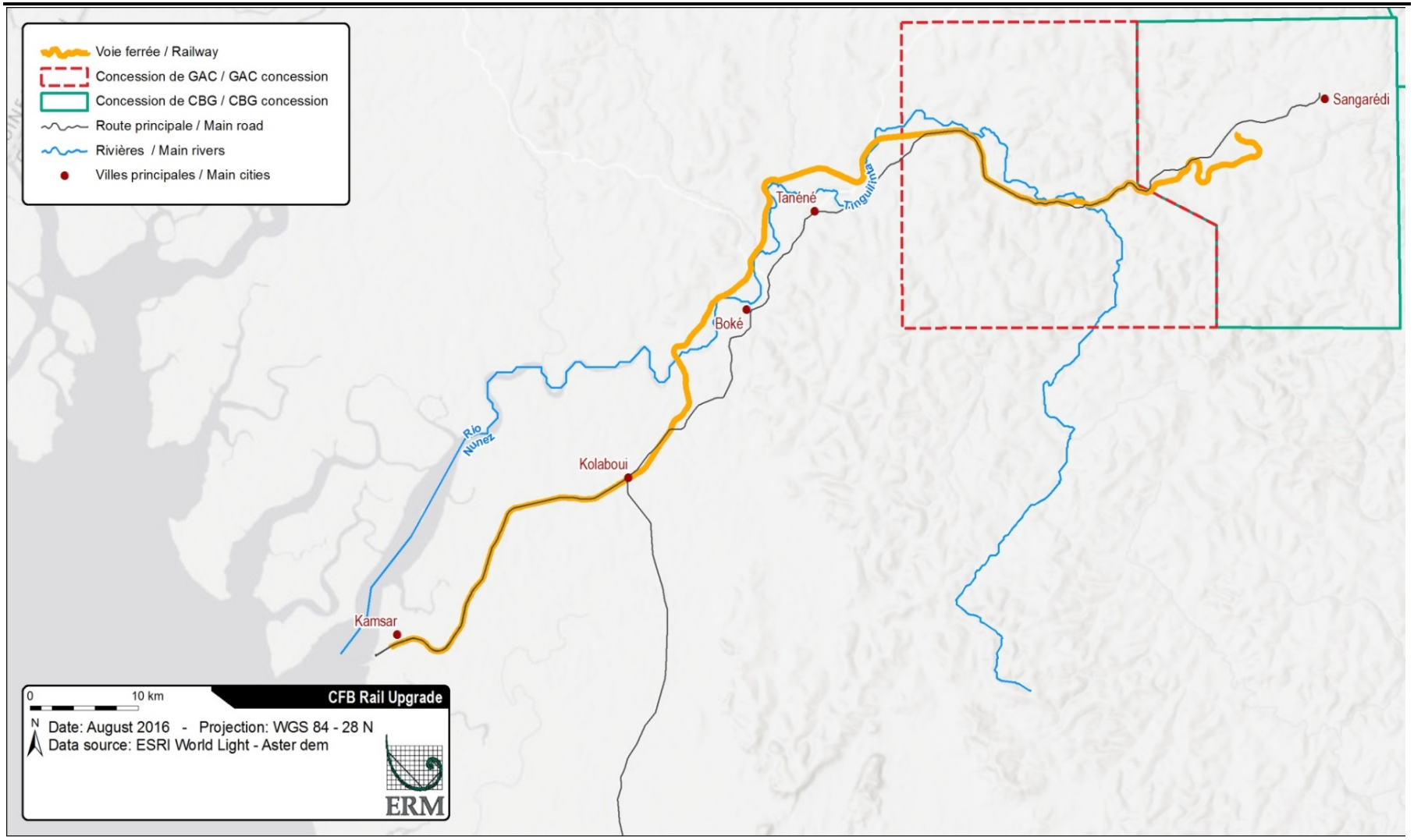
Figure 3.1 shows the Project location.

The Project provides that CFB will own the locomotives and ensure the conveyance of the cars belonging to the various mining operators. The cars will be loaded by these operators and the trains, once loaded, will be made available to CFB for conveyance to the unloading sites. The ESIA concerns only the part of the tracks common to all the current projects of CBG, GAC and COADB located between railway kilometric waypoints (PKs) 1.8 and 134.1 as well as the locomotives and track maintenance facilities that will be owned and operated by CFB.

The new developments for the connections to the existing tracks or the installation of specific operating structures like car maintenance that will be built separately by the various railway users (CBG, GAC, COADB) will or have already been covered by specific ESIAs under their responsibility.

It should be noted that the existing railway will not be modified or doubled at the approaches to bridges crossing the main water streams (permanent stream) along the route. The potential impacts related to the works in the water streams for the extension of the bridges will thus be greatly minimised due to the low extent of the works to be carried out.

Figure 3.1 Project location



3.2 RAIL TRANSPORT CAPACITY

3.2.1 Ore transport

The existing railway is used to transport the ore produced by the CBG-operated mine from Sangarédi to Kamsar.

The CFB Project is a plan to extend the railway between Kamsar and Sangarédi by doubling several rail sections.

In 2015, the railway was used to transport about 16.8 million tons (MTPA) of ore with an average of 4.7 trains loaded per day, for a total of 9.4 daily passages (loaded trains + empty trains). Thanks to the Project, the railway capacity will be raised to 51 MTPA in 2020 then to 70 MTPA in 2028. The Project will allow the trains to cross each other on certain portions of the line, thereby increasing the frequency of train passages, and therefore the infrastructure's capacity to allow the transport of bauxite or alumina produced by the Project partners.

The trains will consist of two or three locomotives and 130 cars of 82 to 85 tons for CBG and GAC, with the COADB trains consisting of 112 cars. The estimated variation in rail traffic is indicated in *Table 3.1.*

Table 3.1 Estimated variation of rail traffic

USER	2020 traffic			2028 traffic		
	Projected tonnage MTPA	Full trains per day	Interval between two trains (h)	Projected tonnage MTPA	Full trains per day	Interval between two trains (h)
CBG	**33**	9.0	2.7	**50**	13.6	1.8
GAC Bauxite	**12**	3.3	7.4	**12**	3,3	7.4
GAC Alumina	**0**	0	0	**2**	1.0	24.4
COADB	**6**	1.9	12.7	**6**	1.9	12.7
TOTAL	**51**	**14.1**	**1.7**	**70**	**19.7**	**1.2**

The provisional rail utilisation phasing calendar is indicated in *Table 3.2.*

Table 3.2 Provisional rail utilisation Stage-in calendar (MTPA)

USER	2016	2017	2018	2020 Stage 1	2022	2023	2028 Stage 2
CBG	**18.5**	**27.5**	**33**	**33**	**39**	**44.5**	**50**
GAC Bauxite	**0**	**8,8**	**8.8**	**12**	**12**	**12,0**	**12.0**
GAC Alumina	**0**	**0**	**0**	**0**	**2**	**2**	**2**
COADB	**3**	**3**	**6**	**6**	**6**	**6**	**6**
Total MTPA	**21.5**	**39.3**	**47.8**	**51**	**59**	**64.5**	**70.0**

3.2.2 Other uses of the tracks

In addition to the circulation of the ore trains, the following needs have been considered in developing the Project:

- circulation of a passenger train three times per week;
- circulation of a daily merchandise train from Kamsar to Sangarédi;
- circulation of locomotives alone (without cars) from Taressa (COBAD's port) for supplying to Kamsar; and
- track maintenance.

