GARID
GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT

GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT PROJECT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

PROPOSED HANDLING AND TRANSPORTATION OF DREDGED MATERIAL FROM ODAWNA, KORLE-NA AND PASICO SITES TO FINAL DISPOSAL SITES IN THE GREATER ACCRA REGION

REFERENCE NO.: GH-MWH-240096-CS-CQS.

OCTOBER 20, 2023

LIST OF ACRONYMS

AER	Annual Environmental Report	**LI**	Legislative Instrument
AbCMA	Ablekuma Central Municipal Assembly	**LPG**	Liquified Petroleum Gas
ACMA	Ayawaso Central Municipal Assembly	**MESTI**	Ministry of Environment, Science, Technology and Innovation
AIDS	Acquired Immune Deficiency Syndrome	**MMAC**	Metropolitan/Municipal Assembly Committee
AMA	Accra Metropolitan Area	**MMDAs**	Metropolitan, Municipal and District Assemblies
CLGRC	Community Level Grievance Redress Committee	**MMLGR**	Metropolitan and Municipal Level Grievance Resolution
COPD	Chronic Obstructive Pulmonary Disease	**MoU**	Memorandum of Understanding
CSO	Civil Society Organisation	**MRH**	Ministry of Roads and Highways
DMTRDMP	Dredged Material Transport, Recovery, Disposal and Management Plan	**MSWR**	Ministry of Sanitation and Water Resources
EA	Environmental Assessment	**MWH**	Ministry of Works and Housing
EFP	Environmental Focal Person	**NO_2**	Nitrogen Oxide
EHS	Environmental Health and Safety	**NRSA**	National Road Safety Authority
EI	Executive Instrument	**OP**	Operational Policy
EIA	Environmental Impact Assessment	**PAD**	Project Appraisal Document
EMP	Environmental and Social Management Plan	**PAP**	Project Affected Person
EPA	Environmental Protection Agency	**PCU**	Project Coordinating Unit
ESF	Environmental and Social Framework	**PHC**	Population and Housing Census
ESIA	Environmental and Social Impact Assessment	**PIU**	Project Implementation Unit
ESIS	Environmental and Social Impact Statement	**PLGR**	Project Level Grievance Resolution
ESMP	Environmental and Social Management Plan	**PM**	Particulate Matter
ESS	Environmental Safeguards Specialist	**PNDCL**	Provisional National Defence Council Law
ESSs	Environmental and Social Standards	**PPE**	Personal Protective Equipment
GARID	Greater Accra Resilient Integrated Development	**PWD**	Persons with Disability
GBV	Gender-Based Violence	**RAP**	Resettlement Action Plan
GHG	Greenhouse Gas	**SEA**	Sexual Exploitation and Abuse
GHS	Ghana Health Service	**SFP**	Social Focal Person
GNFS	Ghana National Fire Service	**SH**	Sexual Harassment
GoG	Government of Ghana	**SHS**	Senior High School
GPS	Global Positioning System	**SO_2**	Sulphur Dioxide
GRC	Grievance Redress Committee	**SSS**	Social Safeguards Specialist
GRM	Grievance Redress Mechanism	**STI**	Sexually Transmitted Infection
HDPE	High Density Polyethylene	**SWCDD**	Social Welfare and Community Development Department
HIV	Human Immunodeficiency Virus	**SWM**	Solid Waste Management

HSD	Hydrological Services Department	**TIA**	Traffic Impact Assessment
HSS	Health and Safety Specialist	**TSP**	Total Suspended Particulates
IFC	International Finance Corporation	**URTI**	Upper Respiratory Tract Infection
IPESMP	Implementation Phase Environmental and Social Management Plan	**WBG**	The World Bank Group
ISO	International Organisation for Standardisation	**WC**	Water Closet
KoKMA	Korle Klottey Municipal Assembly	**WHO**	World Health Organisation

Chemical Symbols - Heavy Metals

Element	Chemical Symbol	Element	Chemical Symbol	Element	Chemical Symbol
Cobalt	Co	Iron	Fe	Molybdenum	Mo
Copper	Cu	Lead	Pb	Zinc	Zn

EXECUTIVE SUMMARY

Background

Like many regions in Ghana, poor Solid Waste Management (SWM) is a significant problem in the Greater Accra Region and contributes to human health and flood risks. In January 2020, the Government of Ghana signed a financing agreement with the World Bank to implement the Greater Accra Resilient and Integrated Development (GARID) Project. The project seeks to reduce flood risk, improve solid waste management in the Odaw River basin and access to basic infrastructure and services in the targeted communities.

Project Justification

The volume of sediments in the Odaw Channel has grown over the years due to lack of consistent maintenance in the face of continuous inflow of materials. The river (and associated drains) from Caprice to the Sea therefore require dredging (referred to as deferred dredging), to restore the original design cross section and hydraulic discharge capacity of the channel. To maintain this optimal functional discharge capacity there will also require future maintenance dredging.

An Environmental (and Social) Impact Assessment (EIA/ESIA) for the deferred and maintenance dredging of the Odaw Channel was carried out in 2021. The estimated content of sand and gravel (approximately 75% of the dredged material) is enough to make beneficial use of the sand and gravel, particularly in the construction industry. The dredged material will, however, have to be treated to separate the usable from the unusable components, necessitating the establishment of handling sites for this activity. The fraction that is not usable (not readily reusable) will be safely transported and disposed of at designated final disposal sites.

Description of Activities at the Sites and Transportation

The handling and transportation of dredged material from the handling sites at Odawna, Korle-na and Pasico to the final disposal sites at Anyaa and Pokuase in the Greater Accra Region is a sub activity of Component 1 of the GARID project. This component focuses on "Climate Resilient Drainage and Flood Mitigation Measures".

The ESIA of Deferred and Maintenance Dredging (2021) estimated the volume of the deferred dredging to be around 555,000m³ whereas the annual maintenance dredging volumes was also estimated at between 44,000 -165,000m^3. The other potential benefits of the dredging include reducing the risk of flooding in the Odaw basin, loss of lives, and assets, as well as creating economic opportunities. The description of the handling and waste transportation activities covered the following areas:

- Location of handling sites;
- Project components;

- Handling sites preparation phase activities;
- Material handling and transportation; and
- Decommissioning phase activities.

The location and area covered by the respective handling sites are as follows:

- Korle-na site - covers an area of 2.39 acres, and has space for handling 33,123m^3 of dredged material and adequate space to serve as equipment/machinery yard for the project;
- Pasico site - covers an area of 1.80 acres with space to handle about 14,334m^3 of dredged material; and
- Odawna site – covers 0.66- acre land with the capacity to accommodate 9,138m^3 of dredged material, before evacuation to the final disposal sites.

Policy, Legal, Regulatory and Institutional Framework

In line with the Environmental Assessment (EA) Regulations (LI 1652) and the World Bank OP 4.01, the EIA/ESIA for the deferred and maintenance dredging of the Odaw Channel was completed and issued an Environmental Permit for the project in October 2021 by the EPA.

The aspects of the project relating to treatment of the dredged material at the handling sites and the waste transportation to the final disposal sites (including Pokuase), however, needed further assessment and mitigation actions for the overall sustainable implementation of the project. An Environmental and Social Management Plan (ESMP) was, therefore, prepared to address the environmental and social impacts and risks with mitigation measures, among other action plans for the handling operations and waste transportation to the final disposal sites at Anyaa and Pokuase.

