4115, rue Sherbrooke Ouest, bureau 310
Westmount, Québec H3Z 1K9
Tél.: 514.481.3401
Téléc.: 514.481.4679
eem.ca

Environmental and Social Impact Assessment of the CBG Mine Extension Project

Chapter 0 – Executive Summary

MAY 2015
PROJECT NUMBER: 13EAO039

SUBMITTED TO:

Compagnie des Bauxites de Guinée

MASTER TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF MAPS

LIST OF PHOTOS

ABBREVIATIONS AND ACRONYMS

(Note: text in square brackets [] is a translation of a French term for which there is no official English version)

°C: Degrees Celsius

AIDS: Acquired Immune Deficiency Syndrome

AIP: Annual Investment Plan

AMC: Alliance Mining Commodities Ltd.

ANAIM: *Agence Nationale d'Aménagement des Infrastructures Minières* [national agency for mning infrastructure development]

APA: *Laboratoire Archéologie et Peuplement de l'Afrique* [archeology and peopling of Africa laboratory]

APAÉ: *Association des parents et amis d'élèves* [parents and friends of students]

ARV: Antiretroviral

BAP: Biodiversity Action Plan

BEPC: *Brevet d'Études du Premier cycle du second degree* [school certificate]

BGÉÉE: *Bureau Guinéen d'Études et d'Évaluation Environnementale* [Guinean bureau of environmental studies and evaluation]

BM: *Banque Mondiale* **/** World Bank (WB)

BPII: *Bonnes pratiques industrielles internationales* / Industrial International Best Practices

C/P: Frontline fishing camps and ports

CA: *Chiffre d'affaires* [Revenues]

CBG: *Compagnie des Bauxites de Guinée*

CCME: Canadian Council of Ministers of the Environment

CCNUCC: *Convention-cadre des Nations Unies sur le changement climatique* / World Bank United Nations Framework Convention on Climate Change (UNFCCC**)**

CDD: *Contrat de durée déterminée* [Contract of defined length]

CDI: *Contrat de durée indéterminée* [Contract of indefinite length]

CECI: *Centre d'études et de coopération internationale* / Centre for international Studies and Cooperation

CECIDE: Centre du Commerce International pour le Développement / Our World is Not for Sale (OWINFS)

CEDEAO: *Communauté économique des États de l'Afrique de l'Ouest* / United Nations Economic Commission for Africa (UNECA)

CFB: *Chemin de Fer de Boké* [Boké railroad]

CITES: Convention on International Trade of Endangered Species

CMG: *Chambre des Mines de Guinée* [Guinean chamber of mines]

COD: Chemical Oxygen Demand

COPC: Contaminant of Potential Concern

CoPSAM: *Comité Préfectoral de Suivi des Activités des Miniers* [Prefectorial mining activity monitoring committee]

CPC: *Contaminant potentiellement préoccupant* / Contaminant of Potential Concern (COPC)

CPD: *Comité Préfectoral de Développement* [Prefectorial development committee]

CPÉ: *Consultation et participation éclairées* / Free Prior and Informed Consent (FPIC)

CR: *Commune rurale* [rural commune]

CRD: *Commune rurale de développement* [rural development commune]

CSA: *Centre de santé amélioré* [improved health centre]

CSO: Civil Society Organizations

CSR: Corporate Social Responsibility

CU: *Commune urbaine* [urban commune]

CVÉ: *Composante valorisée de l'écosystème* / Valued Ecosystem Component (VEC)

dB: Decibel

dBA: A-weighted decibel

dBZ: Decibel relative to Z

DPUHC: *Direction préfectorale de l'urbanisme de l'habitat et de la construction* [Prefectorial directorate for housing and construction]

DUDH: *Déclaration universelle des droits de l'homme* / Universal Declaration of Human Rights (UDHR)

ÉDG: Électricité de Guinée

EIA: Environmental Impact Assessment

ÉIE: *Étude d'impact environnemental* **/** Environmental Impact Assessment

ÉIS: *Étude d'impact social* **/** Social Impact Assessment

EITI: Extractive Industries Transparency Initiative

EPA: Environmental Protection Agency (United States)

EPI: Extended Program on Immunization

EPT: Ephemeroptera, Plecoptera and Trichoptera (types of aquatic insects)

ESCOMB: *Enquête de surveillance comportementale et biologique sur le VIH/SIDA* [monitoring survey on HIV and AIDS]