3.3 TECHNICAL DESCRIPTION OF THE PROJECT

3.3.1 Doubling of the tracks

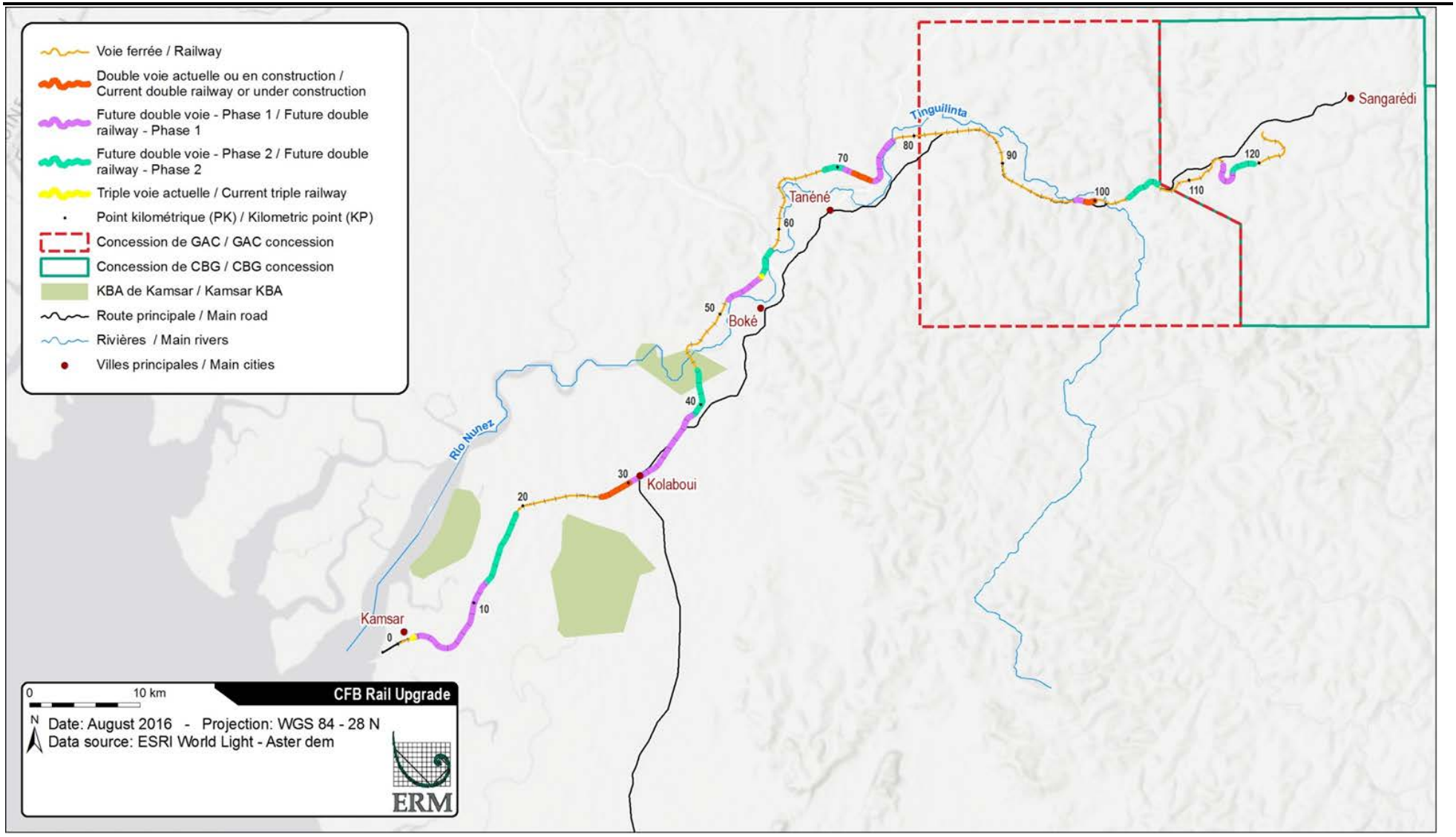
The tracks will be doubled inside the existing ANAIM 50 m corridor and should be done in two Stages between 2018 (Stage 1) and 2023 (Stage 2). The track sections that will be doubled in Project Stage 1 are illustrated in *Figure 3.2*. Stage 1 optimisation studies are still in progress at the time of writing of the report of this ESIA, and slight variations (decrease of doubled lengths and/or adaptation of the location of the track doubling) are still possible. The need for a second Stage of works and the description of the sections that would be doubled if necessary will be decided after optimisation of the Stage 1 infrastructure utilisation. The sections indicated in *Figure 3.2* for Stage 2 are therefore given only as an indication. If necessary, a specific impact assessment will be carried out for this Stage 2 and submitted to the Guinean authorities before works on this Stage begins.

It should be noted that no water stream crossing bridge will be modified by the Project. Certain culverts for passing water or seasonal flows under the rail tracks will be extended, however.

It is planned that the work site facilities will be implanted whenever possible inside the ANAIM's rail corridor in order to minimise the potential impacts of the works Stage.

The Project plans for the dimensioning and installation of a modern "mobile canton and on-board signalling" safety system. This will optimise the use of the line and bring two successive trains closer together while reducing the risk of collision.

Figure 3.2 Track sections planned for doubling



Note: The PK points refer to the railway kilometric waypoints. PK0 is at the entrance to the port of Kamsar on a portion of the connecting track of CBG. The common portions of the track extend from PK2.0 to PK 134.1 of the ANAIM railway

3.3.2 Technical developments

A track maintenance centre is located at Kamsar and will continue to serve as a workshop for major repairs and cyclic servicing on the heavy railway equipment and portable railway maintenance equipment. A new track maintenance workshop will be installed in the Boké region at about PK 54 in order to limit the access times to the various portions of the track during maintenance operations and thus free up operational time for the trains. The maintenance operations will be similar to those conducted in the current configuration.

The locomotives will be maintained in two workshops:

- one existing workshop at the CBG site in Kamsar will be rebuilt, enlarged and modernised on the CBG site (three localisations are currently being studied at a few hundred metres from each other); and
- an existing workshop on the CBG site in Sangarédi that will not be modified in the Project framework.

3.4 MAIN PROJECT ALTERNATIVES CONSIDERED

The ESIA presents various alternatives that have been considered in the process of defining the Project, in order to sustain an acceptable balance between the technical and commercial feasibility and the environmental and social impacts and advantages.

The main alternatives considered are:

- transport of the bauxite by road:
  - using the existing road;
  - using a new specific road to be built.

- transportation of the bauxite by railway.

The volumes to be transported will be very much greater than the capacity of the existing road between Sangarédi and Kamsar. Creating a new road 130 km long dedicated to transporting the ore should provide for the construction of new bridges and very costly infrastructures. The environmental impact of this road would moreover be very significant, requiring the clearing of more than 600 hectares. Lastly, access to the port of Kamsar would be difficult and call for a major resettlement of houses located along this road.

The railway transport solution was thus retained subject to doubling of certain parts of the existing tracks, to increase their capacity.

