Attachment 5

Environmental Monitoring Form

SOMALIA DRIVE ROAD RECONSTRUCTION PROJECT

1st Quarterly Environmental Monitoring and Closure Plan Report

(January - March 2021)

March 2021

PREPARED ON BEHALF OF

DAI NIPPON CONSTRUCTION
Freeport, Somalia Drive
Monrovia, Liberia

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"Turning Africa Green"

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LIST OF ACRONYMS AND ABBREVIATIONS

DD	Data Deficient
DNC	Dai Nippon Construction Company - the Somalia Drive Road Project Implementing Agency
SDRR	Somalia Drive Road Reconstruction
EMMR	Environmental Monitoring and Management Report

EMR	Environmental Monitoring Report
EP	Environmental Permit
EPAL	Environmental Protection Agency of Liberia
EPML	Environmental Protection and Management Law
ESIA	Environmental Social Impact Assessment
ESMP	Environmental and Social Management Plan
GOL	Government of Liberia
GREENCONS	Green Consultancy Incorporated
IUCN	International Union for the Conservation of Nature
JICA	Japanese International Construction Agency
LC	Least Concern
MCC	Monrovia City Corporation
MPW	Ministry of Public Works
NT	Near Threaten
PCC	Paynesville City Corporation
PM	Particulate Matter
SOP	Standard Operation Procedure
ToR	Term of Reference
VU	Vulnerable
WHO	World Health Organization

DEFINITION OF KEY TERMS

Environment: The surroundings in which humans exist and which comprise: the land, water, and atmosphere of the earth, Micro-organisms, plant and animal life, any part or combination of all the above-said interrelationships among and between them, the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.

Environmental Aspect: These are components of the company's activities, products, and services that are likely to interact with the environment.

Environmental Authorizations: Is a written document from the relevant environmental competent authority in terms of the Environmental Protection Management Law of Liberia, with or without conditions, that is an approval of planned activity and the implementation thereof and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

Environmental Feature: These are elements and attributes of the biophysical, economic and social environment.

Environmental Impact: These are changes to the environment resulting from an environmental aspect (an activity) on the environment, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.

Hazardous Waste: Any waste that contains organic or inorganic elements or compounds that may cause impacts to the inherent physical, chemical or toxicological characteristics of that waste have a detrimental impact on health and the environment.

Monitoring: Compliance monitoring is a continuous and systematic process to ensure that the conditions and the requirements in the Environmental Authorization and Environmental Management Program (EMP) are being adhered to.

Pollution: Any change in the environment caused by substances, noise, odors, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction, and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or the composition, resilience, and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future

CHAPTER ONE: INTRODUCTION

This Environmental Monitoring Report (EMR) provides an update on the project associated with the road construction activities linking the Freeport of Monrovia to the Red-light Market. The report represents the Phase II First Quarterly Environmental Monitoring Report for the year 2021 as well as decommissioning plan for the closure of the project.

Dai Nippon Construction Co., Ltd is a Japanese construction firm contracted to carry out the construction works for the project. The company engages in contract civil engineering and building construction works. The engineering contract for the project consists of earthworks, roadwork, drainage works, bridge foundations, bridge substructure, bridge deck, etc. The project upon full completion will provide efficient, reliable, and affordable urban transport infrastructure and services, thereby increase the economic growth potential and competitiveness of urban communities and improve the livelihoods of citizens in and around the project vicinity. The project will also improve urban, environmental, and communities' access to economic opportunities and public and social services; promote efficient and sustainable urban transportation; generate income and employment opportunities.

The objective of the environmental monitoring is to assess the project to determine whether or not the projects and associated activities have any adverse impacts on the environment, considering environmental, social, economic, and legal considerations.

The main objectives of the environmental monitoring are to:

- Assess the environmental and social impacts of the project – both positive and negative since its commencement;
- Revision of mitigation measures for negative impacts and enhancement measures for positive impacts since its inception.
- Verify compliance with national environmental regulations and policies;
- Review baseline data for monitoring and evaluation of how well the mitigation measures have been implemented during the project life cycle; and
- Prepare an Environmental Monitoring Report compliant with the Environmental Protection and Management Law of Liberia, 2003.

Under Part III, Section 11 and Annex 1 (Section 6 and 24) of the Environmental Protection and Management Laws of Liberia (2003) requires all new projects that fall under the Environmental Laws of Liberia Environmental Assessment mandatory listing, including Dai Nippon Construction Co., Ltd, to undergo an environmental and social impact assessment (ESIA) with key emphasis to the compliance conditions of the project operational permit, an independent (third party) quarterly environmental monitoring must be conducted in relation to section 24 of the EPML of (2003). The monitoring is intended to ensure compliance with mitigation measures to minimize, identified impacts and to also update the EPA regarding the current status of the project.

Based upon such requirements, the services of Green Consultancy Incorporated were contracted by Dai Nippon Construction Co., Ltd (DNC) to conduct Environmental Monitoring Services for the project. The length of the Somalia Drive Road is about 13.2 kilometers, which runs precisely from Freeport Junction on Bushrod Island to the Red-Light Junction in Paynesville outside Monrovia. The road consists of two major bridges: The Stockton Creek Bridge connects Bushrod Island to Gardnerville and the Double Bridge connects Gardnerville to Paynesville.

This current monitoring assessment revealed the continuation of Phase II of the project which involves second layer asphalt pavement, sidewalk construction, excavation of old asphalt, drainage channel layout, and culvert installation; and compaction of road layout with granite rock (crush rock).

The Environmental monitoring for the period under review primarily took into consideration the quality of atmospheric air; the quality of surface and groundwater along the corridor; the condition of the soil; biodiversity, waste management; and worker's health and safety.

It can be concluded that minimize adverse environmental impacts related to the construction works were observed. Through continual monitoring, instructions, and guidance provided by GreenCons, the implementation of environmental impact mitigation measures by the company is gradually improving. There are still shortcomings however, thus compliances are continuously monitored and improved.

1.1 Scope of Work

The scope of work of this EMR is to document the environmental management activities and compliance with the approved Environmental and Social Management Plan (EMP) of this project. This report presents project implementation progress, ESMP implementation and supervision; and the external environmental monitoring (water, air, noise & soil qualities) results.

The monitoring scope included site-visitation where observation and identification of environmental issues that violate the Environmental Permit and the Environmental and Social Management Plan and prevailing regulations were made; a collection of project information from field workers and residents along the project corridor as well as inspection photo documentation.

1.2 Methodology

The environmental monitoring was done in two stages: At stage one, a desktop review of various project documents was considered and the available materials were studied. The documents include:

- The Environmental Protection and Management Law of Liberia (2003);
- The Environmental and Social Impact Assessment Report (ESIA) for the project;
- The Environmental and Social Management Plan (ESMP);
- Previous Quarterly Environmental Monitoring Reports; and
- The Environmental Permit documents.

It should be noted that for the monitoring of air, noise, water, and other parameters, International Standards were used to determine and approve quality norms of environmental conditions to ensure a safe environment for human health.

At stage two, visitation to the project site and collection of data was accomplished. Environmental safeguard monitoring was performed as it was required in the Environmental and Social Management Plan and the Environmental Permit.

As a matter of normal protocol, the monitoring was conducted on various environmental aspects. Normal inspections were undertaken by the monitoring team and more intensive investigations on specific sites were carried out for reporting.

1.3 Proponent Guidelines and Standards

This report was written based on the EPA-approved guideline for reporting. It is also a requirement from the Environmental and Social Management Plan submitted to the EPA requiring DNC to regularly report on activities from the Project sites to maintain and sustain environmental best practices. It is also a requirement in the Environmental Management and Protection Laws of the Republic of Liberia, 2003.

Furthermore, DNC environmental compliance is guided by the Environmental Protection and Management Laws of Liberia and other national and international standards as stipulated in the ESIA report prepared for the project. Table one gives various standards and parameters considered for the project.

Table 1: Required Standards

ITEM	PARAMETER	STANDARD
Air Quality	**PM10 (average 24h)**	100µg/m^3(National) **50µg/m^3(WHO)**
	PM 2.5 **(avergage24h)**	100µg/m^3(National) **50µg/m^3(WHO)**
	C	**2,000 mg/L**
	VOC	**0.75ppm (USEPA)**
Noise	Noise Level (Day Time: **06:00-22:01)**	**60dB (National, Residential + industrial or small Production)**
		50dB (National, Residential Building)
		45dB (National, Hospital or school area)
		50dB (National, Mixed Residential Building)
	Noise Level (Night Time: 22:01-06:01)	**50dB (National, Residential Building)**
		45dB (National, Hospital or school area)
		50dB (National, Mixed Residential Building)
	Noise Level (Night Time: 22:01-06:01)	**60dB (National, Residential + industrial or small Production)**
		50dB (National, Residential Building)
		45dB (National, Hospital or school area)
Water Quality (Chemical)	Total Iron	**300mg/L (CANADA)**
	(N0$_3$) Nitrate	**50mg/L (WHO)**
	Mercury (average)	**6 µg/L (USEPA)**

	Chromium Hex (average)	**50 µg/L (WHO)**
	NH_3 as N Ammonia	**N/A**
	COD	**30 – 50mg/L (WHO)**
	Lead	**15 µg/L (USEPA)**
	Chloride	**N/A**
Water Quality (Physical)	DO	**<5.0 mg/L (WHO)**
	TDS	**3 – 300 µg/L (USEPA)**
	ORP	**N/A**
	Conductivity	**µS/cm**
	Salinity	**N/A**
	PH	**6.5-8.5 (National, WHO)**
	Temperature (˚c)	**N/A**
Water Quality (Biological)	E. Coli	**N/A**

1.4 What Activities were Implemented during this Monitoring Period?

During this monitoring period, activities of the company included but not limited to the following:

- Second layer asphalt pavement;
- Sidewalk Construction;
- Excavation of old asphalt;
- Drainage channel layout and culvert installation; and
- Compaction of road layout with granite rock (Crush rock)

During the field engagement, several Environmental Health & Safety issues were noted and brought to the attention of the Company for resolution.