ESIA: Environmental and Social Impact Assessment

ESMP: Environmental and Social Management Plan

ETAE: *Eaux tropicales de l'Atlantique Est* [tropical waters of the Eastern Atlantic]

FEL 1: Front-end Loading – Preliminary Economic Assessment

FEL 2: Front-end Loading – Prefeasibility Study

FEL 3: Front-end Loading– Detailed Engineering Study

FPIC: Free Prior and Informed Consent

GAC: Guinea Alumina Corporation

GdG: *Gouvernement de la Guinée* / Government of Guinea (GoG)

GDP: Gross Domestic Product

GES: *Gaz à effet de serre* **/** Greenhouse gas (GHG)

GHG: Greenhouse gas

GIEC: *Groupe d'experts intergouvernemental sur l'évolution du climat* / Intergovernmental Panel on Climate Change (IPCC)

GIS: Geographic Information System

GNF: Guinean Franc

GoG: Government of Guinea

GPS: Global Positioning System

GRI: Global Reporting Initiative

GTP: Ground truth point methodology

Ha: Hectare

HAP: *Hydrocarbure aromatique polycyclique* / Polycyclic Aromatic Hydrocarbon (PAH)

HFO: Heavy fuel oil

HP: Horsepower

HSE: Health Safety and Environment

IBA: Important Bird Area

ICCPR: International Covenant on Civil and Political Rights

ICESCR: International Covenant on Economic, Social and Cultural Rights

ICMM: International Council on Mining and Metals / *Conseil International des Mines et des Métaux*

IFC: International Finance Corporation

IFI: International Finance Institutions / *Institutions financières internationales*

ILO: International Labour Organization

IPCC: Intergovernmental Panel on Climate Change

ISQG: CCME Interim Sediment Quality Guideline

IST: *Infections sexuellement transmissibles* / Sexually transmitted infections (STI)

ITIE: *Initiative pour la Transparence des Industries Extractives* / Extractive Industries Transparency Initiative (EITI)

IUCN: International Union for Conservation of Nature / *Union internationale pour la conservation de la nature (UICN)*

km: Kilometer

km^2: Square kilometer

LA_{eq}: Equivalent Sound Level (dBA)

LDIQS: CCME Interim Sediment Quality Guideline

L_{eq}: Equivalent Sound Level (dB)

m: Meter

m^2: Square meter

m^3: Cubic meter

m^3/h: Cubic meters per hour

MDDEP: *Ministère de développement durable, de l'environnement et des parcs du Québec, maintenant connu sous le nom Ministère du développement durable, de l'environnement et de la lutte contre les changements climatiques* / Quebec Ministry of sustainable development, environment and parks, now known as the Ministry of sustainable development, environment and the fight against climate change

MDT: *Matières dissoutes totales* / Total dissolved solids (TDS)

ml: Milliliter

mm: Millimeter

MME: Ministère des Mines et de l'Énergie / Ministry of Mines and Energy

MTPA: Million tonnes per annum (year)

MW: Megawatt

N/A: Not applicable

NEP: *Niveau d'effet probable du CCME* / CCME Probable Effects Level (PEL)

NGO: Non-Governmental Organization

NP: *Norme de performance de la SFI* / Performance Standard of the IFC (PS)

NSP: *Ne s'applique pas* / Not Applicable (N/A)

OAU: Organization of African Unity

OCDE: *Organisation de Coopération et de Développement Économique* / Organization for Economic Co-Operation and Development (OECD)

OECD: Organization for Economic Co-Operation and Development

OIT: Organisation internationale du Travail / International Labour Organization (ILO)

OMS: *Organisation mondiale de la Santé* / World Health Organization

ONG: *Organisme non-gouvernemental* / Non-Governmental Organization

ONU: *Organisation des Nations-Unies* / United Nations

OSC: *Organisations de la société civile* / Civil Society Organizations

OUA: *Organisation de l'unité africaine* / Organization of African Unity

OWINFS: Our World is Not for Sale (OWINFS)

PACV: *Programme d'appui aux organisations villageoises* [village support program]

PAI: *Plan annuel d'investissement* / Annual Investment Plan

PARC: *Plan d'action de réinstallation et de compensation* / Resettlement and Compensation Action Plan (RAP)

PCB: *Plan de conservation de la biodiversité* / Biodiversity Action Plan (BAP)

PCS: *Partenaires contre le SIDA* [Aids prevention group]

PDL: *Plan de développement local* [local development plan]

PEL: CCME Probable Effects Level

PEPP: *Plan d'engagement des parties prenantes* / Stakeholder Engagement Plan (SEP)