The other key policy, regulatory and institutional requirements reviewed and applied included the following:

- National environmental policy and related requirements -
  - National Environmental Policy, 2013;
  - Environmental Protection Agency Act, 1994 (Act 490);
  - Fees and Charges (Miscellaneous Provisions) Act, 2022 (Act 1080);
  - National Climate Change Policy, 2013;
  - Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917); and
  - Hazardous, Electronic and Other Wastes (Classification), Control and Management Regulations, 2016 (LI 2250).

- Sanitation sector policy and action plans -
  - Environmental Sanitation Policy, 2010;
  - National Environmental Sanitation Strategy and Action Plan, 2010; and
  - District Environmental Sanitation Strategy and Action Plan, 2010.

- National planning and development requirements -
  - Land Use and Spatial Planning Act, 2016 (Act 925);
  - Local Governance Act, 2016 (Act 936);
  - National Building Regulations, 1996 (LI 1630);
  - Ghana Building Codes (2018);
  - Lands Commission Act, 2008 (Act 767); and
  - Land Act, 2020 (Act 1036).

- National labour, safety, and health requirements -
  - Road Traffic Act, 2008 (Act 761);
  - Ghana National Fire Service Act, 1997 (Act 537);
  - Fire Precaution (Premises) Regulations, 2003 (LI 1724);
  - National Health Policy, 2020;
  - Public Health Act, 2012 (851);
  - National Workplace HIV/AIDS Policy, 2012;
  - National HIV and AIDS Policy, 2019;
  - Imposition Restriction Act, 2020 (Act 1012);
  - Labour Act, 2003 (Act 651);
  - Factories, Offices and Shops Act, 1970 (Act 328);
  - Workmen's Compensation Act, 1987 (PNDCL 187);
  - National Employment Policy 2014;
  - National Gender Policy, 2015; and
  - Persons with Disability Act, 2006 (Act 715).

- National environmental quality and standards -
  - Ghana Standards for Health Protection – Requirements for Ambient Noise Control (GS 1222, 2018);
  - Ghana Standards for Environment and Health Protection – Requirements for Ambient Air Quality and Point Source/Stack Emissions (GS 1236, 2019); and
  - Ghana Standards for Environment and Health Protection – Requirements for Effluent Discharge (GS 1212:2019).

- World Bank requirements -
  - Environmental Assessment Policy OP 4.01;
  - Involuntary Resettlement Policy OP 4.12;
  - Gender and Development OP/BP 4.20; and
  - World Bank Group General Environmental Health and Safety Guidelines.

- Comparison of Ghana EA Regulations and the World Bank OP 4.01:
  - Impact category;
  - Social assessment;
  - Stakeholder consultation; and

  - Minimization of displacement.

- Institutional Framework -
  - Ministry of Works and Housing;
    - Hydrological Services Department;
  - Ministry of Environment, Science, Technology and Innovation;
    - Environmental Protection Agency;
  - Ministry of Sanitation and Water Resources;
    - Water Resources Commission;
  - Ministry of Roads and Highways;
    - Department of Urban Roads;
  - Land Valuation Division of Lands Commission; and
  - Metropolitan Municipal and District Assemblies (MMDAs).

Alternative Analysis of Waste Transport Route and Timing

The distances between the handling and disposal sites are long with interconnected routes providing numerous route options for waste transportation. Analysis of waste transport routes and timing focused on the following:

- Alternative transportation route to Pokuase disposal site;
- Alternative periods for waste transfer to Pokuase site;
- Alternative transportation route to Anyaa disposal site;
- Alternative periods for waste transfer to the Anyaa site; and
- Alternative analysis for handling sites.

The preferred transportation route to the Pokuase disposal site is the Ring Road West to Circle to the Nsawam Road and to Pokuase. The preferred transportation route to the Anyaa disposal site is also the Ring Road West towards Circle to the Nsawam Road and onto the Anyaa-Awoshie Road, while the preferred period for waste transfer is night-time in both cases. The preferred sites for handling the dredged materials are the Korle-na, Pasico and Odawna handling sites.

Environmental and Social Baseline Information

The baseline information for the dredging project ESIA covered the physical, social, and socio-economic environment, water and sediment quality and among others within the Odaw basin and the project metropolis and municipality. The baseline information for this ESMP is therefore restricted to the physical footprint of the handling sites and waste transfer routes as well as relevant areas of influence, to avoid repetition, except where updating the data is necessary. The main areas included:

- Location and land use of all the three handling sites;
- Drainage conditions and historical flood events at the sites;
- Ambient air quality situation at the sites and surrounding areas;
- Ambient noise levels;

- Heavy metal analysis at the sites to determine the presence, distribution and level of contamination;
- Road network and traffic conditions along the main waste transfer routes and the Anyaa and Pokuase disposal site routes;
- Climate conditions - rainfall, temperature, wind, humidity and evaporation;
- Health and disease conditions;
- Social issues; and
- Waste management.

Documents that were reviewed to support the baseline information gathering included:

- Population and Housing Census, General Report Volume 3A - Population of Regions and Districts (2021);
- Population and Housing Census, General Report Volume 3E - Economic Activity (2021);
- EIA for Deferred and Routine Maintenance Dredging of the Odaw Basin (September 2021);
- Draft Scoping Report for EIA of the Anyaa Disposal Site (May 2022); and
- Revised Inception Report: Proposed Handling and Transportation of Dredged Material (May, 2022).

Stakeholder Involvement

The ESIA for the dredging project involved extensive consultations with stakeholders including regulatory bodies, local government institutions and communities. The following stakeholders were further engaged for this ESMP as a follow-up to the previous one:

- Ashiedu Keteke Sub-Metro Office;
- Ablekuma South Sub-Metro Office;
- Korle-na;
  - St. Mary's Senior High School;
  - Trust Sports Emporium Ltd;
- Odawna
  - Assemblyman and community stakeholders at Odawna;
  - Businesses along Odawna route;
- Anyaa community
  - Community members along haulage route;
  - Community Association; and
- Windyhills Resident's Association (Pokuase).

Key highlights of the engagement outcomes included:

- State of the proposed haulage routes leading to the disposal sites in bad condition and should be improved;
- Measures needed to be put in place to check the noise nuisance by the waste haulage trucks at night;

- Low traffic flow after peak hours, with roads usually free, especially at night, hence the need to consider night-time transport of waste to disposal sites;
- Road accidents not rampant although the U-turns and junctions could be prone to accidents once they become busy;
- Noise generated at the Korle-na site at night could affect students in the dormitories of St. Mary's SHS (facing the Korle-na site); and
- Flooding is a major problem at Pasico and Odawna sites, exacerbated by the accumulation of waste in the adjoining drains.

Environmental and Social Risks and Impacts

The potential impacts and risks assessed were based on the baseline conditions and the predicted change in the environmental and social variables with the implementation of the handling site activities and transportation, various stakeholder inputs on perceived impacts, and specialized knowledge of experts. The assessment of adverse impacts covered mainly the site preparation and operation at the handling sites, and waste transportation to the disposal sites. The beneficial impacts including sale of the recovered gravel and sand were fully addressed in the ESIA for the Deferred and Routine Maintenance Dredging Project.