All areas along the path of the existing route have been assessed and classified to determine the best possible configuration of modifications of the infrastructure to implement in order to minimise the Project's potential impacts:

- Location of the track doubling;
- Positioning to right or left of the existing tracks;
- These optimisation analyses are still under way to define a works programme that will avoid:
  - any work site in the Key Biodiversity Area (KBA) of Kamsar located around PK40;
  - any development works on the existing bridges crossing the waterways;
  - implantation of worksite equipment outside the ANAIM railway corridor; and
  - the need to create new access paths to the worksite areas.

3.5 PROJECT CONSTRUCTION CALENDAR

CFB plans to carry out the works of Stage 1 from 2017 to 2019 and Stage 2 from 2023 to 2028 depending on its eventual scope. It is planned to interrupt the earthworks during the rainy season.

The execution times are estimated as follows. The objective of current studies is to optimise the worksite steps and shorten these times if possible:
- Length of Stage 1: 9 months; and
- Length of installation and service start-up of the signalling system: 2.5 years.

The main construction steps of Stage 1 are summarised in *Table 3.3*

Table 3.3 Stage 1 construction milestones

Activity / Batch	Start	End
Excavation and filler	Upon approval of the ESIA	December 2017
Track works	September 2017	December 2017
rehabilitation of existing tracks	2018	-
Signalling – design, manufacture and installation	March 2017	December 2018

Source: Canarail, 2016, FEL-2/Raising CFB to level to allow increase of the level of multi-user traffic up to 2028.

3.6 FUTURE USE OF TRACKS

It is planned to use the tracks 24/7. Speed limitations have been defined to meet safety conditions.

The speed limitations retained are:
- maximum 60 km/h in both directions;
- PK 1.6 – 3.1 = 15 km/h;
- PK 3.1 – 9.0 = 20 km/h (public safety);
- PK 44.6 – 47.0 = 40 km/h; and
- PK 115.2 – 117.0 =50 km/h.

The average time interval between two train passages (full or empty) will be about 50 minutes by 2020 and about 36 minutes by 2028.

4 LABOUR /EMPLOYMENT GENERATED BY THE PROJECT

4.1 CONSTRUCTION STAGE

The construction site to be entrusted to a specialised contractor will be distributed over about 115 km along the existing tracks, with six doubling sections.

This contractor will provide for lodging according to its execution strategy and the number of its employees participating on the work site.

It should be noted that the works may not be concomitant in all the areas, and that about 50 to 60 people will be employed in each work area.

4.2 OPERATION OF THE RAILWAY

The current CFB staff for operating the railway is 324 employees in all departments taken together. An assessment was made of the staff level required in each department, to conserve the reliability and efficiency of railway use after the traffic is increased.

The total estimated staff for CFB to ensure the transports planned in Stage 1 of the Project is 768 employees. *Table 4.1* breaks this number down by department.

Table 4.1 Staff needs for operation in Stage 1

Department	Current staff	Effective Stage 1	Estimated recruitment needs
Administration	8	27	19
Operation	147	252	105
Track maintenance	94	236	142
Signalling & telecom	18	56	38
Rolling stock maintenance	57	197	140
TOTAL	**324**	**768**	**444**

Source: CANARAIL – FEL 2 – Implementation strategy – August 2016

Studies concerning the operational staff needs for Stage 2 have not yet been carried out, but the first estimates indicate that about 140 more people will be needed.

New staff recruitment will be launched several months ahead of the traffic modifications so the newly hired staff can be trained. Also, CFB will institute training upgrade modules to update the skills of existing employees to meet the new work technologies and procedures. Local labour will be recruited if possible, on the basis of the available qualifications, skills and professional experiences.

5 SUMMARY OF THE SOCIAL AND ENVIRONMENTAL IMPACTS ANALYSED IN THE ESIA

5.1 DATA USED

The relevant data collected in the context of the environmental and social impacts of the mining projects of the various partners to extend the railway transport capacity have been considered in this ESIA. Additional data specific to the Project was also collected in field studies carried out by ERM and INSUCO between July and November 2016.

The main studies considered in the framework of this ESIA were:

- CBG, Environmental and Social Impact Assessment (ESIA) of the CBG mine extension project, December 2014;
- COADB, Environmental and Social Impact Assessment (ESIA) of the Dian-Dian mine, December 2014;
- GAC, Addendum to the Environmental and Social Impact Assessment (ESIA) for the GAC Bauxite exportation Project in Guinea, October 2015; and
- GAC, Environmental and Social Impact Assessment (ESIA) for the MBS GAC Project of exportation of bauxite samples in Guinea, June 2016

5.2 ORGANISATION OF THE ESIA REPORT

The ESIA report is presented in a single volume covering the environment, social analyses, and an Environmental and Social Management Plan. The report is divided into chapters dealing with the various Project components (construction, operation) and covering the most significant impacts in detail.

The chapters relating to environment and social topics follow a similar structure and present information about:

- The baseline conditions that is the existing environmental and/or social conditions before Project development. This baseline includes the use of the existing railway up to some ten trains per day.

- The expected severity of the potential negative and positive impacts, in terms of the size of the environmental and social changes that may result from the Project all through the Project life. This included a comparison of the changes planned with the relevant standards.

- The mitigation or improvement commitments: measures proposed by the Project to avoid, reduce, mitigate and/or compensate the negative impacts, and to improve the Project's advantages by its design and operation.

5.3 CHALLENGES RELATING TO THE NATURAL ENVIRONMENT

5.3.1 *Main challenges treated in the ESIA.*

In the ESIA scoping study, the potentially significant environmental challenges summarised in *Table 5.1* were identified:

Table 5.1 Type of potential major environmental impacts

Environmental aspect	Potential impact
Construction	
Biodiversity	Clearing, leading to degradation or loss of habitats and loss of potential individuals of wild fauna Disturbance of wild fauna due to Project activities (collisions, noise, vibrations, human presence)
Air quality	Increased concentrations of pollutants and dust
Noise and vibrations	Increased noise levels and vibrations
Hydric resources	Pollution of surface water streams and ground waters
Soils	Loss and pollution of soils
Operation	
Biodiversity	Collision with wild fauna Disturbance of wild fauna (noise, vibration, maintenance)
Air quality	Increased concentrations of pollutants and dust
Noise and vibrations	Increased average noise levels and vibrations in inhabited and natural areas Increased frequency of noisy events in inhabited areas

issues pertaining to biodiversity and natural habitats, noise and air quality were given special attention, both for the construction Stage and the operating Stage, because these are fields where the potential impacts might be significant – which led in particular to the definition of appropriate mitigation measures.

To rationalise the assessment of the impacts, the entire study area was divided into several categories of discontinuous geographical areas with similar characteristics and sensitivities.

The three types of areas are:

- Urban Areas (UA);
- Semi-Urban Areas (SUA); and
- Rural Areas (RA).