PÉV: *Programme élargi de vaccination* / Extended Programme on Immunization (EPI)

PGES: *Plan de gestion environnementale et sociale* / Environmental and Social Management Plan (ESMP)

PIB: *Produit intérieur brut* / Gross Domestic Product (GDP)

PIDCP: *Pacte international relatif aux droits civiles et politiques* / International Covenant on Civil and Political Rights (ICCPR)

PIDESC: *Pacte international relatif aux droits économiques, sociaux et culturels* / International Covenant on Economic, Social and Cultural Rights (ICESCR)

PK: Point kilométrique [kilometer point

PM_{10}: Particulate matter in air up to 10 micrometers in size

$PM_{2.5}$: Particulate matter in air up to 2.5 micrometers in size

PMH: *Pompe à motricité humaine* [manually– pperated pump]

PNUD: *Programme des Nations-Unies pour le Développement* / United Nations Development Program (UNDP)

PP: *Parties prenantes* / Stakeholders

PPV: Peak particle velocity

PRCB: *Projet de renforcement des capacités de Boké* [Boké rural community development project]

PS: Performance Standard of the IFC

QSE: Quality Safety and Environnement

RAP: Resettlement and Compensation Action Plan

RAP: Rapid Assessment Program / Rapid Biological Assessment

RSE: *Responsabilité sociale des entreprises* / Corporate Social Responsibility (CSR)

RTA: Rio Tinto Alcan

SAG: *Société Aurifère de Guinée* [Guinea gold corporation]

SDT: *Solides dissous totaux* / Total Dissolved Solids (TDS)

SEG: *Société des Eaux de Guinée* [Guinea water corporation]

SEP: Stakeholder Engagement Plan

SFI: *Société Financière Internationale* / International Finance Corporation (IFC)

SIA: Social Impact Assessment

SIDA: *Syndrome d'immunodéficience acquise* / Acquired Immune Deficiency Syndrome (AIDS)

SIG: *Système d'information géographique* / Geographic Information System (GIS)

SNAPE: Service national des points d'eau [national water supply points service]

SO_x: Sulphur oxides

SP: *Sous-préfecture* [subprefecture]

SSC: Species Survival Commission

SSE: *Santé, sécurité, environnement* / Health Safety and Environment (HSE)

SST: *Solides en suspension totaux* / Total Suspended Soilds (TSS)

STI: Sexually transmitted infections

TDR: *Termes de référence* / Terms of Reference (TOR)

TDS: Total dissolved solids

TOR: Terms of Reference (TOR)

TPE: *Très petite entreprise* / Very small business

TPH: Tonnes per hour

TSP: Total Suspended Particulates

TSS: Total suspended solids

UDHR: Universal Declaration of Human Rights

UICN: *Union internationale pour la conservation de la nature* / International Union for Conservation of Nature (IUCN)

UN: United Nations

UNDP: United Nations Development Program

UNECA: United Nations Economic Commission for Africa

UNESCO: United Nations Educational Scientific and Cultural Organization / *Organisation des Nations unies pour l'éducation, la science et la culture*

UNFCC: World Bank United Nations Framework Convention on Climate Change

UniGE: *Université de Genève* / University of Geneva

UTM: Universal Transverse Mercator

VEC: Valued Ecosystem Component

VIH: *Virus de l'immunodéficience humaine* / Human Immunodeficiency Virus (HIV)

WB: World Bank / *Banque Mondiale (BM)*

WHO: World Health Organization */ Organisation mondiale de la Santé (OMS)*

ZÉE: *Zone économique exclusive de la Guinée* [Guinea economic exclusive zone]

ZICO: *Zone importante pour la conservation des oiseaux* / Important Bird Area (IBA)

EXECUTIVE SUMMARY

0.1 Introduction

The *Compagnie des Bauxites de Guinée* (CBG) is a mining company belonging jointly to the Government of Guinea (GoG) and Halco Mining (Alcoa, Rio Tinto Alcan and Dadco). Currently the CBG mines, transports by railroad, treats and ships approximately 13.5 million tons per annum (MTPA) of bauxite at 3 % humidity in its facilities (nominal capacity of the treatment plant), situated at Kamsar and Sangarédi in Northwest Guinea. The CBG has been in existence since 1963, and its installations have been in operation since 1973. The company exploits three sites:

- The Sangarédi mining area (plateaus of N'Dangara, Sangarédi, Boundou Wandé, Bidikoum, Parawi and Silidara);
- The railroad network; and
- The treatment plant at Kamsar (including the port).