The potential adverse impacts and risks assessed included the following:

1) Potential traffic impacts and accident risks;
2) Noise and vibration impacts;
3) Dust and other emission impacts;
4) Occupational health and safety risks;
5) Public/community health and safety risks;
6) Heavy metal exposure risks;
7) Visual intrusion;
8) Potential flood risks of project sites;
9) Waste handling and disposal impacts;
10) Potential fire risks;
11) Infringement on labour rights;
12) Gender-based violence and sexual exploitation and abuse;
13) Potential risk of spread of HIV and STIs;
14) Potential transmission of COVID-19; and
15) Physical and economic displacement.

The mitigation and monitoring measures to the assessed impacts and risks are presented in Table 1 below.

Table 1 Potential Impacts, Mitigation and Monitoring Measures

Source of Impact	Mitigation Measures	Monitoring Measures
1. Potential Traffic Impacts and Accident Risks		
Site Preparation Phase		
• Site entry and exit conflict on the major access roads causing accidents	• Deployment of banksmen to control traffic and manage the entry/exit point at the various handling sites	• Daily review of accident records and near misses at entry/exit to/from sites
• Poor state and narrow sections of access routes in Anyaa and Pokuase with health and safety concerns for road users and roadside households	• Spot improvement and surface dressing of sections of the access routes to the disposal sites at Anyaa and Pokuase	• Bi-weekly inspection of road conditions • Bi-weekly review of complaints by community folk through the grievance redress mechanism
Material Handling Phase		
The enumeration under the Workplace Accidents described under section 4 below also applies to this phase.	Mitigation measures treated under the Workplace Accidents also applies to this phase	• Monitoring measures treated under the Workplace Accidents also applies to this phase
Transportation Phase	• Use of banksmen to regulate the entry and exit of trucks to/from the sites	• Monthly review of accident records and near misses (on-site and trucks in transit)
• Site entry and exit conflict on the major access roads causing accidents.	• Installation and use of reverse alarm on all machinery/vehicles	• Weekly check on installation of reverse alarm and its use
• Additional traffic generation and related congestion with elevated GHG emissions	• Adoption of night-time waste haulage to avoid traffic congestion and minimize emissions.	• Weekly review of haulage records.
	• Scheduled maintenance of trucks	• Monthly review of maintenance schedule
	• Use of trucks not older than 5 years	• Before the start of the project, review the year of purchase of the truck
	• Transportation of waste at intervals of 10 minutes to avoid convoy movement of waste trucks	• Monthly review records of haulage intervals
• Accident involving waste trucks affecting truck drivers and/or pedestrian	• Availability of a co-driver on each trip to aid the driver, such as taking over and continuing the journey or reporting the incident, or calling the towing company	• Impromptu checks on the presence of a Co-drivers in waste trucks in transit
	• Adherence to 50km/hr speed limit for haulage trucks	• Impromptu check on compliance with speed limit.
	• Installation of GPS	• Daily checks of GPS records on speed, time, position of truck speed, route, travel time, etc
	• Inscription of appropriate phone contacts on trucks for reporting careless/inconsiderate driving	• Impromptu check on conspicuous inscription of reporting phone number on waste trucks.
• Truck break-down in transit causing accidents at nightfall	• Towing system with a third party contracted to remove breakdown trucks within 30min of reporting	• Confirm the contract agreement with towing company before start of project • Monthly review of towing records (promptness and causes)
• Limited storage space at handling sites.	• Prearrangement with off-takers for sale and pick-up of aggregates and sand	• Confirm agreement with off-takers before project commencement • Weekly review off-taker pick-up schedule
2. Noise and Vibration Impact		

Site Preparation Phase • Use of bulldozer for site clearing and levelling • Excavation works for drain construction and other installations	• Erection of perimeter closed fence as noise barriers to help attenuate noise • Inspection of machinery and confirmation of good state and condition before use • Switch off all idle engines • Padded seats fitted in mobile equipment and worn-out pads promptly replaced • Provision of vibration reduction gloves for handheld equipment operators. • Provision and usage of PPE including earplugs	• Weekly inspection of the integrity of perimeter fencing • One-time review of records of the state of machinery before use • Daily check for any idle engine running • Weekly check on fitted pads in seats of mobile equipment • Weekly check on records of provision and use of vibration reduction gloves • Weekly check on provision and use of PPE • Spot checks on the usage of vibration reduction gloves and other PPEs
Material Handling Phase Machinery/equipment deployed at the handling sites	Mitigation measures listed above for the Site Preparation phase apply also to the Material Handling phase except for procurement and use of handheld noise monitoring meters at all sites.	Variations in the frequency of monitoring for the Material Handling phase (as distinct from the Site Preparation phase) are as follows: • Quarterly review of records of servicing • Daily check for running of idle engines • Monthly inspection/review of - o Padded seats fitted in mobile equipment o Records of provision of vibration reduction gloves and other PPE o Integrity of perimeter fences at each site • Impromptu checks on the usage of PPEs • Weekly inspection of availability and use of handheld noise monitoring meters
Transportation Phase Cumulative noise from waste trucks in transit (on busy roads) to disposal sites	• Night-time haulage of waste to disposal sites during low traffic period to reduce noise • Follow scheduled maintenance for the waste trucks • Installation of and adherence to speed limit on disposal routes • Honking prohibited in communities along the disposal route (in Anyaa and Pokuase) • Advance notification of the schedule of waste transfer to residents along the disposal routes in Anyaa and Pokuase	• Daily review of truck movement and haulage logbooks. • Quarterly review of records of servicing • Impromptu check on speed limit of trucks • Monthly review of records of engagement with residents on - o Honking and noise making by trucks o Speeding o Advance notification • Response to complaints and resolution, etc.
3. Dust and Other Emission Impact		
Site Preparation Phase • Bulldozer clearing and levelling operations • Delivery of laterite for site filling • Foundation for installations and drain construction	• Erection of perimeter fencing for enclosure of the sites to reduce dust escape into the environment • Provision and use of PPEs (including nose masks) to workers • Inspection of machinery and confirmation of good state and condition before use • Switch off all idle engines	• Weekly inspection of the integrity of perimeter fencing • Weekly inspection of supply stocks and use of PPEs • One time review of state of machinery records before use • Daily check for any idle engine running

	• Dousing of the sites twice daily (minimum) • Adherence to speed limit of 30km/hr on-site • Covering of trucks carrying laterite with tarpaulin	• Daily check for effective dousing of the sites • Daily impromptu checks on speed limit on-site • Daily checks for tarpaulin covering on haulage trucks
Material Handling Phase • Use of machinery in spreading of material, and also sorting of the dredged material	Mitigation measures listed above for the Site Preparation phase apply also to the Material Handling phase except for the regular maintenance of machinery Portable dust monitoring meters with specialized probes to measure concentrations of different size particulates such as SO_2, etc.	Variations in the frequency of monitoring for the Material Handling phase (as distinct from the Site Preparation phase) are as follows: • Monthly inspection of the integrity of perimeter fencing • Quarterly review of records of servicing of machinery/equipment • Weekly inspection of availability and usage of portable dust monitoring meters
Transportation Phase • The fleet of waste trucks in transit to the disposal sites	• Maintaining efficient performance of waste trucks by following maintenance schedules • Covering of the waste trucks with tarpaulin to prevent dust flyoff and other releases • Installation of and adherence to speed limit on disposal routes (in Anyaa and Pokuase)	• Quarterly review of records of servicing • Daily impromptu check of tarpaulin covering of haulage trucks • Weekly impromptu check on speed limit of trucks
4. Occupational Health and Safety Risks		
Site Preparation Phase Workplace accidents including knockdowns, slips and fall	• Implementation of labour management plan which includes – o Ensuring every worker works under safe and healthy conditions o Training and orientation of workers on occupational health and safety protocols o Provision and usage of PPE o Provision of First Aid Box • Training of First Aid Attendants • Use of banksmen at entry/exit to the sites • Installation of reverse alarms • Usage of wheelbarrows/mechanical lifting aids • Observance of good housekeeping practices • Procurement of Workmen's Compensation Policy (Insurance)	• Weekly review of records of labour management plan implementation measures including – o Safe and health working conditions o Training and orientation of workers • Daily impromptu checks on – o Supply and usage of PPE o Availability of First Aid Box • Bi-weekly records of training of First Aid Attendants (refresher) • Daily impromptu checks on – o Availability of banksmen at entry/exit to the sites o Use of reverse alarms o Lifting aids o Good housekeeping practices including visible signage • One-time inspection of insurance policy/certificate
Material Handling Phase	Mitigation measures listed for the Site Preparation phase apply also to the Material	Variations in the frequency of monitoring for the Material Handling phase (as distinct