There has been little progress made in the designation of safety signs at major working areas as compared to the last monitoring that preceded this phase of monitoring. However, more needs to be done to ensure that safety regulations are adhered to by workers. During the monitoring, workers were constantly seen without wearing their complete safety gears. Moreover, some motorcyclists failed to respect the safety protocol at the site thereby disrupting the project activities.

The interruption of pedestrians is at a minimum level to some extent. Nevertheless, more efforts have to be made to further strengthen measures that curb pedestrians' interferences where works are being actively conducted. Street sellers, motorcyclists, and commercial drivers constantly intrude on working areas. Why it is undeniable that some efforts have been made in setting up barricades to reduce their access to working areas, more needs to be done to further curtail this situation

Figure 1: Interview with Traders at Km-13

Toolbox talks are conducted every morning before the start of the day's activities to reduce the rate of incidents/accidents. There has been no incident/accident reported since the beginning of this quarter. In case of an injury, the victim is quickly taken to a clinic for treatment. No emergency vehicle is parked for emergency purposes but a project vehicle can be made available in case of an emergency. The table below gives detail of the findings.

Table 2: Monitoring Findings

No.	ISSUE OF CONCERN	COMMENTS
1.	**Location**	Somalia Drive (Freeport of Monrovia to Red-light) 13.2km
Social		
2.	**Social Impacts**	Obstruction of access to business and residential areas due to road construction activities along the project corridor.

Environmental		
3.	**Biological Environment**	There were no significant impacts on fauna and flora considering the monitoring review under review.
4.	**Riparian Zone Management**	There are creeks (Stockton Creek, Slotte lake, etc.,) that transverse the project area. These creeks are used by the people in the area for washing, fishing, etc. Construction activities pose a potential risk for erosion and mudslides, which could affect the survivability of fauna species. Based on the above, the management of DNC is ensuring that sensitive wetland along the project corridor is managed with caution as recommended in the EMP developed for the project.
5.	**Waste Management**	All municipal solid waste/domestic waste is temporarily collected and stored in waste bins and later disposed of appropriately by a licensed waste management firm.
6.	**Fuel Storage**	Fuel storage at the Company's camp has not been impervious at camp locations. The storage site needs to be cast with concrete to prevent spillage in the area.
Health and Safety		
7.	**Health and Hygiene**	In ensuring a healthy and safe working environment, safety personnel is assigned to various working areas. Best hygiene practice is being implored on-site as well as the monthly refresher workshop on health and safety is conducted. Waste bins and wash hand bowls are placed at strategic locations at the Company's camp.
8.	**First Aid**	Minimum First Aid Kits were observed at workplaces along the project corridor. Regarding injuries (minor/major), the incident is reported to the health and Safety department for urgent attention.
9.	**Personal Protective Equipment –PPE and Safety Signage**	Personal Protective Equipment including Goggles, Gloves, nose mask, and High reflective vest were issued to workers. Workers are being mandated to properly use PPE in construction areas. Requisite safety signs were installed at locations that are risk/hazard-related. The issue of health and safety has since been decentralized at all working camps along the project work corridors.
10.	**Training/Induction**	Trainings are conducted for safety site officers and flaggers on-road usage, traffic regulations, and occupational hazards during road construction.
11.	**Road Safety**	Flaggers are assigned to areas along the project road, where active construction activities are ongoing to ensure the safe flow of traffic and an accident-free work zone. Adequate warning signs and visual reminders (e.g. caution tapes) are installed to help in regulating the traffic in an area along the project corridor where construction activities are ongoing.
12.	**Emergency Response Plan (ERP)**	The company has addressed all issues regarding emergency appropriately during this monitoring period.

13.	**Fire protection and equipment**	Fire extinguishing equipment is available in all vehicles, offices, workshops, as well as cranes, and heavy machines and is maintained on-site according to the manufacturer, recommended schedules. All personnel is aware of the use of fire equipment and site safety rules in case of a fire emergency on-site. Prohibitory signs are installed at strategic locations to forbid the use of flammable objects/ substances.

A monitoring implementation checklist was used to gather relevant data regarding the project. (See checklist below).

Table 3: Monitoring checklist

Project Sites: Somalia Drive Reconstruction Project (13km)		**Date of Inspection: February 24, 2021- March 2, 2021**		
	Yes	**No**	**To some extent**	**Comments/Actions**
Is the project operating in compliance with the Environmental and Social Management Plan (ESMP) and the Environmental Permit (EP)?	√			An Environmental Health & Safety Officer is on-site to ensure the implementation of the ESMP and the EP specifications. The implementation of the ESMP is monitored daily with deviations recorded and remedial actions put in place to mitigate adverse environmental impacts that might result from the project.
Land Use, Ownership & Public Utilities				
Is the use of roads affecting the public's normal use	√			Detours and warning signs are in place to control/regulate vehicular and pedestrian movement. Alternative access routes are created to allow easier access of community dwellers to their respective residents and businesses.
Have constructed access tracks/roads been designed and constructed to incorporate appropriate sediment & erosion controls?	√			The Company is ensuring that requisite measures are instituted to address issues relating to erosion and sediments.
Ecology				
Are operations being carried out to minimize the impacts on threatened species, populations, ecological	√			There was no direct threat to the ecological community along the project corridor.

communities, and their habitats, & critical habitat?				
Cultural Heritage				
Are operations being carried out to avoid knowingly destroying, defacing, or damaging sacred objects or places			√	There was no direct threat to the cultural heritage along the project corridor.
Hydrology				
Has interference of the flow of water in any stream or watercourse been avoided?			√	Watercourse and stream associated with the project terrain are frequently monitored.
Are adequate containment measures installed and maintained to prevent dirty water discharge off-site?	√			
Have sufficient sediment/erosion control measures been implemented and maintained to prevent runoff of sediment into drainage lines, streams, or creeks?	√			
Waste Management				
Are operational areas being kept in a clean and tidy condition at all times?	√			Waste bins are available at the contractor's camp and along the project corridor. The regular collection of waste from waste bins is done. There is a measure in place to ensure the constant monitoring and maintenance of the project camp.
Are all refuse and waste materials being collected, segregated, and deposited in properly constructed containers and removed to an approved landfill or buried in an approved manner at an approved location?	√			Waste generated at the camp is disposed of in waste bins and later collected and transported to an approved disposal area for final management.

Are precautions being taken to prevent spills and soil contamination? Are all chemicals, fuels, and oils being stored in sound containers and kept in spill trays or a bundled area?	√			Collecting dishes are used when fueling and servicing vehicles. All servicing is done in garages and workshops.
Personal Protective Equipment (PPE)	√			As stipulated in the PPE supply plan, the management distributed PPE to workers. PPEs issued included Goggles, Gloves, Nose Mask, and High reflective vest. Workers are being encouraged to always use PPEs during work. A strict policy is in place to deal with violators of PPE usage.
Communication				
Have the relevant stakeholders been contacted regarding the commencement and progress of work?	√			Relevant authorities were contacted before the commencement of work along the corridor.
Air Pollution Control				
Are the construction site/paved roads watered to minimize dust generated?			√	Watering of roads at construction sites was not observed during the month under review due to the current meteorological condition in the country, the Rainy Season.
Are stockpiles of dusty materials covered or watered?	√			
Are all vehicles carrying dusty loads covered/watered over before leaving the site?	√			Asphalt mixes are covered during haulage.
Are there speed control measures applied? (e.g. speed limit sign)	√			Drivers have been advised to observe speed limits during operational hours.
Noise control				
Any noise mitigation measures adopted (e.g. use noise barrier/enclosure)?	√			Management has set up systems to mitigate noise impacts at the project site.

Do air compressors and generators operate with doors closed?	√			Generator rooms are closed to avoid excessive noise levels which are a nuisance to listeners. Furthermore, generators are switched off when not in use.

1.5 Risk Assessment of Environmental, Health & Safety Indicators

This section describes the Environmental, Health & Safety risks associated with each environmental indicator. Consideration of indirect and cumulative effects is based on the best available information at the time of writing this report.