The location of these various areas along the railway is presented in *Figure 5.1; Figure 5.2 and Figure 5.3:*

Figure 5.1 Location of areas from PK 1 to PK 40

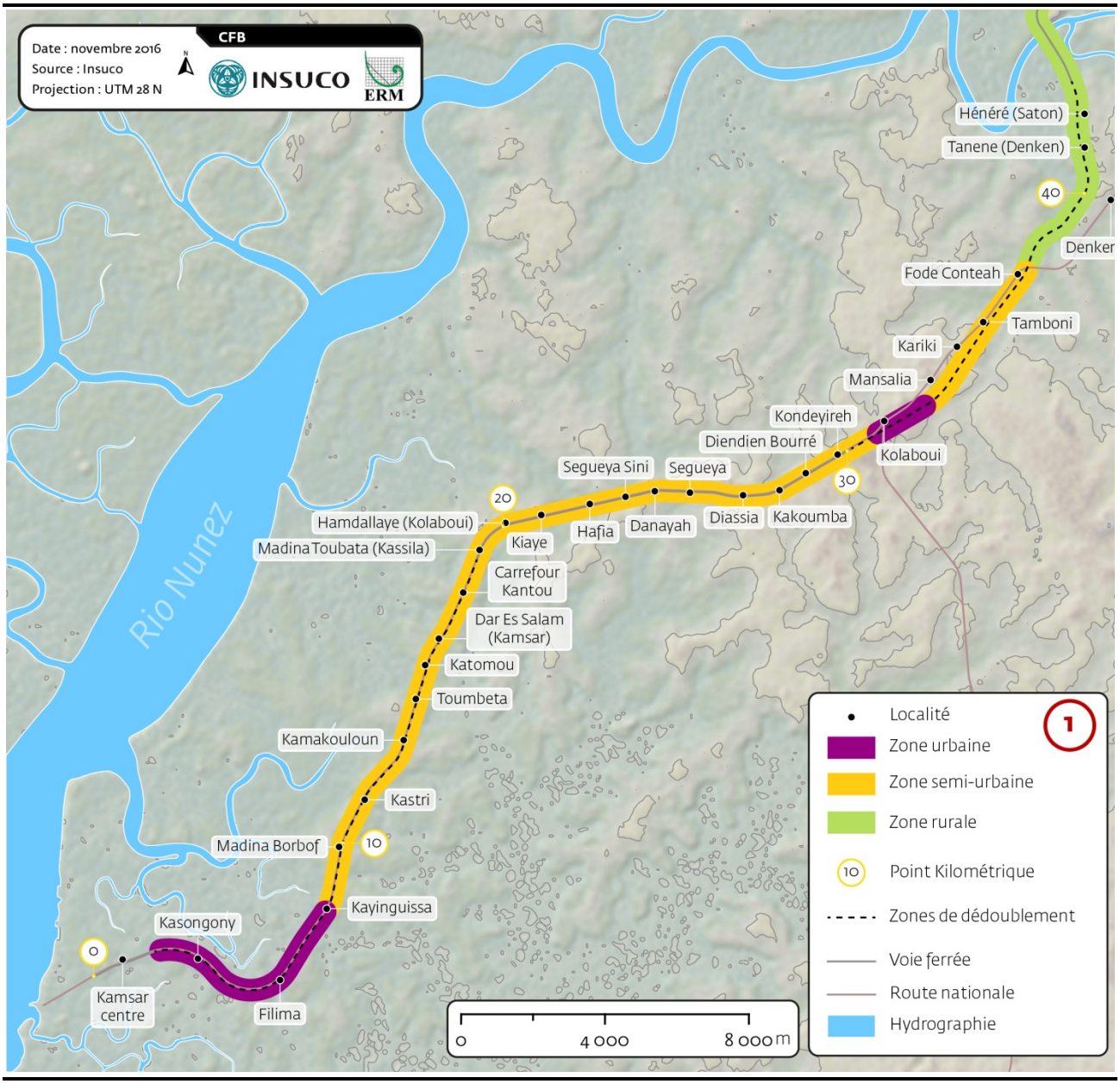


Figure 5.2 Location of areas from PK 45 to PK 80

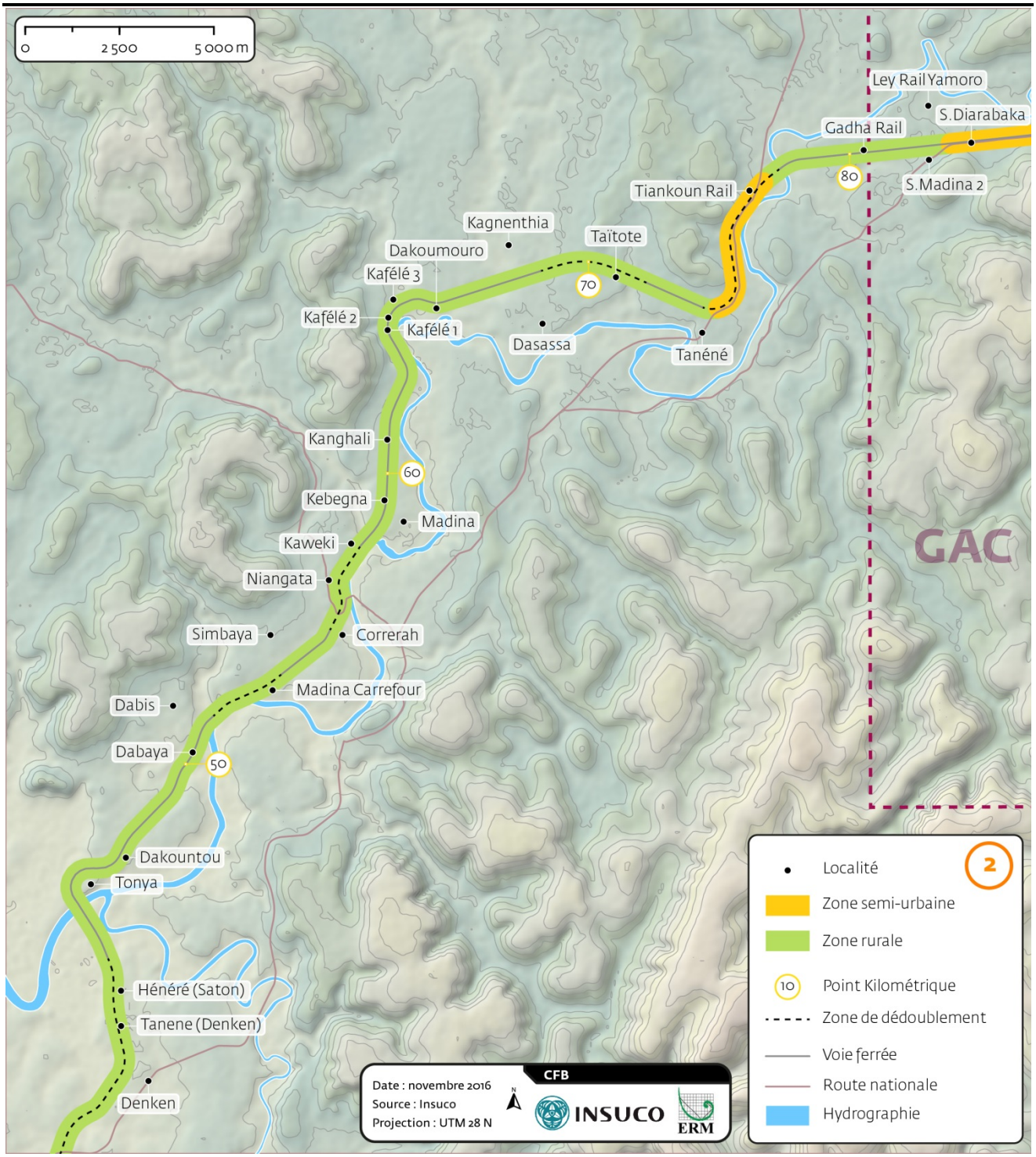
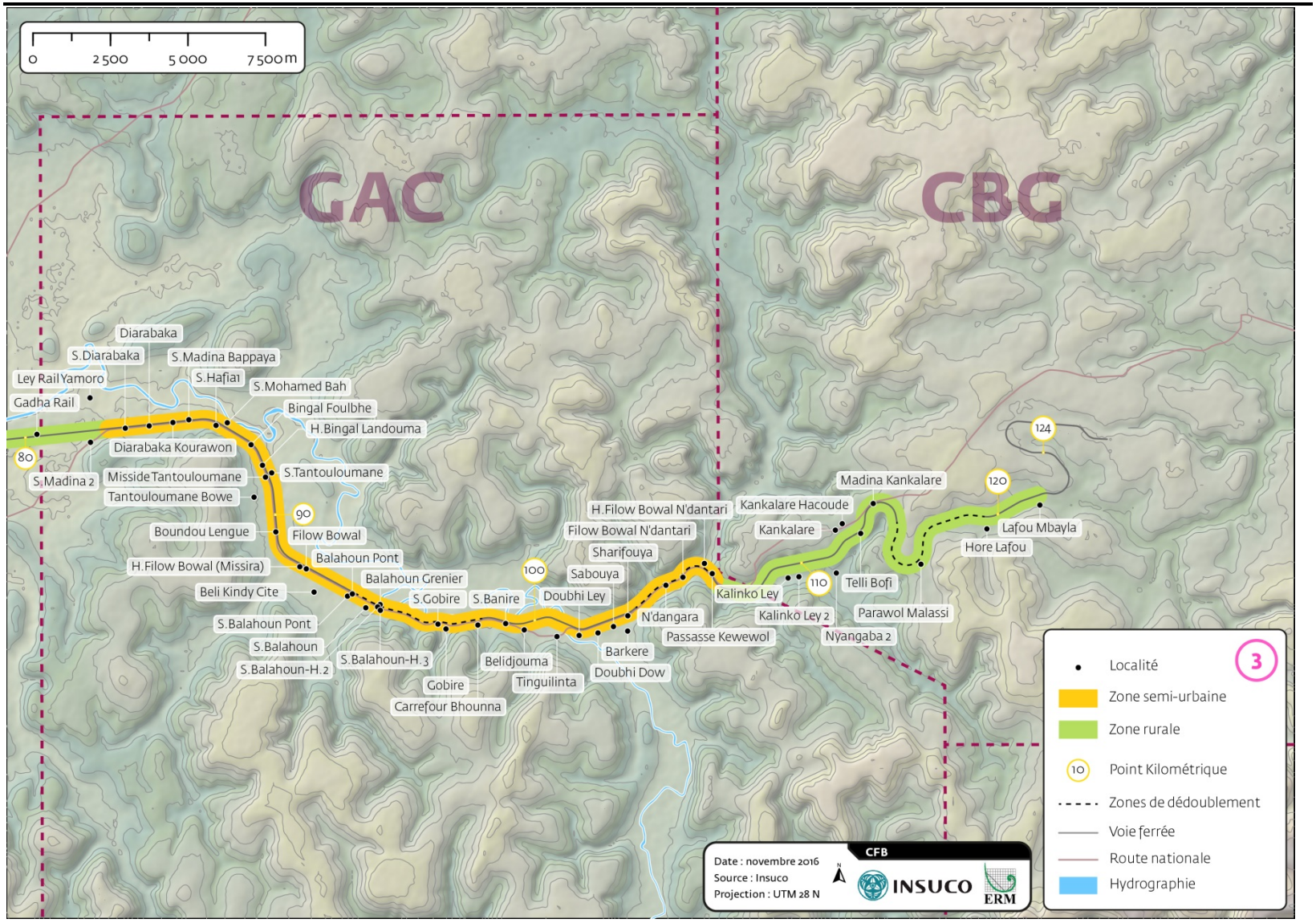