The CBG is currently considering increasing its bauxite production by 9 MTPA of shipped material to a production capacity of 22.5 MTPA (at 3 % humidity) by the last trimester of 2017 with another increase of 5 MTPA, to a production capacity of 27.5 MTPA around 2022. An intermediate step is planned at 18.5 MTPA. The CBG Extension Project (the Project) includes an increase in the rate of bauxite extraction, transport and treatment and includes construction and modifications to the infrastructures, equipment and operations of the CBG.

In 2013, the CBG mandated ÉEM to conduct an Environmental and Social Impact Assessment (ESIA) of the Extension Project. ÉEM is an environmental and sustainable development consulting company based in Montréal, Québec, Canada. The three main spheres of competence of ÉEM are environmental management, community relations and sustainable development strategies.

In order to conduct the Extension Project ESIA and to participate as a consultant to the feasibility study, ÉEM has assembled a group of experts with expertise in environmental and social aspects, who have an appropriate knowledge of the geographical area and the Guinean government structure and the Guinean

environmental legal framework, to form an optimal team for carrying out the studies.

The members of the team, with their discipline of expertise, are described in the figure below:

Figure 0-1 Structure of the study team

Table 0-1 identifies the firms responsible for the write-up of the various chapters of the ESIA.

Table 0-1 Responsibilities for the writing of the chapters of the ESIA

Section of the report	Author(s)
1. Context of the ESIA	ÉEM / CBG
2. Physical environment	ÉEM / CBG / SENES Consultants
3. Biology baseline	ÉEM / SYLVATROP Consulting
4. Evaluation of biological impacts	ÉEM
5. Social baseline	INSUCO
6. Stakeholder consultations	ÉEM / INSUCO
7. Evaluation of social impacts	ÉEM / INSUCO
8. Human rights	INSUCO
9. Evaluation of cumulative impacts	ÉEM
10. Environmental and Social Management Plan (ESMP)	CBG
Evaluation of human health risks	CBG

The principal persons responsible were:

For the CBG:

> Stéphane Dallaire – Of the *Service hygiène, sécurité, environnement, Relations communautaires du Projet d'extension de la CBG*, principal contact of the ÉEM study team with the CBG.

For ÉEM:

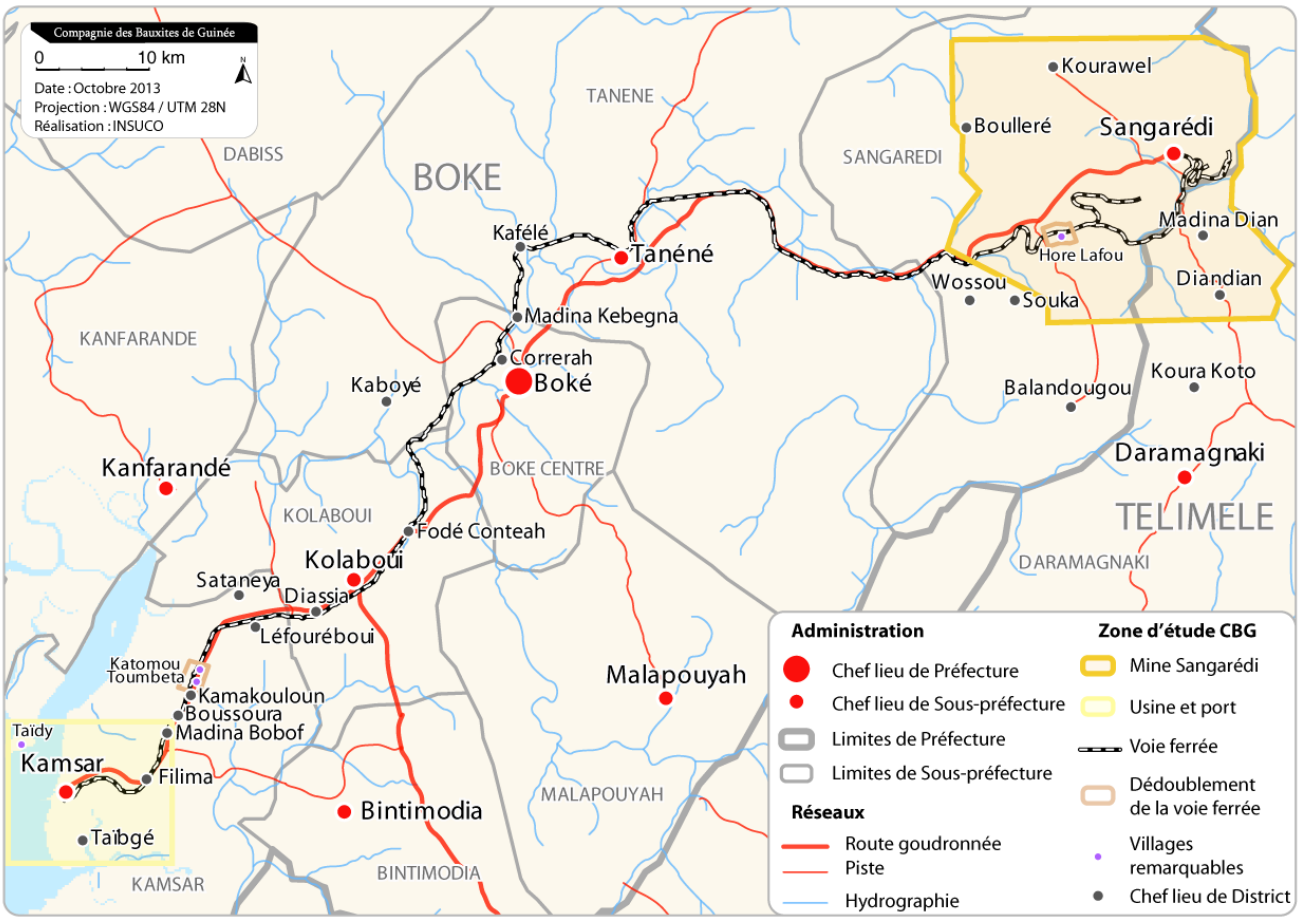
> Paul MacLean – President of ÉEM and director of the ESIA;
>
> Robert Cole – Leader for the social study; and
>
> Eric Muller – Leader for the environmental study.