Sources of impacts for the Site Preparation phase apply also to the Material Handling phase.	Handling phase except for the usage of wheelbarrows/mechanical lifting aids	from the Site Preparation phase) are as follows: • Monthly review of records of occupational health and safety implementation measures including – o Safe and health working conditions o Training and orientation of workers • Daily impromptu checks on – o Provision and usage of PPE o Availability of First Aid Box o Monthly training of First Aid Attendants (refresher) • Daily impromptu checks on – o Availability of banksmen at entry/exit to the sites o Use of reverse alarms o Good housekeeping practices • One-time inspection of insurance policy/certificate
Transportation Phase Traffic accidents associated with the transportation of the waste have been treated separately under Traffic Impact and Accident Risks	Mitigation measures associated with traffic accidents for the Transportation phase also apply to the Workplace Accident.	Monitoring measures associated with traffic accidents for the Transportation phase also apply to the Workplace Accident.
5. Public/Community Health and Safety Risks		
Site Preparation Phase Dust and other emissions, noise and vibration, heavy metal exposure risks, visual intrusion associated with the site preparation phase have been treated separately under the respective sections.	Mitigation measures associated with these impacts have been provided under their respective sections.	Monitoring measures have also been provided accordingly.
Transportation Phase Knockdowns by haulage trucks	• Adherence to 30km/hr speed limit in the communities • Training of drivers on defensive driving • Installation of temporary (earthen) speed ramps • All accidents/injures/near misses and trainings will be reported, recorded and documented	• Bi-weekly check on the adherence to speed limit • Quarterly review training records • Monthly – o Inspect the availability of temporary speed ramps o Review records of accidents/injures/near misses and trainings organized
6. Heavy Metal Exposure Risks		
Site Preparation Phase • Excavation and other earthworks on-sites releasing contaminated soil • Contamination associated with transfer of excavated spoil for disposal • General movement (vehicular and workers) on project site	• Bury excavated spoil at the respective handling sites and cover with layer of laterite (3-inch) • Provision and usage of appropriate PPE • Deployment of machinery for the site reparatory activities (with minimal manual involvement) to avoid human contact	• Daily checks on excavated spoil buried at each site and covered with laterite • Weekly review of records of quantities of excavated spoil generated • Daily check of the availability and usage of PPE by workers

picking/releasing contaminated soil particles	• Provision of changing room for PPE storage area at the end of a working day • Sensitization of workers on – o Dangers of exposure to heavy metals o Importance of usage of PPEs o Thorough handwashing before meals and after work o Practice of personal hygiene	• Weekly check on records of use of various machinery on-site • Daily check for manual/human involvement in excavation and earthworks • Weekly review of records of cleaning/laundry of working gear • Weekly check on the state and patronage of changing room • Weekly review of records of sensitization programme • Impromptu spot checks and corrections on personal hygiene of workers
Material Handling Phase • Non-adherence to basic hygiene practices such as regular handwashing • Potential washing of heavy metals by runoff into channel/lagoon	• Change of working gear at close of work to avoid transferring heavy metal contaminants home • Regular cleaning/laundry of working gear • Provision and usage of PPE and sensitization of workers (as for Site Preparation phase) • Inspection of integrity of laterite layer (3-inch)	• Daily checks on working gear and changed clothes before leaving the work premises • Weekly review of records on laundry and PPE supply and usage records • Quarterly review of records of sensitization programme • Quarterly inspection of integrity of laterite layer
7. Visual Intrusion		
Site Preparation Phase • Deployment of machinery for site clearing and levelling	• Construction of perimeter fence around the handling sites to obscure operations site preparatory activities	• One-time inspection of availability of the perimeter fencing at each handling site • Weekly inspection of the integrity of perimeter fences
Material Handling Phase • Dredged material stockpiling operation • Heaped dredged material	• Rehabilitation of perimeter fences erected at the Site Preparation Phase • Heap of dredged material would not tower over the 2.5m fence wall • Ensure frequent evacuation and transportation of the waste and saleable materials to avoid over-heaping	• Monthly inspection of perimeter fences at each site to ascertain their integrity • Weekly inspection of records on the quantum of waste heaped at each site • Weekly review of records of waste evacuated for disposal and sand sold
Transportation Phase • Convoy movement of waste trucks potentially causing visual nuisance	• Trucks to move at 10-minute intervals to avoid convoy movements • Loading and haulage of waste conducted at night	• Weekly review records of haulage intervals and operations • Weekly review of haulage records
• Waste spills from haulage trucks	• Waste transporting trucks will be covered with tarpaulin • Haulage trucks will be labelled with contact numbers for reporting of waste spills	• Impromptu inspection of the tailgates of haulage trucks • Weekly inspection of labels on the trucks • Monthly review of reported cases of offending drivers and action taken
8. Potential Flood Risks of Project Sites		
Site Preparation Phase		

