DEVELOPMENT OF AN ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM (ESMS) FOR CFM, AND AN ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR THE OPERATION AND MAINTENANCE OF LOCOMOTIVES

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE OPERATION AND MAINTENANCE OF LOCOMOTIVES

EXECUTIVE SUMMARY

Portos e Caminhos de Ferro de Moçambique EP (CFM)
Estação Central dos CFM- Praça dos Trabalhadores
Maputo - Moçambique
Tel. (+258) 21429357
Fax. (+258) 21325614

Consultec - Consultores Associados, Lda.
Rua Tenente General Oswaldo Tazama, No. 169
Maputo, Moçambique
Telephone: +258 21 491 555

August 2023

1 Introduction

1.1 CFM Background

Mozambique Ports and Railways (CFM) is a legally constituted State-owned Company responsible for the operation of Ports and Railways and ensuring mobility and circulation needs are assured.

A major restructuring process was successfully concluded by the Mozambique Railways Company resulting from reforms implemented in recent decades. This resulted in the transformation of a State-Owned Company into a Public Company through Decree 40/94 of September 13th.

This new organizational and functional structure prioritizes quality and improvement in management. It is lighter, more agile, with access and availability of Information and Communication Technologies (ICT) which positively contributes to the achievement of their business plan.

CFM's mission is to develop the rail and port system to render it modern, efficient, competitive and market oriented. CFM intents to become a company of reference and the best logical option through the quality of its services.

At a company level, CFM's objectives are to:

- Promote and develop rail and port infra-structure;
- Operate the rail and port system, promoting logistic activities and the transport of goods and passengers; and
- Maximize the rationalization of its assets by increasing their returns.

The company is administratively subdivided into three regional executive Directorates: North (CFM-Norte), Central (CFM-Centro) and South (CFM-Sul).

CFM Centralized or Support Services, reporting directly to the Management Board, act as a link between the directorates and other functional areas to ensure coordination and development of activities related to organizational support and centralized management of financial processes, procurement, human resources, operational security, and the environment.

The following chart displays the organizational structure of CFM and its regional Executive Directorates:

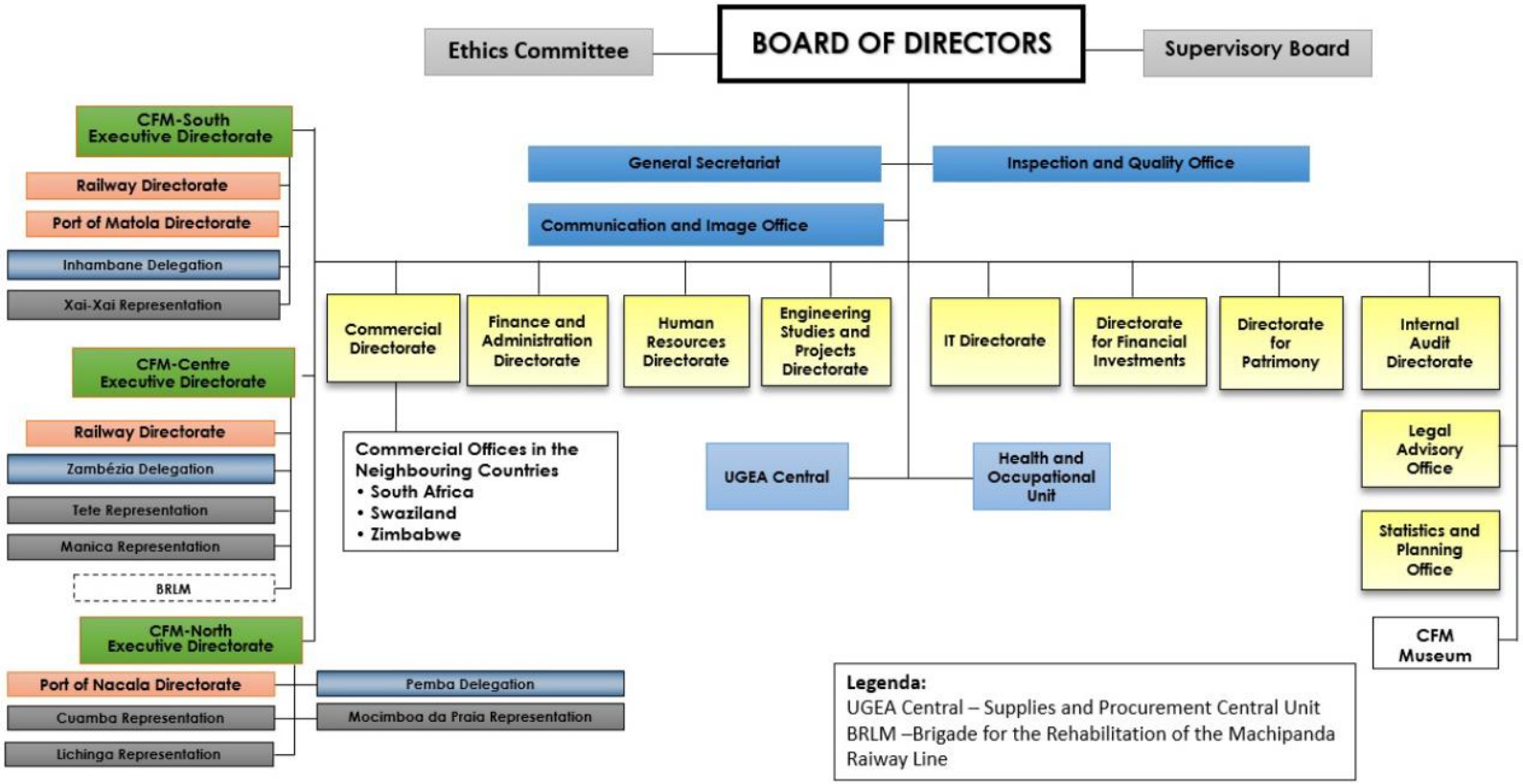

Figure 1-1 – CFM organizational chart

In the context of the above-mentioned restructuring process, and after the concession of the port and railway activities in the Central and Northern systems, CFM is currently responsible for the operation of fuel terminals (all ports), cereals and aluminium (in the Port of Maputo), as well as the Southern Railway System, which includes the Ressano Garcia, Limpopo, Goba and Salamanga branches, which, by Governmental decision and as per CFM's recommendation, are not subject to concessions.

CFM-Centro is currently responsible for the operations of Maritime Services - Fuel Terminals, Coal Terminal and Pier 8 (TCC-8), as well as the Central Railway System which includes Machipanda, Sena, Marromeu and Vila Nova de Fronteira branches.

1.2 Purpose and Scope of the ESMP

This document summarizes the Environmental and Social Management Plan (ESMP) for the maintenance and operation of locomotives[1]. The purpose of the ESMP is to provide comprehensive guidance and measures to identify, assess, and mitigate environmental and social risks associated with locomotive maintenance and operation activities, as well as to provide institutional measures required to prevent, minimize, mitigate, or compensate adverse environmental and social impacts, or to enhance the project beneficial impacts. The ESMP also aims to bring the project into compliance with applicable national environmental and social legal requirements and the African Development Bank (AfDB) safeguard policies and procedures.

In terms of the spatial scope, current CFM-managed railways operations are performed only in the southern system, that is on Ressano Garcia, Limpopo, Goba and Salamanga branches, as well as the central system which includes the Machipanda and Sena lines and their respective branches, and associated support facilities (maintenance workshops, fuelling stations) managed by CFM-Sul.

1.3 Consultant Team

The ESMP was prepared by Consultec, a Mozambican consultancy company based in Maputo and registered as an Environmental Consultant with the Ministry of Land and Environment (MTA).

[1] Locomotives provide the power to move a number of connected passenger or freight (cargo) railroad cars, and this unit is collectively known as a "train". In environmental terms, the impacts of the operation of locomotives *per se,* are difficult (and not meaningful) to segregate from "train" operation, so the assessment and resulting ESMP has looked into train operation (including maintenance) as a whole.

2 Project Description

2.1 CFM General Operations

The company is administratively subdivided into three regional executive Directorates: North (CFM-Norte), Central (CFM-Centro) and South (CFM-Sul). However, current CFM-managed railway operations are limited to the South and Centre systems, where the Executive Directorates are responsible for the management of railway and real estate assets located in the provinces of Inhambane, Gaza and Maputo, and Sofala, Manica, Tete and Zambezia delegations respectively.

CFM-Sul consists of two operative directorates: the railway directorate and the port directorate, along with several support areas known as Central or Support Services. The Railway Directorate (DF) is responsible for managing the approximately 772 km of railway lines:

- Limpopo Line with a length of 522 km (connecting to Zimbabwe);
    - Maragra Branch with 7km
    - Xinavave Branch with 15 km
- Ressano Garcia Line with a length of 88 km (connecting to Republic of South Africa)
- Goba Line with a length of 69 km (connecting to Eswatini), including the Salamanga Branch with a length of 61 km.

CFM-Centro comprises an Operations Directorate, a Fuel Terminal and a Coal Terminal (coal handling-Pier 8), as well as various support areas called Central or Support Services. The Railway Directorate (DF) is responsible for managing 996.7 km of railway line:

- Machipanda line with 317.7 km of extension (connecting to the Republic of Zimbabwe)
- Sena line with 547 km
- Marromeu Branch with 88 km
- Branch from Dona Ana to Vila Nova da Fronteira with 44 km (Connection with the Republic of Malawi)

The CFM (all three regional systems and the headquarters) have a total of 6,407 employees, of which 2,773 are from CFM-Sul and 2,794 from CFM-Centro.

The operational tasks related to rolling stock encompass a comprehensive range of activities associated with the movement of locomotives and railcars along a track section. This includes both passenger and freight transportation, as well as the loading and unloading of cargo at stations, and refuelling of locomotives.

2.2 Operation and Maintenance of Locomotives

Maintenance of locomotives involves two main categories: routine servicing and extensive mechanical maintenance. Routine maintenance tasks encompass activities such as changing lubricating oils, conducting mechanical safety inspections, washing the exteriors of locomotives and wagons, and cleaning the interiors of rail tankers. On the other hand, extensive mechanical maintenance involves more complex tasks like replacing rolling and engine components,

performing engine overhauls, conducting mechanical tests and adjustments, and other similar tasks. This type of maintenance may also entail activities like parts machining, welding, cleaning (including degreasing), and other processes typically carried out in metal mechanics workshops.