Figure 5.3 Location of areas from PK 80 to PK 120



5.3.2 *Significant environmental impacts identified*

The systematic analyses and assessments made in the ESIA context led to determining the Project's significant environmental impacts and the specific mitigation measures to limit them.

The impacts identified are indicated in *Table 5.2.*

Table 5.2 Significant environmental impacts identified

Environmental aspect	Project stage	Impact
Biodiversity and natural habitats	Construction	Clearing leading to the Loss of sensitive habitats Potential loss of individuals of sensitive species
Noise and vibrations	Operation	Increased average noise levels and vibrations in inhabited and natural areas Increased frequency of noisy events in inhabited areas
Air quality	Operation	Increased concentration of pollutants in inhabited areas

The impacts listed in the table above and the corresponding mitigation measures are described and discussed in greater detail in the following sections.

5.3.3 *Impacts of construction on biodiversity and natural habitats*

Preparation of the soil in the area where the new tracks will be installed will require clearing and preparation of the soil over a strip 10 m wide (on the doubled side of the existing tracks). Degradation of the habitats related to the Project is therefore concentrated in this 10 m wide strip and over a total cumulative length of about 60 km.

It should be noted, though, that a large part of the route runs through urban or semi-urban areas, and/or along the national highway, where the habitats may be considered as modified or influenced by urbanisation, the presence of villages, agriculture, exploitation of forest resources. Lastly, the presence of the existing railway and the passage of the current trains contribute to making the Project area a natural environment that is already largely anthropised.

The main potential impact on biodiversity and habitats is therefore concentrated in the main sensitive habitats identified, which are all located in Rural Areas. The total area of natural environments that have to be cleared and where work has to be done in Rural Areas is about 8.1 hectare in Stage 1, and 6.5 hectare in Stage 2. Moreover, creation of new access paths to the work site areas will not be necessary insofar as the existing roads and trails already access these areas.

The most sensitive habitats identified are:

- the mangrove at the level of the bridge over Rio Nuñez (PK 44.5); the very diversified bushy savanna around the village of Saton (PK42-43); both located in the Kamsar Key Biodiversity Area (Kamsar KBA);

- the bushy formation between the tracks and the national road (PK 75); the complex formed by the valley – dense dry forest of the village Taitot (PK 76-77); and

- the palm tree stand and gallery forest of Boundou-Gounoupi (PK116-117) as well as that of Télibofi (PK 115).

Measures were taken in the Project optimisation study to limit the area of the works and avoid sensitive areas like the Kamsar KBA. Also, following best work site management practices (drawing up detailed inventories of biodiversity in work site areas before the works, not conducting earthworks in the rainy season, good management of dangerous products and wastes) will limit the impact of track construction on the natural environments.

Furthermore, recognising that the water streams edged by gallery forests are a sensitive biological environment, the Project does not plan to double the track over the bridges spanning large streams of water (in particular Rio Nuñez, the Tinguilinta and their main affluents). The gallery forest should therefore not be impacted by the works.

Considering the small surface of the sensitive areas impacted by the Project, the residual impact, once all the prevention and mitigation measures are implemented, has been assessed as minor.

5.3.4 Impacts of noise and vibrations during operation

5.3.4.1 Modifications made by the Project

The noise monitoring programme implemented in the context of the baseline mission established that the passage of a mining train over the existing railway generates a similar sound impact whether it is loaded or empty, and produces a noise of about 84-85 dB(A) for receptors 5 metres from the tracks.