• Overflow of the Odaw Channel affecting the Odawna and Pasico sites • Inadequate/absence of drains at Pasico and Korle-na areas which could affect the sites	• Preparatory works such as raising the frontage of the Odawna and Pasico sites towards the Odaw channel to minimize likelihood of flooding • Construction of drains of adequate sizes at the Korle-na, Pasico sites and along the route to the Odawna area	• One-time check to ensure the Contractor's contract specifies raising the frontage of the sites to avoid flooding • Weekly inspection of capacity and adequacy of the constructed drains • Weekly inspection of records of flood events and effects on-sites (in the rainy season)
Material Handling Phase	***Korle-na Site***	
• Damaged drains at the Korle-na handling site	• Reconstruction of the damaged section of drain • Construction of road shoulder drain along the Ring Road West Road of adequate size to trap runoff	• Quarterly checks on functionality of constructed drain • Monthly review of records of performance of the constructed drain.
	Pasico Site	
• Inadequate drain at the Pasico handling site	• Lining the unlined section (12m) of the trapezoidal drain with concrete • Construction of a drain of adequate size along the Pasico wall to trap runoff from the Pasico yard • Construction of a circular drain of adequate size from the main Pasico Yard outlet of length 70.0m to Odaw River	• Quarterly checks on effectiveness of lined drain • Monthly review of records of performance of the constructed drains
	Odawna Site	
• Inadequate drain at the Odawna handling site	• Construction of a drain of adequate size along the untarred road from the VIP Bus Terminal to the Odawna handling site near the Odaw main channel	• Monthly review of records of the drain performance, especially in the rainy season
9. Waste Handling and Disposal Impacts		
Site Preparation Phase		
• Heavy metal contaminated waste (from excavated spoil and site clearing) transferred for disposal elsewhere.	• Excavated spoil used as filling material on-site and further covered with laterite	• Daily inspection of cleared waste and review of quantities used for filling
• Inappropriate disposal of waste from demolished structures at Pasico and Odawna sites	• Waste from demolished structures at Pasico and Odawna sites collected by an accredited waste management company	• Daily review of records of quantities of demolished waste collected for disposal by the waste management company
• Indiscriminate disposal of other solid waste generated	• Segregation of waste into colour coded bins and outsourced to an accredited waste contractor: o Domestic waste o Recyclable materials o Construction waste	• One-time inspection of the waste disposal site used by waste management company • Weekly checks on the use of colour coded bins • Weekly checks on effectiveness of waste segregation practice
• Liquid waste generated by workers	• Provision of WC toilets for workers at Korle-na • Provision of mobile toilet units for workers at Pasico and Odawna sites • Waste from mobile toilet to be dislodged by an accredited waste management company	• Review records of general waste disposed off • Weekly review of hygienic state and adequacy of toilet facilities • Weekly review of records of dislodging

Material Handling Phase	***Segregated Waste***	
• Indiscriminate handling and disposal of waste generated (solid wastes)	• Segregation of waste into colour coded bins for the following and outsourced to a waste contractor: o Domestic waste (all sites) o Recyclable materials (all sites) o Oil and lubricant related waste, including containers and rags (Korle-na site)	• Impromptu checks on the use of colour coded bins • Weekly checks on effectiveness of waste segregation practice • Monthly review of records of general waste disposed off
	Oily Waste (Korle-na Site)	
• Indiscriminate handling and disposal of oily waste (Korle-na Site)	• Designated impervious platform prepared as maintenance area for machinery/equipment servicing (oil and lubricant change, etc.) • Maintenance area fitted with waste oil tank to collect and hold waste oil temporarily, until tank is full for return to the supplier • Oil rags will be segregated into its own receptacle and collected for disposal by an accredited waste company	• One time inspection of availability of servicing platform • Impromptu inspection of usage of the maintenance area • Weekly checks on the integrity of oil tank • Monthly review of records of waste oil collected and returned to supplier • Impromptu inspection of adherence to separation of oily rags
	Liquid Waste (all sites)	
• Indiscriminate disposal of liquid waste (all sites)	• Provision of WC toilet facility at Korle-na (existing facility) for workers • Provision of mobile toilet units for workers at Pasico and Odwna sites • Sanction workers engaged in open defecation and/or urination practice • Grey water will be channelled into drains fitted with silt traps. • Wastewater from tyre wash channelled into on-site drains fitted with silt traps	• Monthly review of the hygienic state and adequacy of toilet facilities • Quarterly review of records of offenders and sanctions applied • Monthly inspection of effectiveness of silt traps
10. Potential Fire Risks		
Site Preparation Phase		
• Machinery and equipment deployment at the handling sites • Dropping of cigarette butts by smoking workers	• Securing of fire permit/certificate from the Ghana National Fire Service (GNFS) • Construction of fire hydrants for all the sites • Training workers on the usage of firefighting equipment including fire extinguisher and hydrants • Provision of fire extinguishers • Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour	• One-time inspection of availability of GNFS fire permits for each site • One-time inspection of availability of fire hydrants • Quarterly review of records of training • Weekly inspection of fire extinguishers • Monthly inspection of usage of designated smoking area, metal bins and compliance
Material Handling Phase *Korle-na Site*	***Korle-na Site-specific Mitigation Measures***	
• Location of Fuel Storage Station within the Korle-na Site • An offsite GOIL Gas (LPG) Station adjacent to the Korle-na Site • Electrical hazard (overloaded outlets and circuits, etc.) • Welding sparks	• Installation of smoke detectors and fire alarms at the – o Fuel storage tank o Near the separating fence wall from the GOIL LPG Station • Area for machinery servicing and welding works situated – o At 65m from the fuel storage tank	• Quarterly testing of functionality of fire alarm and smoke detectors • One-time inspection of the stipulated distances of 65m and 110m to the fuel storage tank and GOIL Gas Station respectively from machinery servicing/ welding area

• Fuel and oil spills	○ At 110m from the GOIL Gas Station • Posting of legible fire safety signs, e.g., "No Smoking", "Switch-off Engines", etc. at the fuel storage area • Construct concrete floor and bunded area around fuel storage tank to contain spills • Prompt cleaning of accidental spills	• Monthly inspection of legibility and adequacy of caution signages • One-time inspection of concrete floor and bunded area • Monthly inspection of spill kit
Korle-na, Odawna and Pasico Sites • Dropping of cigarette butts by smoking workers • Fuel and oil spills	***General Mitigation Measures for all Sites*** • Validation of fire certificate from the GNFS • Provision of fire hydrant at each of the site • Conducting weekly toolbox meeting on fire safety and use of firefighting equipment such as fire extinguisher and fire hydrants • Provision of Fire Assembly Points • Provision of fire extinguishers • Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour • Prompt cleaning of accidental spills	• Annual inspection of validity of fire certificate • Quarterly check on water availability in hydrant • Weekly review of attendees of workers in toolbox meeting • One-time inspection of Fire Assembly Point • Quarterly inspection of expiration date of fire extinguishers • Monthly inspection and usage of designated smoking area, metal bins and compliance • Monthly inspection of spill kit
Transportation Phase • Fuel leakages • Electrical system failures	• Provision of fire extinguishers in trucks • Provision of truck spill kit • Scheduled maintenance and servicing	• Quarterly inspection fire extinguishers • Monthly inspection of truck spill kits • Monthly review of records of servicing
11. Infringement on Labour Rights		
Site Preparation Phase • Non-issuance of employment contracts to workers • Unfair compensation payment • Inability of workers to organise or join Unions	• Issuance of employment contracts to all categories of workers to indicate ○ Worker compensation equal to or above the national minimum wage ○ Equal compensation for both gender of same work schedule and qualification ○ Clauses to promote formation of workers' union and collective bargaining	• Weekly review of records of employment contracts of workers including compensation • One-time check for availability/opportunity for workers' union
• Provision of ill-fitting PPE • Marginalisation of women and PWD	• Provision of adequate and suitable PPE for workers, particularly women and PWD • Employment of women and PWDs where feasible • Provision of adequate access aids for workers with disability • Provision of adequate separate sanitary facilities for women and workers with disability	• Monthly review of records of supply of PPE • Daily check on usage and suitability of PPE • Weekly review of records of women and PWDs employed • One-time check of provision of - ○ Access facilities for PWD ○ Separate sanitary facilities for women and PWD
Material Handling Phase	Mitigation measures listed for the Site Preparation phase also apply to the Material Handling phase, except:	Variations in the frequency of monitoring for the Material Handling phase (as distinct