During major maintenance periods, passenger and cargo wagons might also undergo cleaning and painting, including touch-up painting, to ensure their upkeep.

CFM-Sul has 29 operational diesel-powered locomotives on the rail system.

Each passenger train consists of an average of 08 (eight) to 15 (fifteen) cars with an average capacity from 88 and 110 passengers per car and 704 to 1924 per train, depending on the locomotive series. Around 100 passenger trains circulate weekly in the network, considering both directions. Maintenance takes place on a dedicated workshop in Maputo, next to the central station, that has capacity for 6 locomotives at the same time.

Refuelling takes place on a specific area of this workshop (*Sector Posto Diesel*). There are 2 tanks with 600 m^3 each.

Aside from fuel, other commonly used materials in maintenance are: transmission and engine oils, grease and other lubricants, solvents, degreasers, rust treatment products, paint.

CFM-Centro has 22 diesel locomotives operating on the railway system. Each passenger train is composed on average of 08 (eight) to 20 (twenty) carriages with an average capacity of 88 to 150 passengers per carriage and 1,704 per train. About 18 passenger trains run weekly on the network considering both directions.

There are also cargo trains, transporting mining products, containers, coal, fuel, sugar, sulphur, molasses and others.

The maintenance at CFM-Centro is done in the running Maintenance Sector (Diesel Station) in Sofala (Beira), next to the General Workshops that have the capacity to maintain three locomotives simultaneously. The supply is made in a specific area in the Traction Tank under the responsibility of Total Energy. There are two tanks with 130 m^3 each.

The covered area of the workshop has a dedicated drainage system, equipped with an oil-water separator. The resulting “clean” water is released into the stormwater system and released into the sea. The separated oily waste is collected into a tank and managed by a licensed waste contactor.

Most wastes from railway operations are generated as a result of maintenance and refurbishment of locomotives and rolling stock. These wastes include solids from mechanical cleaning of rail cars; paint chips and sandblast grit; waste paint; spent solvent and solvent sludges (from painting and cleaning); sludge from cleaning and wastewater treatment; waste oil, hydraulic fluid, and other petroleum-based fluids; petroleum-contaminated solids (e.g., oil filters and saturated spill absorbent material); spent coolant; metal filings and scrap; spent locomotive and signal batteries; and spent brake shoes.

3 Potential Environmental and Social Impacts

Railway operation (including maintenance), like any large transportation infrastructure project, can have significant environmental and social risks and impacts. These can vary depending on the location, scale, and design of the railway. Below are some potential negative risks and impacts generically associated with railway operations:

- **Noise and Vibrations**: Train traffic generate significant noise and vibrations from running engine (diesel), wheel/rail track friction, brakes, as well as aerodynamic noise (mainly in highspeed trains). This can be an important issue, especially in urban areas, and close to residential areas, potentially causing disturbance to nearby communities and affecting their quality of life and, indirectly, their health.
- **Air Pollution**: Diesel-powered locomotives emit air pollutants from combustion, including particulate matter and nitrogen oxides (NOx), both of which contribute to public health problems, and carbon dioxide (CO2), a greenhouse gas (GHG). Additionally, transportation and transfer of dry granular materials (e.g., minerals and grain) may result in dust emissions, while the storage and transfer of fuels or volatile chemicals may result in fugitive emissions.
- **Waste Generation**: Railway operations can produce various types of waste, such as maintenance materials, discarded parts, and hazardous waste (e.g., oils, chemicals), requiring proper management and disposal. Improper management may lead to soil and water contamination, and community health safety issues.
- **Resource Consumption**: The operation of locomotives requires significant energy consumption, fossil fuels (diesel) in CFM's case, leading to indirect environmental impacts from its sourcing.
- **Wildlife Mortality**: Running trains may pose a threat to wildlife through collisions, especially if railways pass through natural habitats or migratory routes.
- **Health and safety concerns:** The most significant safety issue is the threat of serious injury or the potential loss of life due to train collisions (with other trains or with road vehicles, at level crossings), as well as a result of derailments. Trespassers on rail lines and facilities may incur in high risks from moving trains, equipment, and hazardous substances, among other issues. Additionally, railways are often used to transport hazardous materials, which can pose a risk of accidental spills, potentially leading to environmental contamination and public safety concerns.
- **Social Disruption**: Noise, vibration, air emissions, and increased safety risks around railway lines can disrupt local communities' daily activities and affect their well-being.
- **Inequitable Distribution of Benefits and Burdens**: The benefits of railway operations, such as improved transportation and economic opportunities, may not be equitably distributed among all communities, leading to social disparities.

By proactively addressing these issues, railway operators can minimize negative impacts and contribute to sustainable and socially responsible transportation solutions.