The risks assessment analysis described in terms of severity of the issue (Risk Level), DNC adaptive capacity, and recommended management option. The risk level has been categorized as follows:

- High - The defect is severe and poses an immediate risk to the environment, to regulatory compliance, or the reputation of the company. There is a real risk that licenses can be revoked or heavy fines incurred.
- Moderate - The defect presents a serious situation, but may have an impact on the environment, human health or safety, or the community. There may be a risk which is immediate, of regulatory non-compliance or adverse publicity affecting the company's public image.
- Low - The defect presents a serious situation, but may not necessarily have an impact immediately on the environment, human health or safety, or the community. There may be a risk that is not immediate, of regulatory non-compliance or adverse publicity affecting the company's public image or reputation.

These criteria enable the determination of the overall importance or significance of each impact identified. Even if a particular evaluation is merely based on a value judgment rather than quantitative data that is not available, the methodology enables the establishment of acceptable levels and defines necessary mitigation and monitoring measures to minimize or eliminate risks.

Table 2: Level of Environmental Impact

Risk	Color Coding	Likelihood of Environmental Harm Occurring
High		Certain
Moderate		Likely
Low		Less Likely

The assessment of the likelihood of environmental harm occurring and the level of environmental impact allows for the risk assessment of DNC environmental performance via a color-coding system. A red risk assessment for non-compliance denotes that the issue is of considerable environmental significance and therefore must be dealt with as a matter of priority. An orange risk assessment for non-compliance is still a significant risk of harm to the environment, however can be given a lower priority than a red risk assessment. A yellow risk assessment for non-compliance indicates that the non-compliance could receive a lower priority, but must be addressed.

Several EPA Permit conditions do not have a direct environmental significance but are still important to the integrity of the regulatory system. These conditions relate to administrative, monitoring, and reporting requirements.

Table three assesses the environmental issues that were noted along the project corridor in terms of compliance rating. The table gives compliance scores as well as recommendations for findings from the assessment. Furthermore, in Table four, the findings from the monitoring are compared against the mitigation measures stipulated in the Environmental and Social Management Plan.

Table 3: Compliance Rating

Score/Rating	**Compliance rating**	**Definition**
5	Full Compliance	All activities, conditions, and requirements 85> 100% have been addressed.
4	Moderate Compliance	
3	Substantial Compliance	75> 85% compliance
2	Broad Compliance	50>75% compliance
1	Partial Compliance	25>50% compliance
0	Non Compliance	0>25%None of the activities, conditions, or requirements has been addressed

Table 4: Environmental Management Checklist for Compliance

Environmental Health and Safety issues	**Recommended mitigation measures**	**Risk Level**	**Compliance Rating**	**Assessment of Compliance with Environmental issue**

Pollution of surface water	The company shall ensure the proper management of all surface and ground waters in proximity to the project area. Pollution to water bodies in any form or by any means shall be avoided	High	4	Since the inception of Phase II of the project, there has been no significant impact on water bodies along the project corridor.
Maintenance of vehicles and equipment	Maintenance of construction vehicles should be carried out at DNC camps and recognized garage; Ensure proper storage, handling, and disposal of oil wastes from machinery; Discourage servicing of machinery and vehicles in construction sites.	Moderate	4	All construction vehicles are serviced at campsites and recognized garages.
PPE Usage	Provide PPE to all construction workers, and instruct field supervisors to enforce a strict policy of wearing PPE at work sites.	Moderate	3	Workers have PPE such as helmets, boots, gloves, and mask. Most workers complied with PPE usage. However, some workers ignore the use of PPE thus exposing them to serious health and safety risks. Supervisors have been given strict instructions to enforce PPE usage
Noise and vibration:	Sensitize the workforce and truck drivers on issues of equipment maintenance; Supervise construction traffic; Maintain equipment; Undertake construction only during the daytime for peace of the neighbors;	High	5	The results from noise and vibration monitoring revealed that the company complies with the requisite limit in minimizing the impacts of noise levels.

	Workers are to wear earplugs, muffs as part of their PPE;			
Construction debris and trash along the road	Collect all construction debris (concrete, waste asphalt, metal) and trash along the road and dispose of offsite per regulations	Low	5	The company has ensured the collection of all construction debris and trash along the road and appropriate disposal. However, communities along the project corridor disposed of domestic wastes along with the project site which is not in the confine of the company to ensure disposal.
Site preparation, construction management, and materials transport	Ensure appropriate management and/or maintenance of construction materials.	Low	5	Trucks, construction equipment, and machines mobilized at construction sites are in good condition and meet all requirements
Dust and exhaust: site preparation, construction management, and materials transport	Carry out water spraying along the road at least twice daily during dry weather periods. Trucks carrying sand/soil/quarry material should be covered	Moderate	4	Management has put in place measures to minimize the impact of dust on workers and the communities' health. Trucks transporting soils and materials are covered.
Efficiency of Fire Extinguishers.	Conduct an immediate inspection of fire extinguishers at substations and include a tag in each extinguisher indicating the date of inspection. Perform quarterly inspections thereafter	Moderate	4	All fire extinguishers have been refilled accordingly Ensure continuous inspection and servicing of fire extinguishers
Traffic Management	Enforce speed limits of construction vehicles; Install approximate cautionary signage for vehicles entering the construction premises;	High	3	Traffic signals are well placed along areas of active construction. Flagmen are assigned to direct traffic routes.

	Ensure appropriate road safety signage; Ensure all drivers adhere to the traffic laws and requirements; Erection of bumps where human; and vehicular traffic have high interaction opportunities.			Warning signs and barriers are well placed at the construction sites
Loss of biodiversity	Minimizing clearing and disruption to riparian vegetation; Consider rerouting to avoid or minimized effect on wetlands	High	5	No issue of the project impact on biodiversity was recorded during this monitoring period.
Materials Management	Scrap materials at substations should be collected and stored in an orderly manner to be reused and disposed of/sold to outside material haulers and recyclers.	Low	3	The company stores materials far from rivers and streams and has also provided bunds or cover to prevent them from dust and erosion. Used construction scrap material (steel, timber, wires, etc.), and impaired machines/spare parts are stored at substations.
Management, Drainage/ Erosion prevention/ Sediment control	Ensure proper construction and drainage management systems.	Moderate	4	Work along the corridor that involves the installation of drainages is ongoing. Management has put in place that required engineering expertise to carry out the task. Warning signs and fence at construction position has been installed.
Bitumen and Asphalt concrete	Ensure the appropriate requirements and procedures for bitumen and asphalt laying as stipulated in the ESMP	Moderate	5	Meets the requirements.

Hazardous Waste Management	Ensure proper/appropriate handling and disposal of hazardous waste	Moderate	4	Asphalt leakages from storage containers were observed at the Jacob Town substation. Ensure spills are clean up immediately and disposed in accordance.
Solid waste management and disposal (domestic waste and construction waste)	Solid wastes must be disposed away from the site to an approved waste disposal site	High	4	Management has mesures in place at the Stephen Tolber Estate Camp Site to handle solid waste. Waste bins have been provided at areas of active construction and substations for storage of domestic waste pending subsequent disposal to an approved waste disposal site (Wiens Town). However, monitoring needs to be done regularly to enance effective implementations.
Environmental Maintenance Practice at all substations along the corridor	Ensure appropriate and continouse environmental maintenance practice at all stations	Moderate	4	Environmental Management systems at various substations needs effective monitoring on a regular basic.