The equipment used for operating the new infrastructures are not going to modify the noise generated by a train passage significantly. The expected impacts will be generated by the increased traffic from 10 trains per day to 40 trains per day in Stage 2. This traffic increase will be reflected in an increased average sound environment (LAeq in dB(A)) felt at the level of the receptors and by a number of noisy events (passage of train) at night, which will go from four per night now up to ten in Stage 1 then 13 in Stage 2.

The impact felt by a given receptor depends on its position with respect to the tracks and the ease of noise transmission in the space environing the tracks

(natural obstacle or building, but also the direction of the wind or a rainy phenomenon, pre-existing ambient noise in the area, etc.)

5.3.4.2 *Noise impact assessment criteria*

To assess the impact of the noise generated by the increased traffic, sound levels were modelled for the three types of areas defined for all the ESIA studies.

The results were compared:

- for the average noise level: to the criteria set in the general EHS Directives of the IFC (IFC, 2007); and
- for the number of nocturnal disturbances: to the Ecoaccess directives (*Ecoaccess Guideline, Planning for Noise Control*), which refer to World Health Organisation (WHO) standards (*WHO, Guidelines for Community Noise*).

The threshold of 3dB mentioned in the general EHS Directives of the IFC (IFC, 2007) is the approximate threshold beyond which the human ear detects a change in sound level. On the basis of the Bies work (1997), the thresholds of 5 and 10 dB are generally retained for levels of *Minor, Average* and *High* intensity.

Table 5.3 Increased noise from the ambient level and intensity of the impact

Increase over ambient noise	Intensity of impact	Comment
0 – 3 dB	Negligible	Change almost imperceptible to human ear
3 – 5 dB	Low	Change slightly perceptible
5 – 10 dB	Average	Change clearly perceptible
> 10 dB	High	Change highly perceptible (noise level doubled for human ear)

The Ecoaccess nocturnal disturbance criteria are illustrated in Table 5.4.

Table 5.4 Nocturnal sound disturbance criteria (Source: WHO /Ecoaccess)

Description	Number of noisy events	Internal limits - dB(A) (1)	External limits - dB(A)
Disturbance to sleep (short-duration events)	10 – 15	45	52
	3	50	57
	1	55	62
Disturbance to sleep (continuous events)	Continual	30	37

Notes:
(1) On the basis of a reduction of 7 dB(A) conservative for partially closed windows.

5.3.4.3 *Noise level modelling results*

The increased sound levels estimated for Project Stages 1 and 2 are summarised in *Table 5.5* and *Table 5.6*. For each receptor, the intensity of the associated impact is defined on the basis of the criteria presented in Table 5.3

Table 5.5 Increased sound levels expected for Project Stage 1

Area of study	Distance from railway [m]	Baseline sound level LAeq [dB(A)]	Sound level during Stage 1 LAeq [dB(A)]	Sound level increase [dB(A)]	Intensity de l' Impact
Area A (Kamsar)	100	58.2	60.4	2.2	Negligible
	50	58.4	62.9	4.5	Low
	20	65.1	69.8	4.7	Low
Area B (Kolaboui)	5	74.0	78.8	4.8	Low
Area C (Tanéné)	5	74.3	79.1	4.8	Low

Table 5.6 Increased sound levels expected in Project Stage 2

Area of study	Distance from railway [m]	Baseline sound level L_{Aeq} [dB(A)]	Sound level during Stage 1 L_{Aeq} [dB(A)]	Sound level increase [dB(A)]	Impact intensity
Area A (Kamsar)	100	58.2	61.2	3.0	Low
	50	58.4	64.1	5.7	Average
	20	65.1	71.1	6.0	Average
Area B (Kolaboui)	5	74.0	80.1	6.1	Average
Area C (Tanéné)	5	74.3	80.4	6.1	Average

The nocturnal sound contribution of the Project was compared with the Ecoaccess nocturnal disturbance criteria that set a threshold of 52 dB (A) outdoors, not to exceed more than 10 to 15 times per night. The increased traffic due to the Project should therefore generate an impact at the upper limit of the criteria established by the international directives pertaining to sleep disturbances.

5.3.4.4 Mitigation measures and residual impact

The following management measures will be instituted and will help minimise the sound emissions and vibrations:

- The locomotives and cars will be inspected and maintained regularly.
- The tracks will be inspected and maintained regularly.

In addition, in order to mitigate the impact of increased noise levels, the Project is considering the following mitigation measures:

- Consideration of sound emissions in the purchase of equipment for the Project, including the ore transport cars;
- Instituting regular checks in the sensitive areas;

- Setting up a complaint management mechanism to hear any noise complaints;

- Instituting a noise management plan to:
  - Identify sensitive points along the route;
  - Plan partial construction of anti-noise structures (walls, tree curtain) the size of which will depend on noise level and receptor sensitivity.

Implementing these measures should entail a *Minor* residual impact over most of the route. However, in certain sensitive areas particularly close to the railway, the impact should nonetheless remain *Moderate.*

Whenever the noise impact is too high for a given receptor and too difficult to mitigate by anti-noise measures, CFB may consider moving the affected receptor to areas less exposed to the noise, in accordance with the general resettlement and compensation procedures developed for the Project.

5.3.5 Impact of Project on air quality during operation

5.3.5.1 Pollutants considered and impact assessment criteria

The atmospheric emissions that were assessed as potentially significant are the locomotive exhaust gases. The main pollutants are NO_x and SO_x.

The air quality was modelled to quantify the concentrations of these parameters at ground level for the three types of areas defined in the context of all the ESIA studies: Urban, semi-urban and rural areas. Highly increased assumptions were used in these models depending on the available data at the time the studies were made, in particular as concerns the power used by the locomotives in urban areas and the speed of the trains in each of these areas. As a consequence, another modelling should be conducted with the most precise possible project data in the context of the air quality management plan in order to allow precise assessment of project compensation or resettlement needs in potentially impacted areas.

Guinean standard NG 09-01-011:2012 / CNQ:2004 sets the regulatory limits on ambient air quality. These limits are the same or slightly less constrictive than the WHO standards that were selected for this assessment. The WHO air quality standards establish Intermediate Targets and reference values for the protection of human health.

For the purposes of this assessment, the WHO's first Intermediate Target served as basis for the assessment criteria. These standards are given in Table 5.7.

Table 5.7 Air quality standards for the protection of human health

Pollutant	Average exposure time	WHO air quality standard (µg/m³)	Guinean standards

		First Intermediate Target	(µg/m³)
PM_{10}	Daily average	150	260[1]
	Annual average	70	80
$PM_{2,5}$	Daily average	75	-
	Annual average	35	65
NO_2	Hourly average	200	200
	Annual average	40	40
SO_2	Daily average	125	125
	Average in 10 minutes	500	-

The impact intensity assessment criteria are based on the concentration level reached with respect to the limits set in the standards (SQA). These criteria are detailed in *Table 5.8*

Table 5.8 Air quality assessment criteria impact intensity

PEC in % of SQA	Intensity
<25%	Negligible
25-50%	Low
50-75%	Average
>75%	High

5.3.5.2 Results of modelling of pollutant concentrations and impact intensity

The results of the modelling (detailed in *Appendix 8-B* and synthesised in the following tables) lead to the following conclusions:

- Rail traffic-related emissions entail exceedances of the WHO air quality standards.
- For each area and each pollutant, the estimated concentrations increase when going from the baseline to Stage 1 and then to Stage 2.
- The main critical parameter is the short-term concentration in NO_2. The baseline traffic in urban areas already contributes to more than 75% of the WHO standard over a strip of about 330 m to either side of the tracks. During Stage 1, this strip broadens by 210 m to each side (250 m for Stage 2). New receptors would thus be impacted by the degradation of the air quality. This trend is also observable in semi-urban and rural areas.