Sources of impacts enumerated under the Site Preparation phase also apply to the Material Handling phase	• Provision of adequate access aids for workers with disability • Provision of adequate separate sanitary facilities for women and workers with disability	from the Site Preparation phase) are as follows: • Yearly review of records of employment contracts including compensation • One-time check for availability/opportunity for workers' union • Monthly review of records of supply of PPE • Daily check on usage and suitability of PPE • Yearly review of records of women and PWDs employed
12. Gender-Based Violence and Sexual Exploitation and Abuse (GBV/SEA)		
Site Preparation Phase • Soliciting for sexual favours from female job seekers and employees • Sexual harassment (SH)/abuse of work colleagues • Sexual harassment/abuse of community women and children ***Material Handling Phase*** Sources of risks enumerated under the Site Preparation phase also apply to the Material Handling phase	• Cases of GBV/SEA/SH will be reported through all outlets of the GRM and will be processed/handled solely by the SSS of the GARID PCU and SSS of MWH HSD • Victims will be aided to receive support from the dedicated GBV service providers in the municipality/metropolis • Education of workers on human rights protection • Support the Social Welfare and Community Development Department (SWCDD) on GBV/SEA/SH educational campaigns • Workers to sign a code of conduct In addition to measures listed in the Site Preparation phase which also apply to the Material Handling phase is: • GBV/SEA/SH Workplace Policy will be developed and implemented	Bi-weekly review of records of - • Reported GBV/SEA/SH cases • Victims aided in accessing support • Educational campaigns on human rights protection • Educational campaigns on GBV/SEA/SH • One-time review of code of conduct signed Variations in the frequency of monitoring for the Material Handling phase (as distinct from the Site Preparation phase) are as follows: • One-time review of the GBV/SEA/SH policy Quarterly review of records of - • Reported GBV/SEA/SH cases • Victims aided in accessing support • Education programmes conducted and campaigns on GBV/SEA/SH • One-time review of code of conduct signed
13. Potential Risk of Spread of HIV and STIs		
Site Preparation Phase • Workers with high disposable income enticing young girls and women into sexual relationships	• Recruiting majority of workers from the project area (Odawna, Pasico and Korle-na). • Handling information on HIV status of workers with due care and confidentiality	• One time review of the number of employees from the community • Weekly review of grievances

• Attraction of commercial sex workers and other women joining the commercial sex business	Implementation of HIV/AIDs Workplace Policy, and incorporation of prevention clauses in employment contract including the following – • Awareness creation among workers through preventive programs including – o Facilitation of voluntary testing o Safe sex practices, condom use, abstinence, etc. o Peer counselling • Provision of condoms at accessible and convenient locations • Incorporation of the Workplace HIV Policy into working conditions to prevent discrimination or stigmatisation • Support to the Municipal Health Directorate of the project area (Odawna, Pasico and Korle-na) to print and distribute awareness leaflets and organise education campaign on HIV/AIDS in the community and the municipality.	• Weekly review of Contractor's HIV Workplace Policy and records of implementation. Weekly - • Review records of awareness programmes o Review records of voluntary testing of workers o Checks for the number of available condoms o Review records of peer counselling organised • Checks for availability of condoms
• Stigmatization		• Review records of reported cases of discrimination or stigmatisation • Weekly review of records of awareness - o Programmes among workers o Campaigns and leaflets distributed in the community and municipality
Material Handling Phase Sources of impacts for the Site Preparation phase apply also to the material handling phase.	Mitigation measures provided for the Site Preparation phase apply also to the material handling phase.	Variations in the frequency of monitoring for the Material Handling phase (as distinct from the Site Preparation phase) are as follows: • One time review of the number of employees from the community • Quarterly checks on creation of workcamp in the community • Monthly records of grievances • Quarterly review of Contractor's HIV Workplace Policy and records of implementation. Monthly - • Review records of awareness programmes • Review records of voluntary testing of workers o Checks for the number of available condoms o Review records of peer counselling organised • Quarterly checks for availability of condoms • Monthly review records of reported cases of discrimination or stigmatisation • Yearly review of records of awareness - o Programmes among workers

		○ Campaigns and leaflets distributed in the community and municipality
14. Potential Transmission of COVID-19		
Site Preparation Phase • Poor public health attitude and unhygienic habits • Failure to allocate a budget for COVID-19 prevention measures • Misconceptions and persons reluctance to COVID-19 vaccination • Non-compliance with COVID-19 protocols • Workers concealing infection ***Material Handling Phase*** Sources of impacts for the Site Preparation phase apply also to the Material Handling phase.	• Implementation of COVID-19 protocols • Requisite investments/budget for provision of standard COVID-19 protocol response requirements • Requiring workers to be fully vaccinated • Sanctioning culpable workers by a caution in the first instance, and dismissal if repeated • Welfare relief package for infected workers who discloses COVID 19 status Mitigation measures provided for the Site Preparation phase apply also to the Material Handling phase.	• Weekly review of number of infected workers • Bi-weekly review records of investments made, and COVID-19 response equipment and logistics procured • One-time review of records of vaccinated COVID-19 cards of workers • Bi-weekly review records of number of sanctioned workers • Weekly review records of number of beneficiaries Variations in the frequency of monitoring for the Material Handling phase (as distinct from the Site Preparation phase) are as follows: • Monthly review of number of infected workers • Quarterly review records of investments made, and COVID-19 response equipment and logistics procured • One-time review of records of vaccinated COVID-19 cards of workers • Quarterly review records of number of sanctioned workers • Quarterly review records of number of beneficiaries
15. Physical and Economic Displacement		
Site Preparation Phase (only) • Relocation of existing structures on the sites (at Odawna and Pasico) affecting PAPs • Disruption of economic activities at the sites affecting livelihoods	• The mitigation measures will involve preparation and implementation of a Resettlement Action Plan (RAP) which is ongoing for the Odawna and Pasico sites. • The RAP will outline restitution measures for the social and property impacts, and ensure that the affected persons are assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms to pre-displacement levels or to levels prevailing prior to the beginning of the project implementation, whichever is higher	• Monitoring and evaluation measures will be outlined in the RAP, designed to follow the RAP implementation to the letter, for fairness and equity, with provisions for grievance redress, etc. and to ensure PAPs are satisfactorily treated and in accordance with the terms as enshrined in the RAP.

Environmental and Social Management and Monitoring Plans

The ESIA includes individual Action Plans and respective objectives and mitigation measures to address the evaluated risks and adverse impacts associated with the project. The estimated budget for the implementation of the environmental and social management and monitoring plans is USD 375,000 (i.e., USD 314,400 for management and USD 60,600 for monitoring).

The specific objectives of the Action Plans are to:

- Prevent vehicular accidents, knockdowns at the handling site and its environs and public safety in communities along haulage route;
- Minimize GHG emissions from project activities;
- Safeguard the quality of ambient air in the project area by minimizing the generation of dust and other air emissions;
- Ensure the safety of workers and the public from odour nuisance and other health and safety concerns;
- Minimise the visual impact from the project;
- To ensure that workers are not exposed to heavy metals detected in high quantities and to avoid the dire health impact associated with the ingestion or inhalation of these heavy metals;
- To minimise the exposure of the public and workers to noise and vibration;
- Ameliorate project-induced social changes and manage community apprehension; and
- To safeguard the rights of all workers and ensure fair treatment, non-discrimination and equal opportunity for all workers;
- To prevent any form of gender-based violence and sexual harassment against workers and members of the community;
- To minimise the potential risk of spread of HIV/AIDS among workers and in the project community; and
- To prevent and contain COVID-19 infections and transmission.