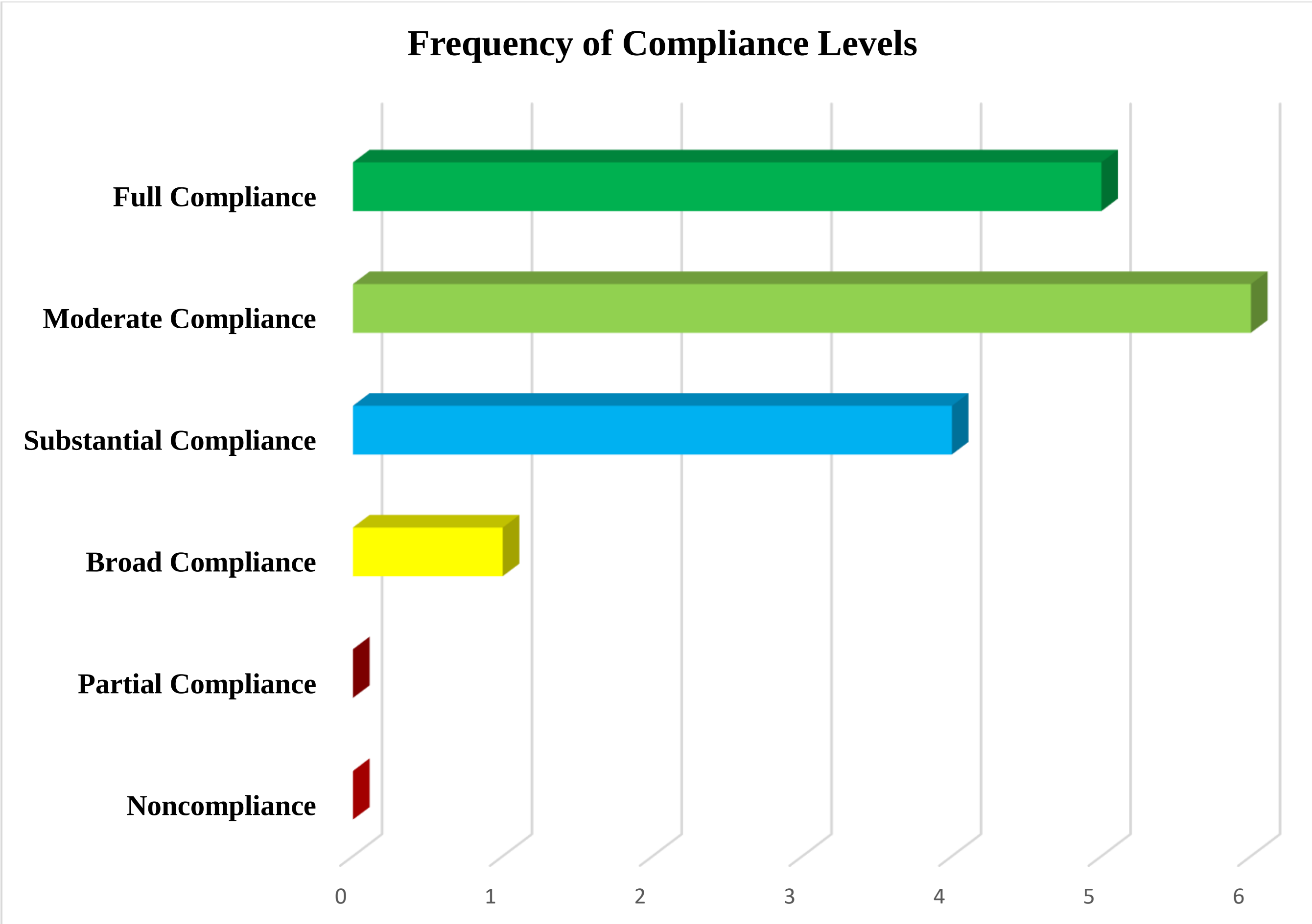


Figure 2: Ranking of Compliance Rating

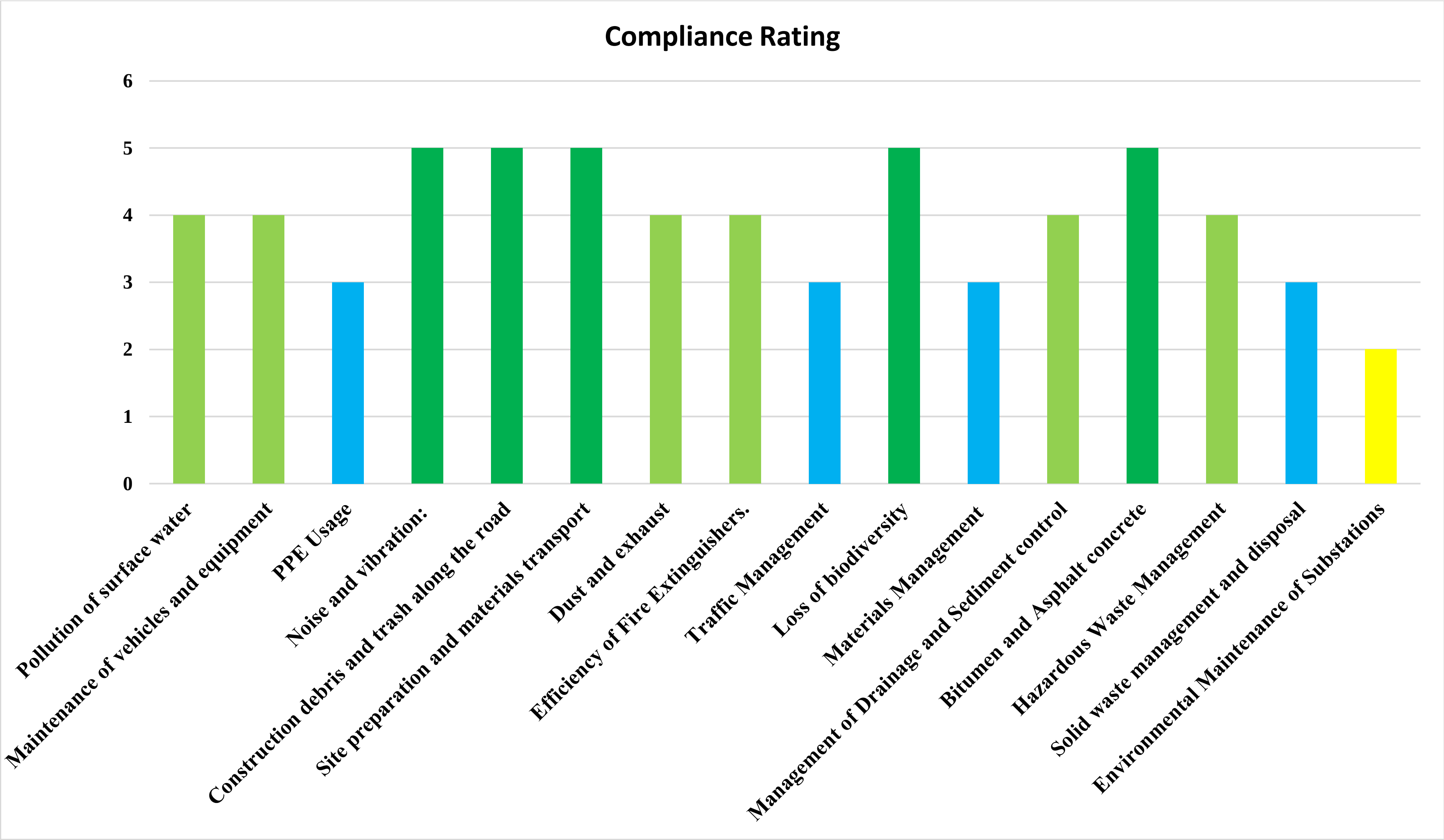


Figure 3: Graphical Representation of level of Compliance of various indicator

CHAPTER TWO: ENVIRONMENTAL MONITORING

2.1 Introduction

DNC subscribes to its environmental policy that wholly supports and complies with or exceeds the requirements of current environmental legislation and codes of practice applicable in Liberia and all areas of operations. The policy promotes environmentally sound design, environmental monitoring, and also environmental safeguards and risk reduction.

Consistent with the requirement that DNC is to submit a Quarterly Environmental Monitoring report to the EPA, the company has set up an Environmental Health and Safety Department for conducting daily environmental monitoring exercises leading to the preparation of the quarterly report. DNC understands the importance of environmental protection, therefore it is adhering to all of EPA guidelines and policies so that any adverse impacts are foreseen and addressed and development are achieved in a way that is sustainable and environmentally responsible.

2.2 Project Profile

Location	Japan Freeway (Previously Somalia Drive, Montserrado County)
Start Point	N 06.33762^0 W 010. 79162^0 (Freeport of Monrovia)
End Point	N 06.29692^0 W 010.69868^0 (Red-light Market)
Project Cost	N/A
Project Length	Approx. 13 km
Major Water Bodies	Stockton and Warner Creeks
National Park/Forest Reserve	None

2.3 The Project Site

The project is located along the Japan Freeway (Previously Somalia Drive, Montserrado County). The construction and rehabilitation of the road commence from the Freeport of Monrovia (Km +0) and ends at Red-light Market (Km +13).