The Study Area for this work included the three areas of the Project (Map 0-1):

- Zone 1: a perimeter around the zones to be mined;
- Zone 2: a zone around the facilities at Kamsar plus a marine zone at the mouth of the Rio Nuñez; and
- Zone 3: a 2 km wide corridor, 1 km on either side of the railroad line.

This study was conducted according to legal and regulatory requirements at the national level as well as the performance standards of the International Finance Corporation (IFC). The terms of reference were approved by the Guinean *Ministère de l'Environnement, des Eaux et Forêts* on November 8 2013 and the final scoping report submitted to the *Bureau Guinéen d'Études et d'Évaluation Environnementale* (BGÉÉE) on December 5 2013.

Map 0-1 Map of project area



The identification of valued ecosystem components (VEC) is a key aspect of the study. VEC are typically defined as: "… every part of the environment judged important by the proponent, the public, scientists and governments participating in the evaluation process."

The initial evaluation of the relative importance of the environmental and social impacts of the Project is based on an analysis using four criteria:

- The value of the component or subcomponent;
- The degree of perturbation;
- The spatial extent; and
- The duration.

A uniform approach has been used for the physical, biological and social analyses so as to provide continuity in the evaluation. Differences in the interpretation of the various criteria applied to the various components are specified and justified in the methodological discussions pertaining to each impact. Impacts are evaluated for two phases of the Project (construction and operation) and for three distinct areas: the plant and port at Kamsar; the railroad linking the mine and the plant; and the mine itself.

Each main study (physical, biological and social environments) had as goals:

- To assemble and evaluate the existing prior data;
- To document the methodology used in the field studies undertaken for the ESIA;
- To present the results of the field studies undertaken for the ESIA;
- To summarize knowledge of the baseline;
- To analyze the impacts of the Project;
- To propose mitigation, control and monitoring measures; and
- To present the residual impacts.

The study identifies potential impacts of the increased production on the environment (physical and biological) and the communities of the Project area. It also supplies an Environmental and Social Management Plan (ESMP), to ensure that impacts will be moderated, adequately managed and that the operations of the CBG conform to the applicable national and international standards and regulations in terms of environmental and social management for mining projects. The acceptability of the Project on the environmental and social levels depends on the application and continuation of all of the undertakings and plans contained in the impact studies on the physical environment (Chapter 2), the biological environment (Chapter 4), the social environment (Chapters 7 and 8) and the ESMP (Chapter 10).

The study also includes the identification and analysis of cumulative impacts, This was conducted only at a general level because of the lack of detailed information on other projects in the area.