In general, railway operations can bring about several positive impacts on the environment, society, and the economy. Here are some of the positive aspects associated with the operation of a railway:

- **Reduced pollution:** Compared to other modes of transportation, such as cars/trucks/busses and airplanes, trains (even diesel-powered) generally produce lower emissions (including of Greenhouse Gases - GHG) per passenger or ton of freight moved. Overall, this provides for not only lower environmental impacts (air, climate, noise) but also social (nuisances, health). Electrified railways or those using cleaner fuels can further reduce emissions, contributing to climate change mitigation (by diverting users from other modes of transportation).
- **Energy Efficiency**: Trains are generally more energy-efficient than individual vehicles, particularly when transporting a large number of passengers or goods over long distances.
- **Congestion Reduction**: By providing an alternative mode of transportation, railways can help alleviate road congestion, reducing travel times and enhancing overall transportation efficiency.
- **Safer Transportation**: Rail travel is statistically one of the safest modes of transportation, leading to fewer accidents and fatalities compared to road transport.
- **Accessibility and Connectivity**: Railways can improve accessibility to remote areas, linking communities to essential services, job opportunities, and education.
- **Economic Development**: Efficient railways can facilitate the movement of goods and people, stimulating economic development and regional trade.
- **Job Skills Development**: The operation of railways requires a skilled workforce, creating development skills opportunities in various fields, such as engineering, operations, maintenance, and customer service.
- **Land Use Efficiency**: Railways have a smaller land footprint per passenger or freight capacity compared to roads or airports, making them a more efficient use of space.

To maximize these positive impacts, railway operators can focus on continuous improvement in efficiency, emissions reduction, safety, and community engagement. Additionally, integrating railways with other modes of transportation and developing multimodal transport networks can enhance overall mobility and sustainability.

The specific impact assessment of the operation and maintenance of locomotives[2] is summarized below.

Negative impacts:

1. Degradation of the acoustic environment, causing labour and community nuisances and health issues.

[2] Considered, in environmental terms, as “train operation” (i.e., locomotive and a number of connected passenger or freight rail cars) as mentioned in the scope section (please see section **Erro! A origem da referência não foi encontrada.**).

2. Degradation of air quality (mostly by emitting particulate matter and NOx), causing labour and community nuisances and health issues.
3. Contribution to GHG emissions and to climate change.
4. Potential soil contamination.
5. Potential surface and ground water contamination.
6. Fauna mortality.
7. Occupational health and safety hazards (train / worker accidents, worker's exposure to noise, vibration, diesel exhaust; physical, chemical, and biological hazards).
8. Community health and safety – Accidents involving train derailments, train collisions (with other trains or road vehicles) and pedestrians.
9. Community health and safety – Accidents involving hazardous goods.

Main mitigation measures:

- Develop and implement a management and monitoring plan for noise, air emissions, wastes and hazardous products, and biodiversity (according to the provided framework programme).
- Ensure preventive and corrective maintenance is carried out timely, to keep rolling stock within manufacturer's specifications.
- Use of enclosed cars or covering of open cars used to carry minerals and grains, to reduce fugitive dust emissions.
- Consider the use, or conversion to, alternative fuels for locomotive powering (e.g. low-sulphur diesel, bio-diesel) and workshop forges (LPG).
- Invest in locomotive re-powering programmes.
- Installation of high-efficiency catalytic exhaust emission control systems in locomotives.
- Implement fuel consumption reduction / energy efficiency measures products (according to the provided framework programme).
- Ensure that the grievance mechanism is communicated to the communities crossed by the railway and around workshops.
- Implementation of emergency response procedures for accidental spills, including removal and treatment of contaminated soils (according to Company's ERPs).
- Workshops must have a sewage collection system equipped with onsite treatment facilities or, alternatively, collected sewage may be transported to adequate offsite treatment and disposal.
- Sewage from sanitary facilities on passenger trains must not be discharged directly to the track.
- Implement CFM's OHS Plan and train workers in OHS procedures.
- Replacement of the hazardous substances with a less hazardous substitutes, as feasible as possible.
- Use of adequate and certified PPE where engineering controls are not sufficient to reduce contaminant exposure to acceptable levels.

- Implementation of rail operational safety procedures aimed at reducing the likelihood of train collisions.
- Progressively install automatic gates at all level crossings and perform regular inspection/maintenance to ensure proper operation.
- Regular inspection and maintenance of the rail lines and facilities to ensure track stability and integrity in accordance with national and international track safety standards.
- Enforce the Company safety management plan.
- Posting of clear and prominent danger warning signage at potential points of entry to track areas (e.g., stations and level crossings).
- Installation of fencing or other barriers at station ends and other dangerous locations to prevent access to tracks by unauthorized persons.
- Conduct regular community awareness initiatives, specially focusing the risks of trespassing.
- Implementation of emergency preparedness and response procedures (according to Company ERPs).

Positive impacts:

10. Improved circulation/increase in the volume of transported goods and people.
11. Country economic development by tax payments.
12. Low freight cost for large volumes of cargo.

Main enhancement measures:

- Identification of additional and potential clients for cargo operations.
- Guarantee the allocation of due taxes to the government authorities.
- Apply fair costs for cargo transport operations.

4 Roles and Responsibilities

CFM-Sul and CFM-Centro, headed by its Executive Directorate (DE), consists of two operative directorates: the railway directorate and the port directorate, along with several support areas known as Central or Support Services.

At CFM-Sul, the Railway Directorate (DF) is responsible for managing the approximately 772 km of railway lines. This directorate includes the Railway Transport Services (STF), General Workshops (SOG), Track and Construction (SVO), and Passenger Transport Services (STP). These services ensure railway traffic and maintenance of rolling stock and tracks, with the assistance of technical support services.

At CFM-Centro, the Railway Directorate is responsible for managing 996.7 km of railway lines.