- The most critical contributions are obtained for the urban area, followed by the semi-urban then the rural areas.

These contributions also add to a baseline that is already more degraded in urban areas than in semi-urban or rural areas.

The intensity of the impacts should be assessed in light of the impacts stemming only from emissions related to the Project (Contribution of the Project – CP). However, to provide a better description of air quality during the Project, the predicted environmental concentration (PEC) was used for this assessment. This approach is an increase because it includes emissions due to the present traffic.

For purposes of summarising, on the basis of the exceedances of certain WHO air quality standards (in particular the hourly concentration in NO_2) and the significant increase in the area over which the Project contributes is a major part of these standards, the impact intensity on air quality was deemed *High.*

The intensity of this impact should be specified by a new modelling exercise when the current technical studies yield more precise results so the very high assumptions used as model inputs can be revised.

5.3.5.3 Mitigation measures and residual impacts

To mitigate the impact of the degradation of air quality, the Project is considering the following mitigation measures:

- Consideration of atmospheric emissions in the purchase of Project equipment. In particular, the new locomotives will be in accordance with the USEPA Tier II standard for NO_2 and NOx emissions.

- Use of diesel fuel with low sulphur content, if available locally.

- Implementation of an air quality management plan that will:
  - identify the sensitive areas along the route;
  - define regular monitoring in the sensitive areas (especially for NO_2 and NO_X);
  - establish a public and authorities' information process in the event of exceedance observed in air quality standards;
  - consider population resettlement if the result of the mitigation measures is insufficient.

- Instituting a grievance management mechanism to record any air quality complaints.

Implementing these measures should entail a *Moderate* residual impact over most of the route.

In certain sensitive areas particularly close to the railway, the impact might nonetheless remain *Major*. These areas should be monitored closely to inform of the need for additional mitigation measures, in particular the need for possible resettlement.

5.4 CHALLENGES PERTAINING TO THE HUMAN ENVIRONMENT

5.4.1 Significant social impacts identified in the ESIA

In all, 98 localities (cities, villages and hamlets), were identified and geo-localised, distributed in 20 districts. Of these localities, there are the two urban agglomerations of Kamsar and Kolaboui, respectively about 100,000 inhabitants and 10,000 inhabitants according to the consulted local authorities.

Of the localities listed, some have their inhabited areas fairly close to the railway. In the village of Dabis, the constructions closest to the tracks are more than a kilometre away, but in many other localities the first houses are less than 15 m to either side of the tracks. This is in particular true at the level of the two urban agglomerations mentioned before.

The sources of potential impacts are not strictly the same for villages along the existing tracks and those whose domain is precisely located on one of the future doubling sections. The ESIA pays special attention to the latter, the domain of which will be encroached upon physically by the CFB Project, especially when assessing the impacts of the Project construction Stage. Also, the characteristics specific to each type of area defined for the assessment of the impacts in this ESIA were taken into consideration (urban, semi-urban and rural areas).

After analysis and detailed assessment of the potential impacts, significant social impacts were identified. These are summarised in *Table 5.9* and detailed in the following sections

Table 5.9 Significant social Impacts identified by the ESIA

Impact theme	Construction Operation C/ O	Potential impact
Demography	C	Loss of houses on the physical imprint of the Project
Incomes and means of livelihood	C	Loss of arable and pasturing land on the physical footprint of the Project including within ANAIM rail corridor
	C	Loss of commercial activities on the physical footprint of the Project including in the ANAIM rail corridor
	O	Permanent reduction of breeding and transhuman activities due to increased rail traffic
Community cohesion	C	Social tension related to PAR process
	C	Tension with administrative and traditional authorities
	C	Tension between labour and communities
	C / E	Tension due to Project employment policy
Access to water	C	Loss of water provisioning points
	O	Deterioration of traditional wells because of vibrations generated by train passage

Impact theme	Construction Operation C/ O	Potential impact
Health and community safety	C /O	Increased frequency and seriousness of accidents due to increased road traffic during construction work and rail traffic in operation
Workers' health and safety	C	Increased risk of accidents during construction works
Infrastructures of public utility	C	Reduction of the number of infrastructures in the construction corridor (health, religious, school, etc.)
Mobility, flows, transport	C	Movement difficulties at edge of construction work site areas
	O	Reduction of access to sites on the other side of the track due to increased traffic
Cultural heritage	C	Loss of cultural heritage sites

5.4.2 *Project-related loss of public infrastructures, goods or activities*

Project-related losses of public infrastructures, goods or means of subsistence is a potentially major element that might generate impacts and major disorders if it is not managed carefully.

The main measures stipulated for managing these situations, both in the construction stage and in operation, are to:

- develop clear and consistent communication about the Project to the potentially impacted communities;
- avoid directly impacting public infrastructures and involuntary resettlement as much as possible;
- develop and implement a RAP in concert with the impacted communities and the local authorities in consideration of the owners and all users, legitimate or not, of the resources;
- make sure that the movement and re-location of public infrastructures are done before the construction activities in the doubling corridor;
- develop a plan to restore livelihood for the communities that will be concerned by an economic displacement (loss of property and/or of means of subsistence);
- compensate all the types of lands (agricultural or other) on the basis of a management plan of individual and collective compensations covering the losses incurred both by individuals and the community;
- stress compensations in kind rather than financial; and
- develop and implement a grievance mechanism in conformity with IFC requirements.

It should be noted that the displacement of certain public infrastructures (schools, health centres), in concert with the populations might generate a positive Project impact if the new installations lead to an improved existing situation (modernisation of premises and equipment, improved accessibility, etc.).

If the mitigation measures are correctly applied, it will curb the Project's residual impact on these themes to a minor level in the SUA and RA and negligible in the UA.

5.4.3 Community cohesion

5.4.3.1 Sources of impact

Social tensions are already perceptible between the administrative and traditional authorities, and the local population, with the people accusing the authorities of having no influence over CFB and their incapacity to send in complaints about real or alleged nuisances. When construction work begins, this could increase these tensions.

The presence of Project labour is likely to generate tensions with the members of the communities nearby where these works are going on. It is possible that the presence of a group of workers of up to sixty people can generate hostile reactions from the local communities especially in the SUA and RA. These reactions might be exacerbated if the communities affected by the construction in the doubling areas are not employed by the Project.

The compensation and relocation procedures are likely to generate tensions in the communities affected, between members who receive compensations for utilisation right or administration as well as amongst households that receive compensations and those that don't. Moreover, since in the SUA and RA, the lands are managed collectively and the overlapping of utilisation and administration rights is complex, it is possible that these processes will be sources of conflict in the communities.

It is planned that the Project in Stage 1 of operation employs 444 additional people and that an ambitious training programme will be implemented. Amongst these jobs, only 142 are jobs with low qualifications for which the members of the communities without training can apply directly. If the Project does not anticipate training people without qualification for better qualified jobs, recruiting people considered to be foreign to the community might generate tensions with regard to the Project.

5.4.3.2 Mitigation measures and residual impact

The mitigation measures stipulated are listed below. If applied correctly, they will limit the residual impact to minor or negligible depending on the sensitivity of the area considered.