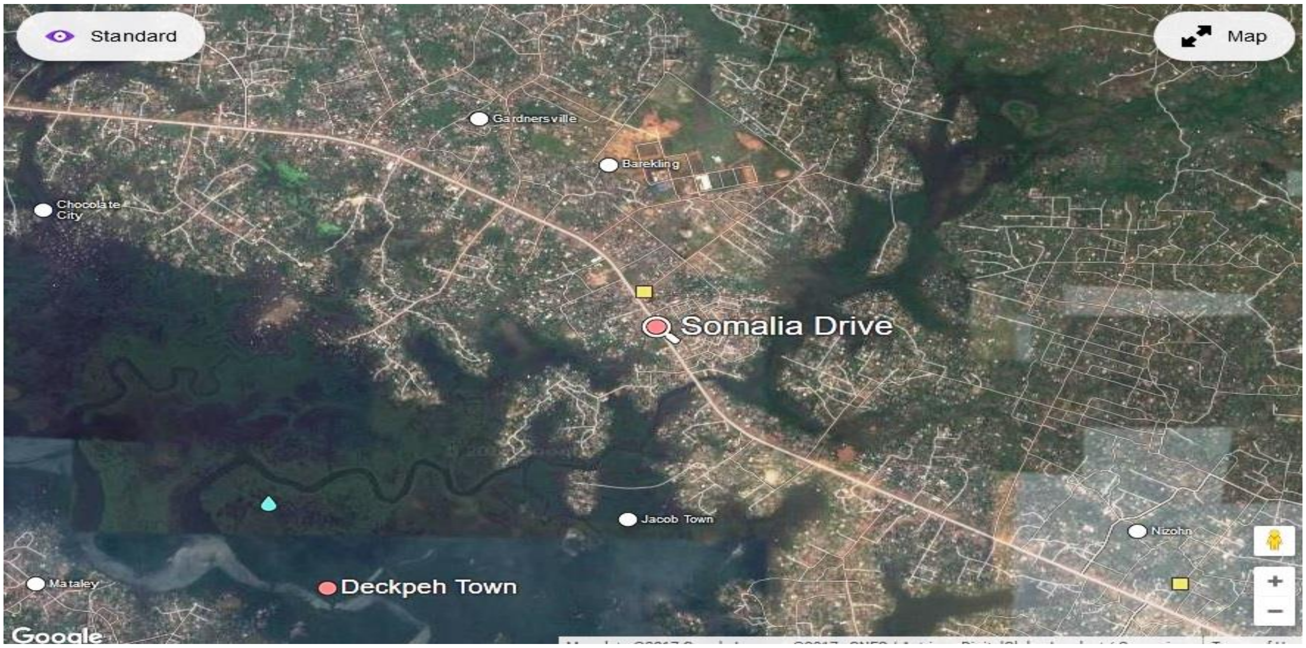


Figure 4: Google Earth Map of the Project Area

Figure 5: Inspection of Construction activities along the Project Corridor

CHAPTER THREE: BIODIVERSITY SURVEY

3.1 Introduction

Liberia lies at the heart of the Western Guinean Lowland Forest Eco-region, the westernmost rainforest on the African continent. The flora and fauna of the ecoregion are diverse with nearly 1,000 vertebrates. Recent estimates indicate there are more than 200 plants endemic to this ecoregion, including an endemic family of lianas. The fauna is also distinctive with larger numbers of narrowly endemic species than in the contiguous Eastern Guinean Lowland Forest ecoregion, including two endemic duikers, three strictly endemic birds, and strictly endemic amphibians. Much of the natural forest in this ecoregion has been lost to human activities, and almost all remaining forest has been modified by human disturbance.

The environmental components decide what kind of plants and animals are to be sustained in the specific area. The overall distribution of species principally depends on the climatic conditions and presence of specific environmental parameters along with typical landform and land-type. In the distribution of flora, the topography, rainfall, soil type, etc. play a crucial role in their distribution.

3.2 Objective of the study

The Biodiversity study aimed to determine whether the project have had an impact on the existing fauna and flora characteristic of the project area and make a recommendation to curtail or minimize potential impacts; to make recommendations for the conservation, protection, and rejuvenation of the natural vegetation and animal life by involving staffer and senior management**.**

3.3 Result

The DNC road project extends from Freeport to Red-light which is about 13.2 km in length. It's characterized by Mesurado wetland along both sides. The increase in human population growth along the route has greatly affected the Mesurado wetland thereby resulting in depletion of the mangroves species for Charcoal production, fuelwood collection among others. Throughout the monitoring, reflection shows that there has been no clearance of vegetation by DNC along the Somalia Drive to date as a result of road reconstruction work. However, some plants identified on-site, have been harvested by communities' dwellers for fuelwood collection and construction materials for a local home with greener leaves regenerating gradually due to the variations done. DNC has maintained caution and safeguards in its construction methods to ensure that the footprint of the construction does not affect the integrity of the wetland ecosystem. The company is committed to ensuring that its work in compliance with the Environmental Protection and Management Laws of Liberia (2003) and other best practice international safeguard environmental standards. Four mangroves species were identified along with several ferns, grasses, and other plant species. The Detail of the finding is mention in appendix one to five.

The company is also committed to ensuring that the construction work is conducted in line with the Environmental Protection and Management Laws of Liberia (2003) and other international safeguard and environmental standards.

3.3.1 Floral Diversity of the Project Area:

The type of ecosystem associated with the project corridor is a wetland which is mainly characterized by mangroves swamps, grasses, ferns, and shrubs. During this time interval, a total of four sampling plots was assessed, with 10m x10m within the Stockton, Warner, Jarkpa, and Slotee Lake along with the 13.2 Km road project. There were several Flora species identified within those sample areas in which the team used the online IUCN database as referenced to identify Red Data Species and their various threat status categorizations. The list of these Flora species is in Appendix one.

3.3.2 Fauna Diversity of the project area

3.3.2.1 Avifauna (Bird)

During the monitoring, bird observation studies were conducted along the project corridor to identify the impact of the project on birdlife as well as identify the type of bird species that are found within the project area. Onsite observation, as well as Key Informant interviews, were used to gather information about bird species associated with the project corridor. Several species of birds were recorded during the assessment. These species identified are mostly migratory and seasonal (See appendix two for the list of birds recorded).

3.3.2.2 Mammals

The project site is considered a habitat for small mammals' species. There were several species of small mammals identified from the four reference sites over the survey periods. Among the species recorded from the project site were mostly rodent species. These species are considered to be indicators of remnants of disturbed habitats because they are tolerant of noise and disturbance. Their presence could suggest that there may be remnants of modified habitat within the area. The list of these species is in Appendix three.

3.3.2.3 Amphibians and Reptiles

Surveys of amphibians were made using a standardized protocol whilst reptiles were recorded opportunistically. There were several species of amphibians belonging to different families recorded from the site. The reptile diversity at the site is likely to be quite low due to the lack of large rocky outcrops at the site which are an important reptile habitat. Most reptiles are sensitive to the amount of plant cover. During the assessment, observation demonstrates that the team identified several amphibian and reptile species along the project corridor. The list of these species recorded from the site is in Appendix four.

3.3.2.4 Fish

Based on the survey, a total of 24 fish species were identified; 72% of which were identified through photo questionnaire interview conducted while 28% was based on physical observation. One of them has been identified to be near threatened (*Epiplatys olbrechtsi*), while the others were considered as Least Concern. A list of the fishes recorded is found in Appendix five.

CHAPTER FOUR: ANALYSIS AND REPORT FOR PROJECT INSTRUMENTS

4.1 Background

Analyses of water, vibration, air, and noise were conducted along the Somalia Drive for six days (February 24-28, 2021). This report is a summary of the test methods employed and results from the study. It is anticipated that the results obtained herein will be compared against results from the previous quarterly report (4th Quarter 2020) to establish spatial variation and contaminant trends for the current phase of the road construction project. All Laboratory analyses were conducted by Rayan Laboratory Services, an Accredited Environmental Laboratory located in Maude Town, Paynesville.

Figure 6: Google Earth Map Showing Various Sampling Locations

4.2 Sampling and Analytical Methods

Analyses of water, vibration, air, and noise were conducted along the Somalia Drive for six days (February 24-28, 2021). This report is a summary of the test methods employed and results from the study. It is anticipated that the results obtained herein will be compared against results from the previous quarterly report (4^{th} Quarter 2020) to establish spatial variation and contaminant trends for the current phase of the road construction project. All Laboratory analyses were conducted by the University of Liberia Civil Engineering Laboratory.

Figure 7: Surface Water Sample Collection (Werner Creek)

Table 5: Parameters and Analytical Methods to be considered

Parameter (Unit)	**Instrument**	**Analytical Method**	**Instrumental Range**	**Precision (Standard deviation)**
pH	Multi-meter (HI 98129)	Standard Electrode Method	0 to 14.00	± 0.01
Suspended Solids (ppm)	DR 890 Colorimeter	Photometric Method	0 to 750 ppm	± 18.2 ppm
COD (ppm)	DR 890 Colorimeter	Reactor Digestion Method	0 to 150 ppm	± 2.0 ppm
DO (ppm)	DR 890 Colorimeter	HRDO Method	0 to 15 ppm	± 0.41 ppm
Color (Pt-Co Unit)	DR 890 Colorimeter	APHA Pt-Co Standard Method	0 to 500 units	± 10.0 Pt-Co Units
Electric Conductivity (µS/cm)	Multi-meter (HI 98129)	Standard Electrode Method	0 to 3999 µS/cm	± 0.02 µS/cm
Turbidity (NTU)	DR 890 Colorimeter	Absorptometric Method	0 to 1000 NTU	± 2.00 NTU
Oil (ppm)	TD 500-D Oil & Grease Analyser	Digital Analysis	0 to 500 ppm	± 1.05 ppm
Noise (dbA)	3M Sound Examiner SE-400	Sound Level Analysis	0 to 143 dbA	± 2.00 dbA
Vibration (Vdb)	Fluke 805 Vibration Meter	Vibration Analysis	0 to 1000 Vdb	± 10.00 Vdb
Air quality (CO, CO_2, SO_2, NO_2, O_3)	AeroQual 500	Gaseous Analysis in Air	0 to 5000 ppm	± 1.0 ppm

4.2.1 Suspended Solids (SS)

For suspended solids, the sample was collected in clean plastic or glass bottle. The bottle was labeled for easy identification and the sample was analyzed within 24 hours of collection. For analysis, Photometric Method was employed. This method is a simple, direct measurement that does not require filtration or ignition and weighing steps that gravimetric procedures do. The sample was agitated using a blender and the SS readings were taken directly using a DR890 Colorimeter.

4.2.2 Chemical Oxygen Demand (COD)

Samples were collected in a glass bottle. Biologically active samples were analyzed within 24 hours of collection. Samples were homogenized to obtain representative concentrations. The test analysis was done using the dichromate method. In this procedure, the sample was heated for two hours with a strong oxidizing agent, potassium dichromate. Oxidizing organic compounds react, reducing the dichromate ion to green chromic ion. The readings were taken using a DR890 Colorimeter and applying the Reactor Digestion Method.