Concerning Environmental and Social Management, and by its nature of Support Service, the key player will be the Safety, Quality and Environmental Management Unit (UGSQMA). UGSQMA will be in close contact with Railway Directorate (DF) and work together with several other CFM-Sul services and subordinated departments, whose most relevant will be, by the nature of their activities, the Railway Transport Services (STF) and the General Workshop Services (SOG).

The Environmental, Social and Governance Manager (ESGM) shall be appointed by the Executive Director and shall be supported by a Community Liaison Officer (CLO) appointed by the UGSQMA.

The following figure presents the ESMP's implementation organisational chart.

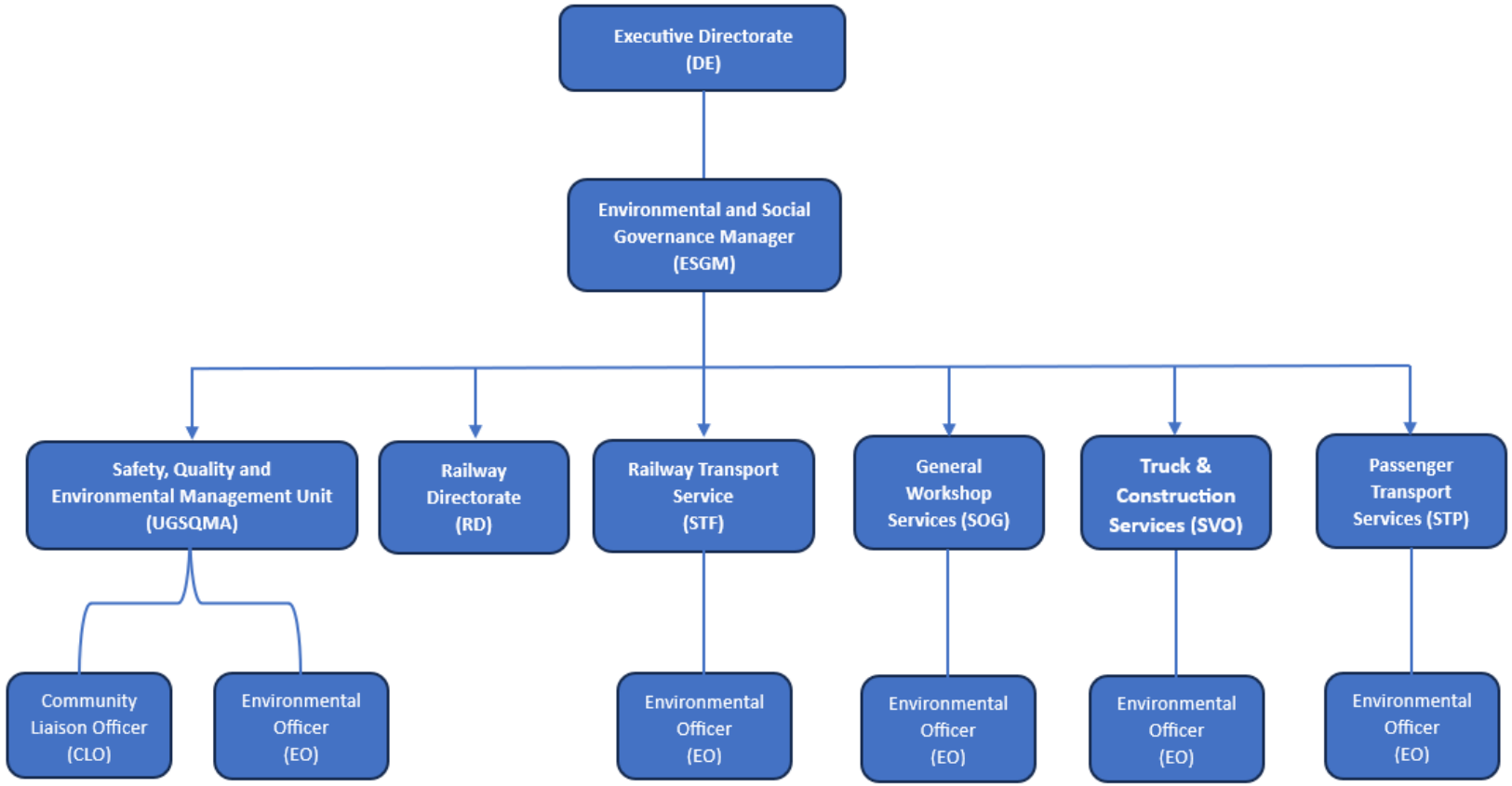

Figure 4-1- ESMP Implementation organisational chart

5 Environmental and Social Management and Programmes

The Project´s environmental and social management is divide in two specific sections, namely the implementation plan of the general mitigation measures (not integrated into a specific management programme/plan) and a specific management and monitoring programmes for key environmental factors.

5.1 General Mitigation Measures

The following general measures, that result from the impact assessment, are defined for the Project.