The following sections summarize the whole ESIA that is contained in ten chapters and numerous annexes:

- Volume 1
  - Chapter 0 – Executive Summary
- Volume 2
  - Chapter 1 - Context of the Environmental and Social Impact Assessment of the Extension Project
  - Chapter 2 – Physical Baseline Study
- Volume 3
  - Chapter 3 – Biological Baseline Study
  - Chapter 4 – Biological Impact Assessment
- Volume 4
  - Chapter 5 – Social Baseline Study
  - Chapter 6 – Stakeholder Consultation
  - Chapter 7 – Social Impact Assessment
- Volume 5
  - Chapter 8 – Potential Impacts on Human Rights Report
  - Chapter 9 – Cumulative Impact Assessment
- Volume 6
  - Chapter 10 – Environmental and Social Management Plan
  - Evaluation of Human Health Risks
- Volume A – Annexes 1-1 to 2-2
- Volume B – Annexes 2-3 to 2-10
- Volume C – Annexes 3-1 to 3-12
- Volume D – Annexes 4-1 to 4-4
- Volume E – Annexes 5-1 to 5-3
- Volume F – Annexes 6-1 to 8-2

0.2 Physical environment studies

0.2.1 Introduction

0.2.1.1 Generalities

The physical environment study concentrates on the following major topics:

- Climate;
- Air quality;
- Noise;
- Vibration;
- Surface and groundwater quality;
- Sediments;
- Landscape;
- Geology;
- Soils; and
- Seismology.

0.2.1.2 Criteria

For some aspects of the physical impact assessment there are accepted numerical criteria that help determine the importance of impacts.

Air quality

In the absence of currently applied national legislation, the Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Environmental of the IFC (2007a) state that for air quality the WHO guidelines (Table 0-2) or other international sources apply.

Table 0-2 World Health Organization Ambient Air Quality Guidelines [1, 2]

Contaminant	Averaging period	Guidance value (µg/m³)			
		Interim Target 1	Interim Target 2	Interim Target 3	Guideline
SO_2	24 hours	125	50		20
	10 minutes				500
NO_2	1 year				40
	1 hour				200
PM_{10}	1 year	70	50	30	20
	24 hours	150	100	75	50
$PM_{2.5}$	1 year	35	25	15	10
	24 hours	75	50	37,5	25

[1] World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile

[2] Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines

In the absence of applicable national standards, Interim Target 1 of the WHO for particulates and SO_2 are applied and referenced.

Noise and Vibration

As Guinea does not have a community noise criterion, the approach for noise evaluation in the Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Environmental – Noise Management (IFC, 2007b) was used.

Table 0-3 IFC Noise Level Guidelines

Receptor	One Hour LA_{eq} (dBA)	
	Daytime (07:00-22:00)	Night-time (22:00-07:00)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

0.2.1.3 Water and sediments

Following the recommendation of the IFC, where the GoG has no specific guidance, public criteria published by international agencies may be adopted. In this case, the criteria for water and sediment quality published by the WHO and the US EPA and guidelines from other countries such as Canada and the EU have been used as primary sources for quantitative criteria.

0.2.2 Baseline studies for the physical environment

The following field studies were carried out in 2014 and are described in details in the appropriate sections of Chapter 2 of the ESIA:

- Air quality (meteorology, gas, particulates, heavy metals);
- Ambient noise;
- Surface and groundwater quality;
- Sediment quality; and
- Soil quality.