4.2.3 Dissolved Oxygen (DO)

The main consideration in sampling was to prevent the sample from becoming contaminated with atmospheric oxygen. The Dissolved Oxygen content of the water being tested can be expected to change with depth, turbulence, temperature, sludge deposits, light, microbial action, mixing, travel time, and other factors. To reflect a more accurate condition of the body of water, several samples were collected at different times, locations and depths. Samples were tested immediately upon collection and the results were averaged and presented. In the test method, a yellow color forms when which turns purple when oxygen reacts with the reagent. The color developed is proportional to the concentration of the dissolved oxygen. Readings for the DO were taken using a DR890 Colorimeter.

4.2.4 Color

Samples were collected in clean plastic bottles and analyze d within 24 hours of collection. During sampling, care was taken to fill the bottle and cap tightly. This was intended to avoid prolonged contact with air. Color was measured by applying a DR890 Colorimeter.

4.2.5 pH and Electric Conductivity (EC)

For pH and Conductivity, samples were collected in clean plastic bottles. All samples were analyzed within 24 hours of collection. All analyses of pH and Conductivity were done using a Multi-meter (HI 9829). Before analysis with the Multi-meter, the instrument was calibrated using pH buffer 4.0, 7.0, and 10.0.

4.2.6 Turbidity

For turbidity, samples were collected in clean plastic bottles. All samples were analyzed within 24 hours of collection. Turbidity was measured using a Turbidity meter (T 100). This turbidity test measures an optical property of the sample which results from scattering and absorption of light by particles in the sample. The amount of turbidity measured depends on variables such as the size, shape, color, and refractive properties of the particles. Before analysis, the meter was calibrated using formazin turbidity standards.

4.2.7 Oil

Samples were collected in clean plastic bottles. Samples were analyzed within 24 hours of collection. The test method employed for the analysis was digital photometry employing a TD-500D Oil and Grease Analyzer.

4.2.8 Noise and Vibration

For Noise and Vibration, the readings are taken in situ. The coordinates for the sample point were simultaneously recorded for easy reference and reportage. Noise and Vibration readings were taken during peak hours. To compare these results against the baseline, readings were also taken during early morning hours when noise and vibration were likely to be at their bare minimum.

4.2.9 Air Quality

For Air Quality, the appropriate air quality sensor (CO, CO_2, SO_2, NO_2, O_3) was mounted on the

air quality device (AeroQual 500) and the readings were taken in situ.

4.3 Water Sampling and Analysis

Water samples were collected from three points along the Somalia Drive. The sampling

Figure 8: Night Monitoring of Air Quality along the project corridor

information is presented below.

Water samples were collected from three points along the Somalia Drive. The sampling information is presented in Table six.

Table 6: Sampling Information

Sample Code	GPS Coordinates		Location	Date	Time
	X	Y			
001	308825	698417	Borehole well approximately 10m from Warner Creek	01-03-2021	10:15 am
002	308832	697111	Warner Creek, Stephen Tolbert Estate Bridge	01-03-2021	10:40am
003	303015	701048	Stockton Creek Bridge		10:57 am

The analytical results for the water samples are presented in Table seven. A comparison was also made between the current and previous water quality data in Figure Nine.

Table 7: Analytical results for water samples

Parameter (Unit)	001 (Well)	002 (Warner Creek)	003 (Stockton Creek)	National Standard (Class II)	National Standard (Class III)
pH	6.71	6.27	6.15	6.0-9.0	5.5-9.0
Suspended Solids (ppm)	23.91	29.60	24.51	<30.0	<50.0
COD (ppm)	16.13	20.38	30.12	<200.0	<250.0
DO (ppm)	1.23	4.31	4.53	≥4.0	≥5.0
Color (Pt-Co Unit)	4.0	5.0	5.0	NS	NS
Electric Conductivity (µS/cm)	34.4	64.3	74.5	NS	NS
Turbidity (NTU)	1.59	3.91	3.68	<10	<100
Oil (ppm)	ND	1.27	0.39	NS	NS

NS = not stated; ND = not detected

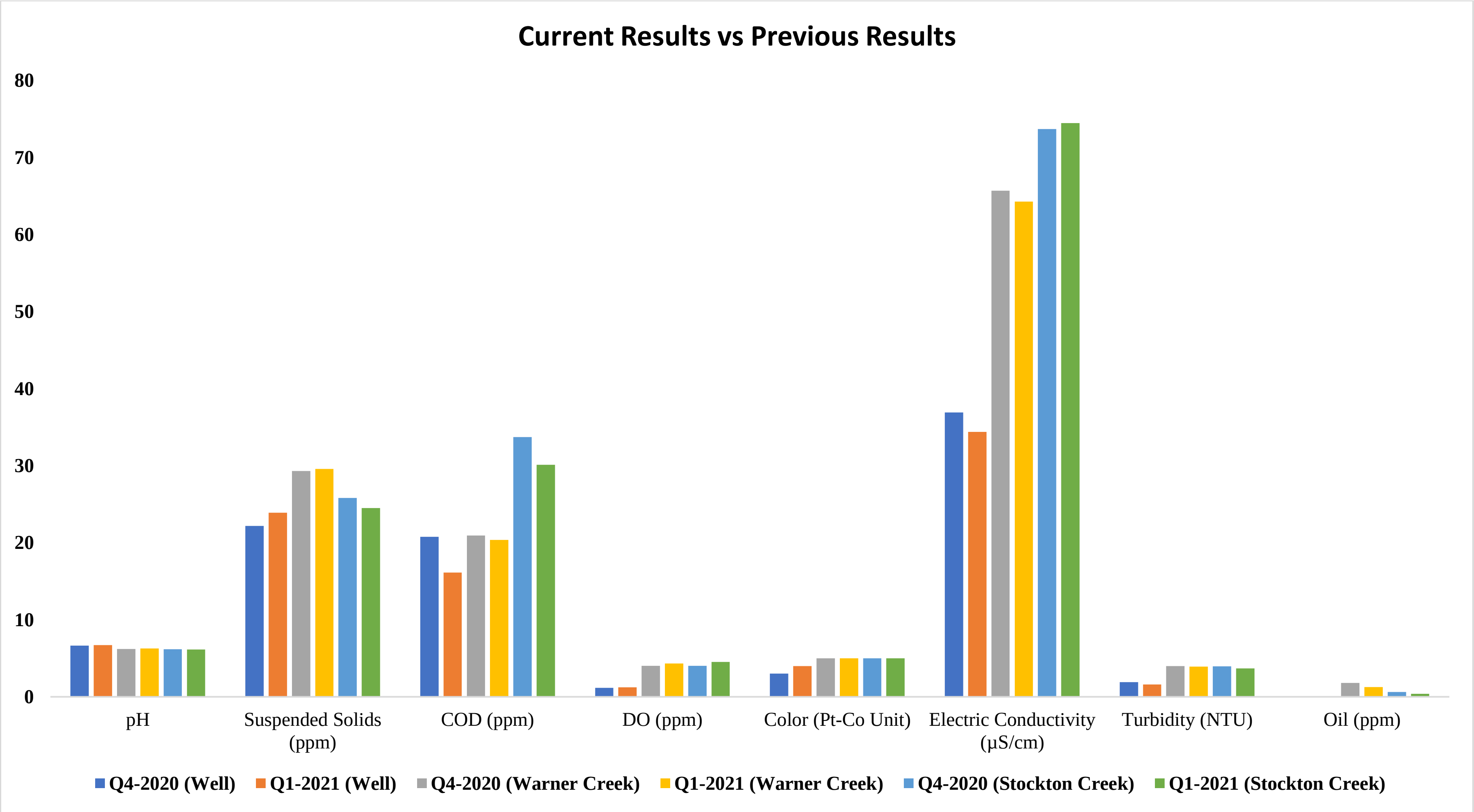


Figure 9: Comparison of current water quality results with previous quarter data (4th Quarter 2020)

4.4 Sound Quality

Sound quality results were taken at several points during the study. The sound quality results are presented in Table eight.