- Communicate before the construction Stage on the Project scope and agenda;
- develop a strategy before the project and a communication plan of local, regional and national scope to inform job-seekers of the true opportunities offered by the Project;

- implement a recruitment policy favouring local communities as much as possible (subject to sufficient competence and/or for activities requiring little qualification such as clearing the land);
- develop and implement a code of good conduct for the project workers and subcontractors that will include directives on worker-communities and worker-worker interactions;
- develop strict management procedures for earthworks and track laying, to avoid accidental degradations or destruction of community property;
- follow the Mining Code with specific attention to Articles 107, "Preference to Guinean companies", Article 108, "Staff employment", Article 109 "Staff training";
- support initiatives to improve access to the basic infrastructures in collaboration with the State and the mining companies implanted in the area;
- repair or replace any social infrastructure that might be altered by the Project;
- develop and implement a grievance management system;
- consider the Local Development Plans generated by the municipalities when choosing actions to finance in the context of its community projects

5.4.4 Access to water

5.4.4.1 Sources of impact

Three water access points have been identified in the doubling corridors: two traditional wells in the UA of Kolaboui and a functioning drilled well in the UA of Kamsar. The loss of these water points could affect the sanitary conditions in the communities and obligate people to travel generally greater distances with heavy loads.

In the Projects area of influence, only 23 of the 100 localities have at least one functioning drinking water point in their inhabited area. The others therefore depend on surface waters or traditional wells without pipes for water. The increase in rail traffic will increase vibrations. Depending on the geological characteristics and distance from the railway, the increased vibrations may entail or accelerate the collapse of the traditional wells.

5.4.4.2 Mitigation measures and residual impact

If the measures listed below are implemented correctly, they would lead to a positive impact of the Project, mainly in the rural areas that are very sensitive to the possibility of accessing good quality water all year round.

- Press initiatives of construction, equipment, servicing and maintenance of improved water points in the communities affected by the Project;
- develop and implement a complaint management system;
- develop and implement a PARC containing a part pertaining to access to water resources;

- replace the infrastructures affected by functional drilling in concert with the users before beginning construction.

5.4.5 Mobility and transport

5.4.5.1 Nature of the impact

Aside from a few level crossings for vehicles, the current infrastructure is not equipped with securitised systems for crossing the tracks safely either by pedestrians or for two wheelers.

The presence of the construction sites, although localised and temporary, will represent physical barriers that can prevent pedestrian circulation and vehicle traffic.

The increase in rail traffic from 9.4 trains per day currently to nearly 40 trains per day in 2028, as well as the presence of additional rail infrastructures after the construction Stage, will represent a major physical barrier all along the railway. This situation will be especially bothersome in the doubling sectors where two trains might be present at the same place. On average over the whole railway, a train passage will occur every 50 minutes at the end of Stage 1 development (2020/2022). The increased rail traffic will therefore lead to a major decrease in the possibility for the members of the communities to cross the railway, including for the access to the basic infrastructures (schools, health stations, water points, markets). This will affect the daily activities of people living nearby the railway throughout the area of social study.

Moreover, the seasonal transhumance activities of herds may be significant, and require crossing the tracks. Depending on the size of the herd, the time to cross the tracks may be large, generating a risk that will increase concomitantly with the increase in traffic.

The impacts generated by the Project therefore concern the mobility of the populations that cross the tracks or whose activities are located to both sides of the railway, and the safety of these same populations when crossing the railway.

5.4.5.2 Mitigation measures and residual impact

The following mitigation measures will be implemented to reduce the severity of this impact:

- Establish a safety management plan for all construction works and operations on the railway tracks;
- include analysis of needs and risks of track crossings in the safety management plan, in all situations (vehicles, pedestrians, herds) including for the Project construction stage;
- Before the construction Stage, consult with the communities to identify what trails would be impacted and develop solutions in concert with the populations affected;
- Conduct regular sensitisation sessions of the populations to the risks of the train by including the schools in this sensitisation programme;

- In concert with the local communities, study the construction of new protected passages for all activities (pedestrians, two-wheelers, vehicles, herds) including temporary facilities for the construction works stage if necessary;
- Construct alternative trails to let the population get to neighbouring villages, their crop zones and the urban centres without crossing the railway.

These measures will greatly reduce the severity of these impacts. However, considering the significant increase in traffic, the impacts will remain of moderate severity and must be subject to permanent attention all along the Project.

5.4.6 Cultural or religious assets

5.4.6.1 Nature of the impact

Cultural heritage sites have been identified in the rail doubling corridors and in an area of 200 m to either side of the tracks.

There are 63 sites at less than 200 m from the tracks, 31 spirit homes, 30 cemeteries and one historical site. These cultural sites might be impacted directly by a change of their context. Those located at an estimated maximum of 200 metres from a construction site might have their value diminished in the eyes of the stakeholders because of the noise, the visual impacts or reduced accessibility.

The presence of nationals or foreign workers in the Project area might prompt potential degradations by inadvertently crossing through holy areas like spirits' homes.

Depending on local beliefs, the communities using these cultural heritage sites might also fear that altering the sites by the Project may release uncontrolled occult forces that would negatively affect the community members. That would prompt a degradation in relations with the Project and arouse tensions between the members of the communities and Project workers.

Six cemeteries and six spirit homes were identified in the railway doubling corridors. Seven religious infrastructures were identified in the doubling corridors, five of which were in the UA of Kamsar and one in the UA of Kolaboui. Because of the Project's footprint and the planned earthwork and track laying activities, these sites cannot be kept at their current locations.

5.4.6.2 Mitigation measures and residual impact

The severity of the impact may be reduced to a minor one in all the Project areas by implementing the following measures:

- Before the construction begins, implement a community consultation process to move the sites concerned under conditions that are acceptable for the communities;
- Insofar as possible, adapt the Project design if a site cannot be moved;
- Contribute to the preservation of the sites whenever the communities so request;
- Install protective infrastructures (barriers, fences, screen plantings, earthworks, etc.) whenever the communities so request;
- Make sure the contractors implement a chance find process for cultural sites;
- Always inform subcontractors of the presence of heritage sites on their workplace; and
- Manage the subcontractors' work when they have to work in an area where cultural heritage sites have been found.

6 *CONVERTING THE ESIA IN A SOCIAL AND ENVIRONMENTAL MANAGEMENT PLAN*

CFB and its partners have committed to take a great many social and environmental measures designed to mitigate the negative impacts and optimise the advantages of the Project. All the mitigation measures specified in the ESIA are grouped together, updated and converted into a Social and Environmental Management Plan (SEMP) for implementation by the CFB project to extend the transport capacity of the railway between Sangarédi and Kamsar.

The objective of the SEMP is to list and summarize all the mitigation measures, procedures and social and environmental plans to implement by the Project and provide a framework to control or even audit the project's compliance with standards and best practices.

The SEMP is organised by topic and defines a clear indication of the actions that will be undertaken for each Project component. It also includes commitments to carry out later studies to refine the mitigation plans and tracking plans as well as the prevention systems to check that the impacts are no greater than expected.

The monitoring and tracking of the Project's environmental and social impacts are an essential aspect of an effective and efficient social and environmental management system.

The need to modify the measures in place will be based on quantitative social and environmental thresholds or on qualitative criteria as defined by the Social and Environmental Monitoring Plan.