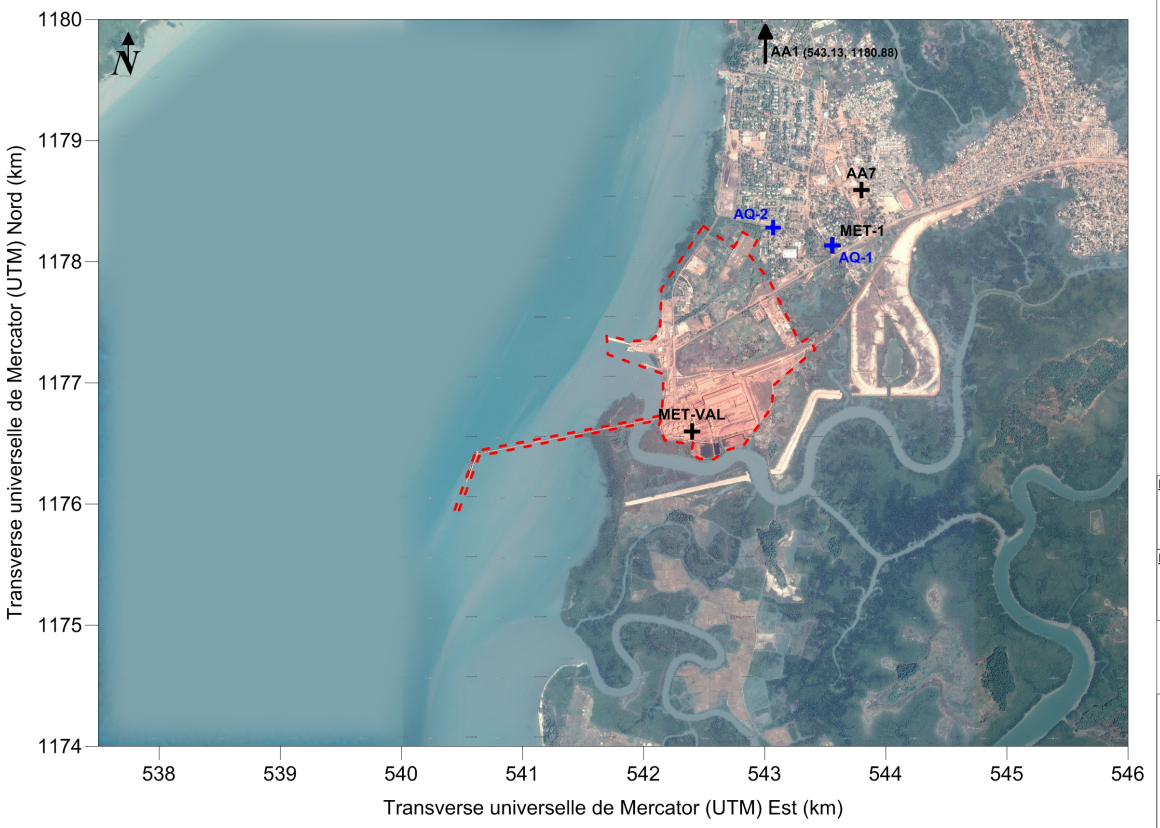
The following subsections summarize the most important aspects. In addition to these specific field studies, data from the AECOM (2011) study and other sources were also considered.

0.2.2.1 Air quality

Baseline program

A baseline monitoring program for ambient air quality was undertaken on the site from February to May 2014 (Maps 0-2 and 0-3). Monitoring followed the recommendations in Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Environmental (IFC, 2007a). CBG personnel using US EPA methods and procedures carried out the gathering of the field data. Maxxam Analytics, a Canadian accredited laboratory, did the analysis of the samples. The results of the ambient air quality measurements were also compared to the data from AECOM (2011) study.

Map 0-2 Air quality sampling stations at Kamsar (2014)



Légende:

- Empreinte du projet
- Stations de qualité de l'air (AQ-1 & AQ-2)
- Other Monitoring Stations