Table 8: Sound Quality Results

DAY ONE: February 24, 2021

Code#	GPS Coordinates	Day/Time Wednesday	Sound intensity (db)
001	29N 0312085 UTM 0696336	10:15am 10:22am 10:29am	71.6 66.9 62.3
002	29N 0310663 UTM 0697111	10:50am 10:57am 11.02 am	72.1 68.5 53.4.
003	29N 0308832 UTM 0698441	11:20am 10:27am 11:33am	70.9 64.8 66.8
004	29N 0305419 UTM 0700744	11:50am 11:57am 12:06pm	56.1 68.0 60.8
005	29N 0303015 UTM 0701048	12:35Pm 12:43pm 12:50pm	46.8 47.8 49.0
006	29N 0302231 UTM 0700991	1:35Pm 1:42pm 1:47pm	80.5 79.1 80.4

DAY TWO: February 25, 2021

Code#	GPS Coordinates	Day/Time Thursday	Sound intensity (db)
001	29N 0312085 UTM 0696336	9:15am 9:22am 9:27 am	70.4 53.4 64.6
002	29N 0310663 UTM 0697111	9:40am 9:47am 9:51am	60.9 56.5 60.1
003	29N 0308832 UTM 0698441	10:16am 10:22am 10:27am	49.6 49.7 48.8
004	29N 0305419 UTM 0700744	10:45am 10:52am 11:00am	50.5 52.1 55.5

005	29N 0303015 UTM 0701048	11:23am 11:28am 11:33am	57.5 57.7 58.3
006	29N 0302231 UTM 0700991	11:55am 12:02pm 12:10pm	66.1 60.2 58.5

DAY THREE: February 26, 2021

Code#	GPS Coordinates	Day/Time Friday	Sound intensity (db)
001	29N 0312085 UTM 0696336	9:05am 9:12am 9:19am	52.6 58.3 61.7
002	29N 0310663 UTM 0697111	9:47am 9:52am 9:57am	60.5 60.4 50.8
003	29N 0308832 UTM 0698441	10:27am 10:27am 10:32am	71.9 70.2 70.1
004	29N 0305419 UTM 0700744	10:55am 11:0am 11:0am	66.3 60.4 65.0
005	29N 0303015 UTM 0701048	11:36am 11:42am 11:47am	71.6 79.3 70.7
006	29N 0302231 UTM 0700991	12:15pm 12:22pm 12:27pm	78.8 70.8 70.2

DAY FOUR: February 27, 2021

Code#	GPS Coordinates	Day/Time Saturday	Sound intensity (db)	Night/Time Saturday	Sound intensity (db)
001	29N 0312085 UTM 0696336	9:00am 9:07am 9:14am	62.6 64.2 61.5	8:01pm 8:08pm 8:15pm	52.4 53.1 51.7
002	29N 0310663 UTM 0697111	9:45am 9:53am 9:59am	56.5 63.2 58.7	8:30pm 8:37pm 8:42pm	65.9 61.3 58.2
003	29N 0308832	10:25am 10:30am	62.1 64.6	9:08pm 9:15pm	53.2 65.1

	UTM 0698441	10:35am	66.3	9:21pm	50.4
004	29N 0305419 UTM 0700744	11:00am 11:07am 11:15am	66.3 60.4 65.0	9:31pm 9:36pm 9:41pm	48.3 50.1 47.4
005	29N 0303015 UTM 0701048	11:50am 11:55am 12:00am	73.8 76.5 75.4	10:30pm 10:35pm 10:40pm	52.2 57.8 49.1
006	29N 0302231 UTM 0700991	12:05pm 12:10pm 12:15pm	79.8 74.4 77.2	11:22pm 11:27pm 11:32pm	65.9 61.3 58.2

DAY FIVE: February 28, 2021

Code#	GPS Coordinates	Day/Time Sunday	Sound intensity (db)	Night Time Sunday	Sound intensity (db)
001	29N 0312085 UTM 0696336	9:10am 9:17am 9:23am	62.7 61.2 60.7	8:10pm 8:17pm 8:23pm	76.7 74.3 74.0
002	29N 0310663 UTM 0697111	9:45am 9:50am 9:55am	59.5 61.4 58.2	8:45pm 8:50pm 8:55pm	59.5 61.4 58.2
003	29N 0308832 UTM 0698441	10:20am 10:27am 10:32am	60.6 61.6 63.1	9:20pm 9:27pm 9:32pm	60.6 61.6 63.1
004	29N 0305419 UTM 0700744	11:05am 11:10am 11:15am	66.0 64.1 66.4	10:05pm 10:10pm 10:15pm	66.0 64.1 66.4
005	29N 0303015 UTM 0701048	11:45am 11:50am 11:55am	70.1 74.4 76.3	10:45pm 10:50pm 10:55pm	70.1 74.4 76.3
006	29N 0302231 UTM 0700991	12:25pm 12:32pm 12:40pm	76.7 74.3 74.0	11:25pm 11:32pm 11:40pm	76.7 74.3 74.0

4.5 Vibration Analysis

Vibration counts were recorded at three major points during the period of the study. The vibration was recorded at peak traffic hours (6:30-7:30 am and 5:00 -6:00 pm). Control vibrations were also recorded from 1:00 am to 2:00 am for comparison. The results are presented in Table nine.

Table 9: Results of vibration analysis

Code	GPS Coordinates		Peak Hours Results (Vdb)	Control Hours Results (Vdb)	Mean (Vdb)
	X	Y			
001	0308781	0698562	60.4	52.3	56.35
002	0303120	0701092	61.1	52.3	56.70
003	0302193	070962	60.2	51.7	55.95

4.6 Air Quality Results

Air quality data were collected in situ at four major points from February 24 to February 28, 2021. The results are presented in Table 10.

Table 10: Air Quality Result across the study period

Date: Feb 24, 2021

Location	Coordinate	Time	CO_2	NO_2	CO	SO_2	O_3
72nd Junction	0312031N/0696330W	2:00-2:36 pm	427 ppm	0.031 ppm	195 ppm	0.00 ppm	0.03 ppm
Stephen Tolbert Estate	0308814N/0698527W	9:40-10:11 am	440 ppm	0.030 ppm	148 ppm	0.00ppm	0.04 ppm
Jamaica Road/Stockton Creek	0303066N/0701073W	11:27 am-12:11 pm	428 ppm	0.035 ppm	170 ppm	0.00 ppm	0.03 ppm
Freeport Junction	0301717N/0700833W	12:40-1:18pm	494 ppm	0.027 ppm	175 ppm	0.00 ppm	0.03 ppm

Date: Feb 25, 2021

Location	Coordinate	Time	CO_2	NO_2	CO	SO_2	O_3
72nd Junction	0312081N/0696343W	2:33-3:01 pm	443 ppm	0.020 ppm	170 ppm	0.00 ppm	0.03 ppm
Stephen Tolbert Estate	0308811N/0698502W	9:30-10:17 am	446 ppm	0.031 ppm	141ppm	0.00ppm	0.02 ppm
Jamaica Road/Stockton Creek	0303061N/0701064W	11:20-11:49 am	449 ppm	0.025 ppm	163 ppm	0.00 ppm	0.03 ppm
Freeport Junction	0301716N/0700840W	12:22-1:14pm	471 ppm	0.027 ppm	168 ppm	0.00 ppm	0.03 ppm

Date: Feb 26, 2021

Location	Coordinate	Time	CO_2	NO_2	CO	SO_2	O_3
72nd Junction	0312080N/0696343W	2:14-2:49 pm	414 ppm	0.017 ppm	170 ppm	0.00 ppm	0.02 ppm
Stephen Tolbert Estate	0308808N/0698518W	9:13-9:45 am	448 ppm	0.023 ppm	148 ppm	0.00ppm	0.02 ppm
Jamaica Road/Stockton Creek	0303057N/070183W	11:01-11:47 am	470 ppm	0.022 ppm	164 ppm	0.00 ppm	0.03 ppm
Freeport Junction	0301703N/0700803W	12:13-12:44pm	461 ppm	0.029 ppm	160 ppm	0.00 ppm	0.03 ppm

Date: Feb 27, 2021

Location	Coordinate	Time	CO_2	NO_2	CO	SO_2	O_3
72nd Junction	0312081N/0696305W	2:24-2:57 pm	430 ppm	0.014 ppm	173 ppm	0.00 ppm	0.02 ppm
Stephen Tolbert Estate	0308818N/0698528W	9:11-9:48 am	458 ppm	0.020 ppm	159 ppm	0.00ppm	0.02 ppm
Jamaica Road/Stockton Creek	0303051N/070172W	11:05-11:53 am	471 ppm	0.021 ppm	160 ppm	0.00 ppm	0.02ppm
Freeport Junction	0301718N/0700811W	12:23-12:40pm	454 ppm	0.023 ppm	169 ppm	0.00 ppm	0.03 ppm

Date: Feb 28, 2021

Location	Coordinate	Time	CO_2	NO_2	CO	SO_2	O_3
72nd Junction	0312081N/0696305W	2:24-2:57 pm	434 ppm	0.022 ppm	170 ppm	0.00 ppm	0.03 ppm
Stephen Tolbert Estate	0308818N/0698528W	9:11-9:48 am	433 ppm	0.021 ppm	166 ppm	0.00ppm	0.01 ppm
Jamaica Road/Stockton Creek	0303051N/070172W	11:05-11:53 am	439 ppm	0.019 ppm	168 ppm	0.00 ppm	0.02ppm
Freeport Junction	0301718N/0700811W	12:23-12:40pm	450 ppm	0.021 ppm	160 ppm	0.00 ppm	0.02 ppm

4.7 Conclusion

During the quarter under review, there was a steady change observed in some parameters across the study area. The change in these parameters varied across portions of the study area. The changes were, however, not significant and can be attributed to seasonal variation and cumulative impacts from different activities along the project area.

The results obtained in this report effectively serve as the basis for auditing against baseline data from the previous quarter (Quarter 4, 2020). The water quality data showed very little variation when compared to previous results. Sound quality and vibration results varied across the two quarters. There was very little change in Air quality data across the two quarters. Based on the results of the study, it can be concluded that the impact of the current road project on the tested environmental matrices remains negligible.