Table 5-1– Potential risks and impacts and mitigation/enhancement measures

Potential Risks and Impacts	Mitigation/Enhancement measures	Responsible	Monitoring and Performance Evaluation		
			Monitoring Methods	Performance Indicators	Timing / Frequency
1. Degradation of the acoustic environment, causing community nuisances and health issues	- Develop and implement a noise and vibrations management and monitoring plan (according to the framework programme on section **Erro! A origem da referência não foi encontrada.**)	- ESGM - DF	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Quarterly
	- Limit to a minimum the use of locomotive horns when crossing inhabited areas	- STF	- Operational procedures - Inspection records - Performance report - Audits	- No. of Non-conformities - No. of complaints	- Quarterly
	- Provide adequate soundproofing of workshops' buildings and of noisy equipment	- SOG	- Soundproofing projects - Performance report - Audits	- No. of Non-conformities - No. of soundproofing projects implemented	- According to Company investment plan - Annually (E&S follow-up)
	- Ensure preventive and corrective maintenance is carried out timely, to keep rolling stock within manufacturer's specifications	- SOG	- Maintenance records - Performance report - Audits	- No. of Non-conformities (missed planned maintenance)	- According to Company Maintenance Plan - Annually (follow-up)
	- Whenever practical, perform high-noise maintenance activities inside the workshop buildings and not on the access track	- SOG	- Operational procedures - Inspection records - Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually
	- If workshops are located in noise-sensitive areas (residential areas), no high-noise activities should be undertaken in the nighttime period (22-07h)	- SOG	- Operational procedures - Inspection records - Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually

Potential Risks and Impacts	Mitigation/Enhancement measures	Responsible	Monitoring and Performance Evaluation		
			Monitoring Methods	Performance Indicators	Timing / Frequency
	- Ensure that the grievance mechanism is communicated to the communities crossed by the railway and around workshops	- UGSQMA / CLO - DF	- Community meetings minutes - Performance report - Audits - Company Communication Plan	- N.º of engagements with communities - No. of Non-conformities - No. of complaints resolved in due time	- Biannually or whenever necessary
2. Degradation of air quality (mostly by emitting particulate matter and NOx), causing community nuisances and health issues 3. Contribution to GHG emissions and to climate change	- Develop and implement an air emissions and GHG management and monitoring plan (according to the framework programme on section **Erro! A origem da referência não foi encontrada.**)	- ESGM - DF	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually
	- Ensure preventive and corrective maintenance is carried out timely, to keep rolling stock within manufacturer's specifications	- SOG	- Maintenance records - Performance report - Audits	- No. of Non-conformities (missed planned maintenance)	- According to Company Maintenance Plan - Annually (follow-up)
	- Use of enclosed cars or covering of open cars used to carry minerals and grains, to reduce fugitive dust emissions	- STF	- Inspection records - Performance report - Audits	- No. of Non-conformities - No. of complaints (dust)	- Biannually
	- Consider the use, or conversion to, alternative fuels for locomotive powering (e.g. low-sulphur diesel, bio-diesel) and workshop forges (LPG)	- DF - SOG	- Company investment plan - Fuel usage records - Performance report - Audits	- Quantity of alternative fuels used vs conventional fuels	- Annually
	- Invest in locomotive re-powering programmes	- CFM (admin. council) - DE	- Company investment plan - Performance report - Audits	- No. of re-powered locomotives	- According to Company investment plan - Annually (E&S follow-up)
	- Installation of high-efficiency catalytic exhaust emission control systems in locomotives	- DF - SOG	- Company investment plan - Company maintenance plan - Performance report - Audits	- No. of exhaust emission control systems installed / refurbished	- According to Company investment plan - Annually (E&S follow-up)

Potential Risks and Impacts	Mitigation/Enhancement measures	Responsible	Monitoring and Performance Evaluation		
			Monitoring Methods	Performance Indicators	Timing / Frequency
	- Use of alternative power sources for idling locomotives	- DF - SOG	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually
	- Implement fuel consumption reduction / energy efficiency measures (see air emissions management and monitoring programme on section 6)	- ESGM - DF	- Performance report - Audits	- No. of Non-conformities - No. of energy efficiency measures adopted	- Annually
4. Potential soil contamination 5. Potential surface and ground water contamination	- Develop and implement a waste management plan (for hazardous and non-hazardous waste) (according to the framework programme on section **Erro! A origem da referência não foi encontrada.**)	- ESGM - STF - SOG	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually
	- Develop and implement a hazardous products management plan (including fuel) (according to the framework programme on section **Erro! A origem da referência não foi encontrada.**)	- ESGM - SOG	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually
	- Implementation of emergency response procedures for accidental spills, including removal and treatment of contaminated soils (according to Company ERPs)	- ESGM - DF - STF	- Accident records - Performance report - Audits	- No. of Non-conformities - No. of accidents involving spills to soil - Quantity of contaminated soil removed (m^3) - No. of accidents involving spills to water resources - No. of remedial actions	- Annually
	- Develop and implement a wastewater management and monitoring plan (according to the framework programme on section **Erro! A origem da referência não foi encontrada.**)	- ESGM - STF - SOG	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually
	- Workshops must have a segregated system to drain the pavement of the operational area, where hazardous substances are used (oils and lubricants, solvents and paints, etc.) and wastes are produced (e.g., sand blasting waste, used oil). The system must be equipped, at least, with an oil-water separator	- SOG	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Biannually