Grievance Redress Mechanism

The GRM is to provide all persons (both the public and employees) and groups affected during site preparation and material handling and transportation activities, avenues through which they can express their concerns and receive the needed corrective action in an appropriate and timely manner. The mechanism will provide an effective, transparent and timely system that will give employees or aggrieved persons redress and avoid litigation, minimize bad publicity, avoid/minimize delays in execution of infrastructural works, and ensure public health, safety, and sustainability during project implementation. The GRM provides for both workers and community members and the process comprises the following tiers:

- Community Level Grievance Redress Committee (CLGRC);
- Metropolitan and Municipal Level Grievance Resolution (MMLGR);
- Project Level Grievance Resolution (PLGR); and
- The Law Court.

Decommissioning and Closure Plan

The decommissioning and closure section outlines the anticipated actions needed to guide the project in the formal closure and preparation to hand over of the handling sites to the Accra Metropolitan Assembly and the Ngleshi Stool of James Town, in accordance with the general provisions of the Memorandum of Understanding among the parties. The parties comprise of the Ministry of Works and Housing on the one hand, and the Accra Metropolitan Assembly and the Ngleshi Stool of James Town, Accra on the other.

The following stages of actions will be required to effectively decommission the three operational (handling) sites and to hand over to the original owners:

- **Pre-closure activities -**
  - Notice to relevant authorities and stakeholders;
  - Stakeholder engagements; and
  - Pre-closure report preparation to EPA.
- **Closure/shutdown of activities -**
  - Abate deposition of dredging materials and all haulage operations;
  - Evacuate all materials, equipment and facilities movable; and
  - Conduct site inventory and E&S Audit.
- **Decommissioning activities -**
  - Remove all structures and clear the sites of wastes;
  - Conduct backfilling or filling of the sites as necessary;
  - Conduct ripping to prepare the appropriate sections for revegetation; and
  - Undertake revegetation of the sites.
- **Post-closure activities –**
  - Conduct site monitoring for necessary remedial action (e.g. revegetation effectiveness and erosion control/avoidance);
  - Media monitoring (mainly detection of heavy metals and runoff water quality);
  - Facility and equipment legacy left onsite for the owners;
  - Post-closure report preparation; and
  - Handing over of sites.

The estimated budget for the decommissioning and closure action plan implementation is USD 65,000.00.

Conclusion and Recommendations

The conclusion section and recommendations highlight the need:

- To improve the 1.5km route to the final disposal sites at Pokuase;
- To improve the 700m access route at the final disposal site at Anyaa;
- For night-time haulage as the most preferable alternative;
- Good planning and consistency required to deliver project benefits; and
- Keeping communities informed and maintaining open communication.

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1.0 INTRODUCTION

1.1 Background

Like many regions in Ghana, poor Solid Waste Management (SWM) is a significant problem in the Greater Accra Region and contributes to human health and flood risk. Indiscriminate dumping into water channels reduces the discharge capacity of the drains and increases flood risks. This problem arises from: (a) the lack of community awareness; (b) limited collection, segregation, and recycling infrastructure; (c) limited disposal capacity; and (d) inadequate enforcement of relevant bylaws.

Areas along the Odaw Channel lack waste collection and transfer stations. As such, waste collected often ends up in open drains, watercourses, and streams or in illegal dumpsites, which causes higher flooding impacts. In June 2015, about 53,000 people fell victim to a severe flooding incident which resulted in damage to infrastructure and other facilities to the tune of approximately US$100 million. Following the unfortunate incident, the need to dredge the Odaw River became imperative.

In January 2020, the Government of Ghana signed a financing agreement with the World Bank to implement the Greater Accra Resilient and Integrated Development (GARID) Project. The GARID project comprises five interrelated components, namely:

- Climate resilient drainage and flood mitigation measures;
- Solid waste management capacity improvements;
- Participatory upgrading of targeted flood prone low-income communities, and local government support;
- Project management; and
- Contingent emergency response component (CERC).

The overall goal of the intervention is to reduce flood risk and improve solid waste management in the Odaw River basin of the Greater Accra Region and improve access to basic infrastructure and services in targeted communities within the Odaw River Basin.

1.2 Project Justification

The volume of sediments in the Odaw River Channel has grown over the years due to lack of consistent maintenance in the face of continuous inflow of materials. The river (and associated drains) from Caprice to the point it enters the Atlantic Ocean therefore require deferred dredging (also referred to as postponed maintenance dredging from previous years) to restore the original design cross section and hydraulic discharge capacity of the channels. The volume of the deferred dredging is estimated to be around 555,000m^3.

Upon removal, the dredged material would have to be handled safely and ultimately the waste fraction hauled away to designated final disposal sites in order to create an obstruction-free work environment and to prevent the material from washing back into the channel.

Analysis of sediment from the Odaw Channel indicates that it is a mixture of gravel and sand (75%), and silt and clay (25%). Thus, there is enough sand and gravel content to make sand and gravel sale for beneficial use, particularly in the construction industry.

To achieve this, the dredged material will have to be treated to separate the usable material (for sale) from the waste component, designated for disposal, hence the establishment of the proposed handling sites for this activity. The volume of material to be transported and disposed of at the final disposal sites is estimated at around 110,000m^3 from the deferred dredging and about 20,000m^3 per year resulting from routine maintenance dredging.

1.3 Purpose of the ESMP

In line with the Environmental Assessment (EA) Regulations (LI 1652) and the World Bank Operational Policies (OP) an Environmental and Social Impact Assessment (ESIA) was completed in 2021 on the deferred and maintenance dredging of the Odaw Channel; and an Environmental Permit subsequently issued for the project in October 2021 by the EPA (Appendix 1).

The aspects of the project relating to treatment of the dredged material at the handling sites and the waste transportation to the final disposal sites (including Pokuase and Anyaa), however, needed further assessment and mitigation actions for the overall sustainable implementation of the project. This ESMP has therefore been prepared to complement and improve the outcomes of the Odaw dredging Environmental and Social Impact Statement (ESIS).

The ESMP process assessed the environmental and social impacts and risks with measures to mitigate the anticipated impacts, among other action plans for the handling operations and waste transportation to the final disposal sites at Anyaa and Pokuase. The process specifically involved:

- Reviewing the Dredging Environmental and Social Impact Statement;
- Reviewing and applying relevant policies, legal and institutional frameworks to the dredged material handling and waste transportation operations;
- Engaging relevant stakeholder institutions and other interested and affected parties as an opportunity for dialogue on concerns, and for local knowledge;
- Providing public notification and re-sensitisation about the project and opportunities available for participation in identifying potential impacts and risks, and to engender broader social acceptability;
- Generating additional relevant baseline information;
- Predicting impact magnitude and evaluating significance;
- Analysing and providing alternative routes for waste transportation final disposal sites; and
- Developing action plans to monitor and manage all significant impacts by implementing the relevant safeguards measures.

1.4 Outline of ESMP Methodology

The key methodologies for the ESMP processes involved stakeholder engagements, site visits and specialized studies, baseline surveys, and document review including:

- Population and Housing Census, General Report Vol 3A_Population of Regions and Districts (2021);
- Population and Housing Census, General Report Volume 3E_Economic Activity (2021);
- GARID Project Appraisal Document (PAD);
- EIA for Deferred and Routine Maintenance Dredging of the Odaw Basin (September 2021);
- Draft Scoping Report for EIA of the Anyaa Disposal Site (May 2022); and
- Revised Inception Report Proposed Handling and Transportation of Dredged Material (May, 2022).