Échelle: 0 – 2.0 km

Référence: World Geodetic System 1984 (WGS84) UTM Zone 28N

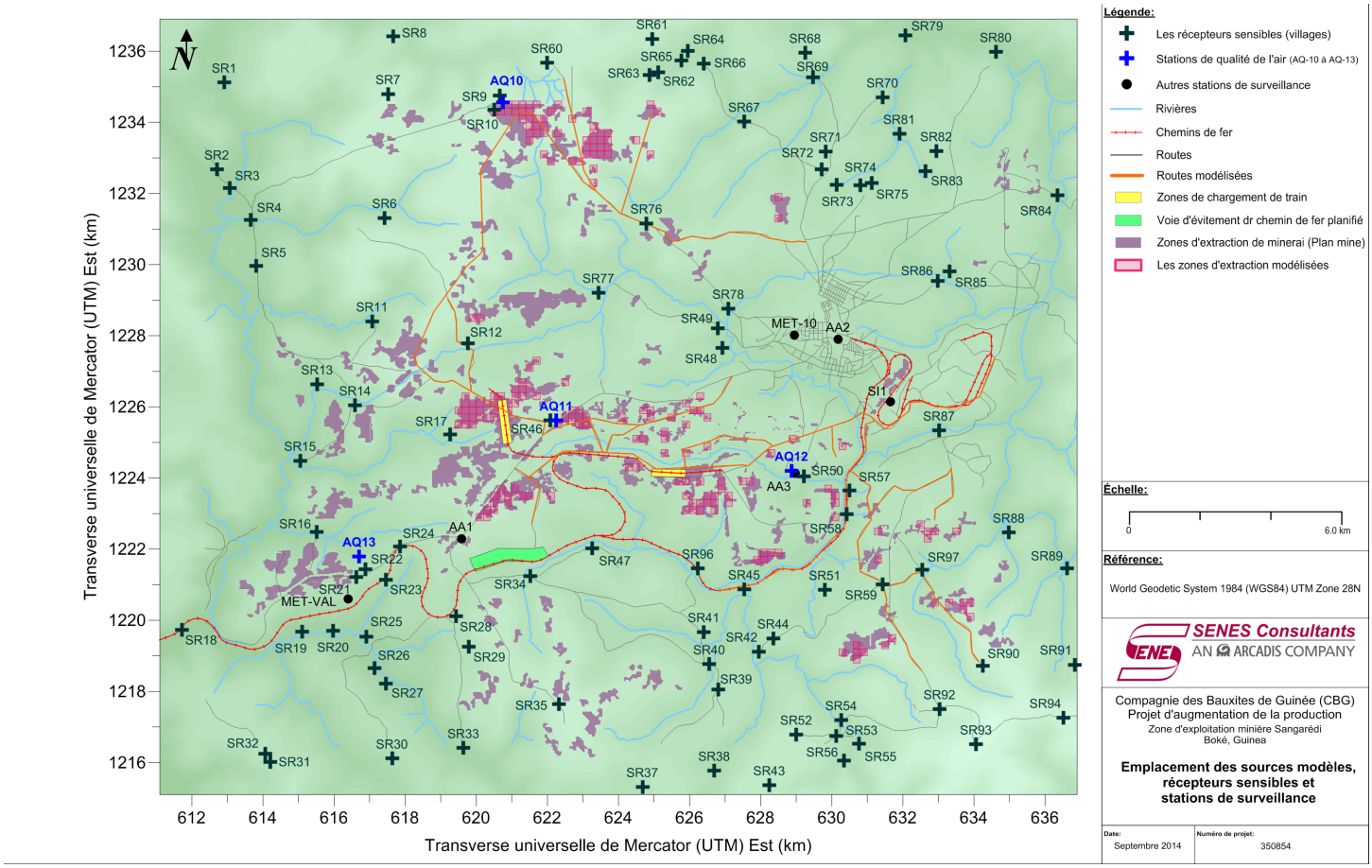
SENES Consultants AN ARCADIS COMPANY

Compagnie des Bauxites de Guinée (CBG)
Projet d'augmentation de la production
L'installation de traitement Kamsar
Kamsar, Guinée

Empreinte du projet et de la localisation des récepteurs sensibles et stations de surveillance

Date: Septembre 2014
Numéro de projet: 350854

Map 0-3 Air quality qampling qtations at Sangarédi (2014)



Ambient air quality at Kamsar

The results of the 2014 sampling survey for ambient air quality in the spring of 2014 and the 2011 results indicate that the atmospheric basin is already burdened with fine particulates.

Ambient NO_2 and SO_2 measurements at a station close to the plant are approximately 10% of applicable WHO guidelines

Ambient air quality at Sangarédi

Similar to Kamsar, the results of the ambient air quality monitoring campaign indicate that the Sangarédi airshed is already burdened with fine particulates. The

maximum measurements from three stations during the 2014 sampling exceeded the WHO Interim Target 1 for both PM_{10} and $PM_{2.5}$. During the 2014 sampling campaign, CBG staff noted that all four ambient air quality monitoring stations were influenced to some degree by local sources of dust that are unrelated to CBG activities (e.g., brush fires and from charcoal cooking fires). At one station, which is not currently affected by mining activities, the average and maximum daily concentrations of PM_{10} and $PM_{2.5}$ were approximately 30 to 100% above the WHO Interim Target 1. By contrast, PM_{10} and $PM_{2.5}$ concentrations at another station are 30 to 40% below WHO guidelines, showing the least influence from local sources of dust and CBG activities.

Similar to Kamsar, ambient NO_2 and SO_2 measurements were often less than 10% of applicable WHO guidelines.

0.2.2.2 Noise and vibration

Baseline program

An extensive noise measurement program characterized the ambient sound environments close to the plant in Kamsar and in the area delimited by the future mining operations in the Sangarédi region. Recent aerial photographs and GIS data were used to identify sensitive receptors close to the plant site and future mining areas in the Sangarédi area. On the basis of this, a total of five points were selected around the Kamsar site and fifteen in the mining area (see Maps 0-4 and 0-5 and the larger maps in Annexe 2-2).