Potential Risks and Impacts	Mitigation/Enhancement measures	Responsible	Monitoring and Performance Evaluation		
			Monitoring Methods	Performance Indicators	Timing / Frequency
	- Workshops must have a sewage collection system equipped with onsite treatment facilities or, alternatively, collected sewage may be transported to adequate offsite treatment and disposal	- SOG	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- Biannually
	- Sewage from sanitary facilities on passenger trains must not be discharged directly to the track	- STF	- Operational procedures - Inspections - Performance report - Audits	- No. of Non-conformities - No. of complaints	- Annually
6. Fauna mortality	- Develop and implement a biodiversity management and monitoring plan (according to the framework programme on section **Erro! A origem da referência não foi encontrada.**)	- ESGM - STF	- Performance report - Audits	- No. of Non-conformities (namely, the number of dead animals during operations).	- One-off activity - Annually (follow-up)
7. Occupational health and safety hazards (train / worker accidents, worker's exposure to noise, vibration, diesel exhaust; physical, chemical, and biological hazards)	- Implement Company OHS System and train workers in OHS procedures. The system and OHS plans will comply with national legislation, AfDB E&S OS 2 (Labour and Working Conditions), and WBG/IFC General and Railways EHS Guidelines	- UGSQMA - ESGM - OHS committees	- Company OHS system - Performance report - Audits	- No. of Non-conformities - No. of OHS training actions	- One-off activity - According to Company OHS Management Plan/System - Annually (E&S follow-up)
	- Develop and implement a noise and vibrations management and monitoring plan (according to the framework programme on section **Erro! A origem da referência não foi encontrada.**)	- ESGM - DF	- Performance report - Audits	- No. of Non-conformities - No. of complaints	- One-off activity - Annually (E&S follow-up)
	- Limit the time locomotives are allowed to run indoors and use of pusher cars to move locomotives in and out of maintenance shops	- STF - SOG	- Company OHS system - Workshop operational procedures - Performance report - Audits	- No. of Non-conformities	- Annually
	- Ventilation of locomotive shops or other enclosed areas where diesel exhaust may accumulate	- SOG	- Company OHS system - Workshop operational procedures - Performance report - Audits	- No. of Non-conformities	- Annually

Potential Risks and Impacts	Mitigation/Enhancement measures	Responsible	Monitoring and Performance Evaluation		
			Monitoring Methods	Performance Indicators	Timing / Frequency
	- Replacement of the hazardous substances with a less hazardous substitutes, as feasible as possible	- SOG	- Performance report - Audits	- No. of replaced hazardous substances	- Annually (quarterly)
	- No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection	- OHS committees - SOG	- Company OHS management system - Noise monitoring plan - Inspection records - Performance report - Audits	- No. of Non-conformities - No. of complaints	- According to Company OHS management system / noise monitoring plan - Daily/Annually (E&S follow-up)
	- Use of adequate PPE where engineering controls are not sufficient to reduce contaminant exposure to acceptable levels	- OHS committees - SOG	- Inspection records - Performance report - Audits	- No. of Non-conformities - No. of complaints	- According to Company OHS management system - Annually (E&S follow-up)
8. Community health and safety – Accidents involving train derailments, train collisions (with other trains or road vehicles) and pedestrians	- Implementation of rail operational safety procedures aimed at reducing the likelihood of train collisions such as a positive train control (PTC) system	- DE - DF - STF	- Company investment plan - Operational safety improvement projects - Operational safety procedures - Performance report - Audits	- No. of completed of rail operational safety improvement projects - % of rail network with automatic operation	- According to Company investment plan - Annually (E&S follow-up)
	- Progressively install automatic gates at all level crossings, and perform regular inspection/maintenance to ensure proper operation	- DE - DF - SVO	- Company investment plan - Inspection / maintenance records - Level crossing improvement projects - Performance report - Audits	- No. of completed level crossing improvement projects	- According to Company investment plan - Annually (E&S follow-up)

Potential Risks and Impacts	Mitigation/Enhancement measures	Responsible	Monitoring and Performance Evaluation		
			Monitoring Methods	Performance Indicators	Timing / Frequency
	- Regular inspection and maintenance of the rail lines and facilities to ensure track stability and integrity in accordance with national and international track safety standards	- SVO	- Inspection records - Maintenance records - Performance report - Audits	- No. of Non-conformities (missed planned inspections & maintenance)	- According to Company maintenance plan - Annually (E&S follow-up)
	- Enforce the Company safety management plan	- UGSQMA - ESGM - DF	- Company emergency plan - Inspection records - Performance report - Audits	- No. of Non-conformities	- According to Company emergency plan - Annually (E&S follow-up)
	- Ensure preventive and corrective maintenance is carried out timely, to keep rolling stock within manufacturer's specifications	- SOG - STF	- Maintenance records - Performance report - Audits	- No. of Non-conformities (missed planned maintenance)	- According to Company maintenance plan - Annually (E&S follow-up)
	- Posting of clear and prominent danger warning signage at potential points of entry to track areas (e.g. stations and level crossings)	- UGSQMA - ESGM - SVO - Department off Signalization and Telecommunications	- Inspection records - Signalization projects - Performance report - Audits	- No. of completed signalization (or repair) projects - No. of Non-conformities	- Quarterly
	- Installation of fencing or other barriers at station ends and other dangerous locations to prevent access to tracks by unauthorized persons	- UGSQMA - ESGM - SVO	- Fencing projects - Performance report - Audits	- No. of completed fencing or repair projects / metres of fence installed / repaired - No. of Non-conformities	- Biannually