CHAPTER FIVE: CONCLUSION & RECOMMENDATION

The environmental management system of the project has been completely prepared during the preconstruction phase. All the environmental preparatory activities that would ensure that consideration will be given to environmental protection during the construction stage have been put in place. The water quality data showed very little variation when compared to previous results. Sound quality and vibration results varied across the two quarters. The Air Quality data effectively serves as the baseline for future reference. The project will be decommissioned in a manner that reduces waste and restores the site to a clean and safe condition, suitable for the likely future use of the land per the EPA guideline.

It can be concluded that the DNC's commitment to environmental management is demonstrated in its environmental policy and Standards Operational Procedures (SOPs). Additionally, the Company has prepared the relevant documentation required by the EPML and obtained an EPA permit for its operation. The monitoring provides a basis for assessing the overall environmental performance of the company’s operations to identify gaps in meeting compliance requirements and to provide recommendations that seek to improve environmental performance. The monitoring has brought out the key issues that need immediate attention that could be improved.

Figure 11: Sample of Scraps within the Stephen Tolbert Camp Site that need to decommissioned

Figure 10: Improper Management of Asphalt at Jacob Town Camp Site

Based on the results of the study, it can be concluded that the impact of the current project on the tested environmental matrices remains negligible.

The following are recommendations for timely implementations:

1. That mandatory conduction of Environmental Closure assessment to ensure the implementation of the recommendations in this monitoring report;
2. DNC shall ensure full adherence to conditions and specifications stipulated in the environmental Permit before the closure of the project;
3. That restoration of campsites is done by both national and international best practices.
4. That appropriate erosion control system is implemented along the project corridor;
5. Equipment and stockpile storage areas are located away from riparian zones; and
6. That the government of Liberia through Monrovia City Corporation (MCC) and Paynesville City Cooperation (PCC) put in measures to curtail the disposal of waste along the corridor by a resident along with the project locality; and

Finally, the assessment team is with the conviction that the company will take all appropriate measures to act punctually as to ensure full compliance with the environmental permit specifications. The conditions for the permit can provide guidance and support for upgrading environmental performance with regular monitoring, reviews and enhance closure activities.

APPENDIXES

Appendix One

1. **List of these Flora species recorded from the DNC Project Site.**

Species	IUCN Status
Ficus sur	NE
Pterocarpux angolenses	NE
Spathodea campanelata	NE
Mimose pudica	NE
Cocos nucifera	NE
Solanum tarvum	NE
Alstonia boonei	NE
Peterocarpus angolense	NE
Managifera indica	NE
Musa *sapientum*	NE

Cola nitida	NE
Cassia siamea	NE
Cyperus *spp.*	NE
Spondia mombinne	NE
Rhizophora recemosa	LC
Rhizophora harrisonii	LC
Avicennia germinans	LC
Acrostichum aureum	LC

NE- Near Endangered, LC- Least Concerned

2. **List of herbaceous species**

No	herbaceous Species	Status	IUCN Status
1	*Astraea lobata*	Grasses	Not Assess
2	*Cyperus lanceolatus*		
3	*Cyperus alternifolius*		
3	*Cyperus difformis,*		
4	*Cyperus eragrostis*		
5	*Cyperus haspan*		
6	*C. difformis,*		
7	*Fuirena umbellata,*		
8	*Panicum laxum,*		
9	*Pycreus lanceolatus,*		
10	*Pycreus polystachyos,*		
11	*Scleria flexuosa*		
12	*Scleria naumanniana*		
13	*Scleria sumatrensis*		
14	*Spigelia anthelmia,*		
15	*Sida linifolia*		

3. **Fern and Mangroves species identified within the project area**

No	Fern and Mangroves species	Status	IUCN Status
1	*Hydrocotyle bonariensis*	Fern	Not Assess
2	*Cyclosorus striatus*	Fern	Not Assess
3	*Alectra sessiliflora*	Fern	Not Assess
4	*Nymphaea micrantha*	Fern	LC
5	*Nymphoides indica*	Fern	Not Assess

6	*Limniophyton anolense*	Fern	Not Assess
7	*Lasimorpha senegalensis*	Fern	Not Assess
8	*Ipomoea asarifola*	Fern	Not Assess

Appendix Two
List of Bird Species based on key informants' interview with pictographic field guide.

Scientific name	Common name	IUCN Status
Polyboroiddestypus	African Harrier Hawk	LC
Turturafer	Blue-spotted Wood Dove	LC
Streptopeliasemitorquata	Red-eyed Dove	LC
Centropus senegalensis	Senegal Coucal	LC
Meropsalbicollis	White-throated Bee-eater	LC
Pogoniulusscolopaceus	Speckled Tinkerbird	LC
Pogoniulussubsulphureus	Yellow-throated Tinkerbird	LC
Hirundoabyssinica	Lesser striped Swallow	LC
Hirundorustica	Barn Swallow	LC
Andropadusvirens	Little Greenbul	LC
Andropadusgracilirostris	Slender-billed Greenbul	LC
Pycnonotusbarbatus	Common Bulbul	LC
Cisticola lateralis	Whistling Cisticola	LC
Cisticola brachypterus	Short-winged Cisticola	LC
Priniasubflava	Tawny-flanked Prinia	LC
Camaropterabrachyura	Grey-backed Camaroptera	LC
loceuscucullatus	Village Weaver	LC
Laniuscollaris	Common Fiscal	LC
Chalcomitraadelberti	Buff-throated Sunbird	LC
Cyanomitraolivacea	Olive Sunbird	LC
Lamprotornissplendidus	Splendid Glossy Starling	LC
Senegalensis	Laughing Dove	LC

IUCN categories: LC= least Concerned.

Appendix Three

List of Mammals Species based on key informants' interview with pictographic field guide.

Scientific name	Common name	IUCN Status
Cricetomus emmi	Giant rat	LC
Thryonomys swinderianus	Greater Cane rat	LC
Crocidura jouvenetae	Jouvenet shew	LC
Crocidura obscurior	West African long tailed Shrew	LC
Crocidura olivieri	Olivier's Shrew	LC
Crocidura theresa	Theresa Shrew	LC
Crocidura poensis schweizeri	Fraser Musk Shrew	LC
Grammomys poensis	Shining thicket rat	LC
Protoxerus aubinnii	Slender-tailed squirrel	-
Heliosciurus punctatus	Small sun squirrel	-
Mus minutoides	African pygmy mouse	LC
Colomys goslingi	African wading rat	LC

LC- Least Concerned

Appendix Four

List of Reptile, Amphibian Species based on key informants' interview

Species	IUCN Status
Ptycadena bibonii	LC
Amietophrynus regularis	LC
Phrynobatrachus *Oogenesis*	LC
Archachanitina marginata ovum	NT
Amietophrynus reguaris	NT
Phrynobatrachus ogoensis	DD
Phrynobatrachus plicatus	LC
Agama agama lionotus	LC
Archachatina Marginata	NT
Tympanotonus fuscatus	LC

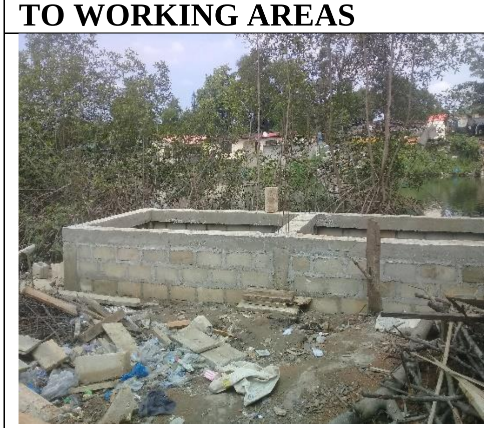
DD=Data Deficient, LC=Least Concern, NT=Near Threatened,

Appendix Five

List of Fish Species based on key informants' interview with pictographic field guide.

Species	**Common name**	**IUCN**
Brycinus imberi	Spot-tail	LC
Lates niloticus	Nile perch	LC
Chrysichthys auratus	Catfish	LC
Heterobranchus isopterus	Black catfish	LC
Heterobranchus longifilis	Black catfish	LC
Mormyrops anguilloides	Cornish jack	LC
Schilbe mystus	African butter catfish	LC
Epiplatys olbrechtsi	- - -	NT
Xenomystus nigri	African knife fish	LC
Papyrocramus afer	Reticulate knife fish	LC
Hemichromis fasciatus	Banded Jewlfish	LC
Hemichromis bimaculatus	Jewlfish	LC
Tilapia zillii	Redbelly tilapia	LC

Appendix Six: Photo Gallery

		
CONDUCTING OF AIR QUALITY AT THE PROJECT SITE	**INTERVIEW WITH DNC SAFETY OFFICER**	**CONSTRUCTION WORKERS AT THE PROJECT SITE**
		
MOTORCYCLIST INTRUDING TO WORKING AREAS	**ROAD CONSTRUCTION ACTIVITIES**	**CRUSH ROCK LAYING**
		
CONSTRUCTION ACTIVITIES IN WETLAND BY COMMUNITY DWELLERS	**IMPROPER WASTE DISPOSAL AT JACOB TOWN SUBSTATION**	**DISPOSAL OF WASTE IN DRAINAGES BY COMMUNITY DWELLERS ALONG THE PROJECT CORRIDOR**