Potential Risks and Impacts	Mitigation/Enhancement measures	Responsible	Monitoring and Performance Evaluation		
			Monitoring Methods	Performance Indicators	Timing / Frequency
	- Conduct regular community awareness initiatives, specially focusing the risks of trespassing	- UGSQMA - CLO - STF	- CFM Communication Plan - Community meetings minutes - Performance report - Audits	- N.º of engagements with communities - No. of Non-conformities	- Biannually
	- Implementation of emergency preparedness and response procedures (according to Company ERPs)	- UGSQMA - ESGM - DF - STF	- Accident records - Performance report - Audits	- No. of Non-conformities - No. of accidents involving community members	- According to Company ERPs - Annually (E&S follow-up)
9. Community health and safety – Accidents involving hazardous goods	- Implementation of a system for the proper screening, acceptance, and transport of hazardous goods	- STF	- Performance report - Audits	- No. of Non-conformities	- One-off activity - Annually (E&S follow-up)
	- Use of tank cars and other cargo rolling stock that meet national and international safety standards appropriate for the cargo being carried	- STF - SOG	- Performance report - Audits	- No. of Non-conformities	- Annually
	- Ensure preventive and corrective maintenance is carried out timely, to keep rolling stock within manufacturer's specifications	- SOG - STF	- Maintenance records - Performance report - Audits	- No. of Non-conformities (missed planned maintenance)	- According to Company maintenance plan - Annually (E&S follow-up)
	- Implementation of spill prevention and control, and emergency preparedness and response procedures (according to Company ERPs)	- UGSQMA - ESGM - DF - STF	- Accident records - Performance report - Audits	- No. of Non-conformities - No. of accidents involving spills	- According to Company ERPs - Annually (E&S follow-up)
	- Regular dissemination of emergency preparedness and response information to the potentially affected communities	- UGSQMA - ESGM - CLO - STF	- CFM Communication Plan - Community meetings minutes - Performance report - Audits	- No. of engagements with communities - No. of Non-conformities - No. of complaints	- Annually

5.2 Environmental and Social Programmes

Considering the key environmental factors and impacts/risks associated with the operation and maintenance of locomotives, the following sectorial management and monitoring programmes were defined to complement the general measure0 presented earlier, namely:

- Air Emissions and GHG Management and Monitoring Programme;
- Noise and Vibrations Management and Monitoring Programme;
- Waste Management Programme;
- Hazardous Products Management Programme;
- Wastewater Management and Monitoring Programme;
- Biodiversity Management Programme;
- Community Health and Safety Management Programme;
- Stakeholder Engagement Framework/Programme.

Additionally, other good practice plans and programmes are proposed, in line with international guidelines, namely those from the AfDB and WBG, namely:

- Gender Based Violence (GBV) / Sexual exploitation, abuse and sexual harassment (SEAH) Prevention and Response Programme;
- Environment, Health and Safety Training Programme.

These programmes provide a broader and ongoing framework that integrates management strategies and monitoring activities for a larger scope of operation, that can be further developed to a more specific Management and Monitoring Plan, that outlines the protocols for managing and monitoring a particular activity, site, region, or aspect within the larger programme, facilitating a more efficient implementation by CFM.

The further development and implementation of the management plans, based on the requirements presented in this ESMP, will generally be the responsibility of ESGM, as centralized E&S unit, along with the relevant directorates and services for each case.

Additionally, CFM has the following relevant plans in place or in imminent approval stage, that are considered important impact mitigation tools, thus are considered to make part of the ESMP and shall not be repeated here:

- Occupational Health and Safety Management System;
- Emergency Response Plans for passenger and cargo trains;
- Maintenance Plan for Locomotives;

It is important to refer that each of these plans presents specific control and monitoring actions as well as corrective actions, key performance indicators and reporting procedures.

6 ESMP Implementation Schedule and Budget

Part of the costs associated with the development of specific social and environmental management plans and the implementation of mitigation measures cannot be specified at this stage because initial baseline assessments are required.

Given this uncertainty, contingency funds were added, and the budget estimate is limited to the first five years of implementation.

The **Table 6-1** presents a preliminary estimate of the budget for the ESMP, based on the main costs.

Table 6-1 – Preliminary estimated EMP budget for operation and maintenance of locomotives (initial 5 years), based on core costs

Item	Cost (USD)
Development and implementation of the Air Emissions and GHG Management and Monitoring Plan	$75 000
Development and implementation of the Noise and Vibrations Management and Monitoring Plan	$75 000
Development and implementation of the Hazardous Products Management Plan	$25 000
Development and implementation of the Wastewater Management and Monitoring Plan	$25 000
Development and implementation of the Biodiversity Management Plan	$50 000
Development and implementation of the Community Health and Safety Management Plan	$25 000
Development and implementation of the Waste Management Plan	$25 000
Development and implementation of the Safety Plan	$50 000
Develop and implement a GBV/SEAH Plan	$12 500
Environment, Health and Safety Training Plan (development and implementation)	$12 500
Development and implementation of a Grievance Response Mechanism (GRM)	$12 500
Monitoring of social and environmental performance, including the development of adaptive mitigation measures (if necessary)[3]	$250 000
Annual E&S performance audit	$62 500
Subtotal	**$700 000**
Contingency Fund (~20% of the operational budget)	**$140 000**
Grand Total (preliminary)	**$840 000**

[3] Excluding mitigation detailed design, civil construction works and specialized equipment acquisition, if required