The site investigations and traffic and road assessments covered the following:

- Location and land use;
- Drainage conditions;
- Ambient air quality and noise;
- Heavy metal concentration and distribution;
- Road network and traffic conditions;
- Climate conditions;
- Health conditions and diseases;
- Employment and gender related issues; and
- Waste management.

Stakeholders involved in the processes included:

- Ablekuma South Sub-Metro Office;
- St. Mary's Senior High School;
- Ashiedu Keteke Sub-Metro Office;
- Korle-na –
  - Trust Sports Emporium Limited;
  - St. Mary's Senior High School;
- Odawna -
  - Assemblyman and community members;
  - Businesses along the project route;
- Anyaa -
  - Community members along haulage route;
  - Community Association; and
- Windyhills Residents Association (Pokuase).

These stakeholders were engaged in addition to those previously engaged during the ESMP preparation process.

1.5 Structure of Report

The ESMP is organised into thirteen main chapters as follows, preceded by an executive summary:

- Chapter 1: Introduction;
- Chapter 2: Policy, regulatory and institutional framework;
- Chapter 3: Handling site activities and waste transportation;
- Chapter 4: Alternative analysis;
- Chapter 5: Environmental and social baseline conditions;
- Chapter 6: Public/stakeholder involvement;
- Chapter 7: Environmental and social risks and impacts;
- Chapter 8: Mitigation measures;
- Chapter 9: Environmental and social management plan;
- Chapter 10: Environmental and social monitoring plan;
- Chapter 11: Grievance redress mechanism;
- Chapter 12: Decommissioning and closure plan; and
- Chapter 13: Conclusion and recommendations.

2.0 POLICY, LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK

This section presents the key policy, legal and institutional frameworks relevant to the safe handling of the dredged material and transportation of the waste component, as well as institutional requirements for environmental assessment and management. The requirements as reviewed and applied in the ESMP, have been grouped under eight broad themes as follows:

- National environmental policy and related requirements;
- Sanitation sector policy and action plans;
- National planning and development requirements;
- National labour, safety, and health requirements;
- National environmental quality and standards;
- World Bank requirements;
- Comparison of Ghana EA Regulations and the World Bank OP 4.01; and
- Institutional framework.

2.1 National Environmental Policy and Related Requirements

The policy and regulations on environment, including climate change and hazardous waste requirements reviewed and applied in the assessment included:

- National Environmental Policy, 2013;
- Environmental Protection Agency Act, 1994 (Act 490);
- Environmental Assessment Regulations, 1999 (LI 1652);
- Fees and Charges (Miscellaneous Provisions) Act, 2022 (Act 1080);
- National Climate Change Policy, 2013;
- Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917); and
- Hazardous, Electronic and Other Wastes (Classification), Control and Management Regulations, 2016 (LI 2250).

2.1.1 National Environmental Policy

The National Environmental Policy, 2013 is fashioned for a holistic management of the environment, where people have access to clean air and water, decent housing, and other necessities of life. The policy supports a new paradigm of sustainable development, through ensuring a balance between economic development and natural resource conservation based on coordinated environmental management to ensure the quality of life of citizens and their living and working environments, as well as participation in decision-making.

The ESMP addressed the policy requirement for a holistic management of the environment, with relevant mitigation measures against odour, visual intrusion, and noise and general pollution prevention. The involvement of stakeholders in the processes met the policy demand for citizen participation in decision-making.

2.1.2 Environmental Protection Agency Act

The Environmental Protection Agency (EPA) is responsible for regulating the environment as mandated by EPA Act, 1994 (Act 490), and ensuring the implementation of government policies for the protection of the environment. The functions include:

- Ensuring compliance with laid down environmental assessment regulations;
- Promoting effective planning in the management of the environment;
- Controlling and monitoring the generation, treatment, and disposal of waste; and advising on regulation and management of hazardous substances; and
- Acting in co-operation with government agencies, District Assemblies, etc. to control pollution and generally protect the environment.

The Agency is also vested with the power to require Environmental Assessments (EAs), Environmental (and Social) Management Plans (EMPs/ESMPs), and Annual Environmental Reports (AERs) of 'undertakings', and to regulate and serve Enforcement Notice for any offending or non-complying undertaking. The Agency is required to conduct monitoring to verify compliance with environmental permit conditions.

In line with the Agency's mandate, an ESIA was conducted in 2021 for the project and subsequently this ESMP to ensure compliance with the LI 1652.

2.1.3 Environmental Assessment Regulations

Consistent with Section 12 of Act 490, the Environmental Assessment Regulations, 1999 (LI 1652) were enacted to regulate Environmental Assessment (EA) in Ghana. The regulations prohibit commencing an "undertaking" without prior registration and environmental permit from the EPA. The Agency is clothed with the power as part of the process to require EAs, Environmental and Social Management Plans (ESMPs), and Annual Environmental Reports (AERs) of 'undertakings', and to regulate and serve Enforcement Notice for any offending or non-complying undertaking.

This ESMP complied with the requirement to register with and obtain approval from EPA for the project, in line with the power vested in the Agency to ensure compliance with the laid down environmental assessment regulations. Also, the Agency's function to control the treatment and disposal of waste was underscored and the due process in providing relevant environmental action plans and other requirements were followed.

2.1.4 Fees and Charges (Miscellaneous Provisions) Act

The Fees and Charges (Miscellaneous Provisions) Act, 2022 (Act 1080) sets out the fee regime for processing and environmental permits, associated with the Environmental Assessment Regulations.

Invoices for processing and permit fees have been issued and will be paid before EPA grants the Environmental Permit, in accordance with the Act 1080.

2.1.5 National Climate Change Policy

The National Climate Change Policy, 2013 affirms Ghana's resolve to lessen the potential hardships that climate change impacts may pose to sustainable development. The policy seeks to provide strategic directions and co-ordinate issues of climate change, bearing in mind its linkages with development. The Policy is built on seven systematic pillars with the objective to mitigate and ensure an effective adaptation in key sectors of the economy.

The contribution of greenhouse gas (GHG)/carbon emissions from long distant waste haulage to the disposal sites in relation to the Nationally Determined Contribution of the transport sector was taken into consideration in deciding on the preferred timing of transporting the waste.

2.1.6 Hazardous and Electronic Waste Control and Management Act

The Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917) provides for the control, management and disposal of hazardous, electrical, and electronic waste and related purposes. The Act also requires a person involved in the management of hazardous or other wastes to:

- Take steps necessary to prevent pollution from hazardous wastes and other wastes arising from the management; and
- Where pollution occurs, minimize the consequences of the pollution on human health and the environment.

2.1.7 Hazardous, Electronic, and Other Wastes Control and Management Regulations

The Hazardous, Electronic, and Other Wastes (Classification), Control and Management Regulations, 2016 (LI 2250) is derived from the parent Act 917 and applies principally to waste generators, transporters, and managers, but not to domestic waste. The purpose includes:

- Classification, control, and management of wastes;
- General duties of waste generators, waste transporters, and managers; and
- Requirements for the disposal of wastes.

The ESMP focuses on the separation of the waste component from the dredged material to be transported to the disposal sites. Again, mitigation measures have been given which makes provisions for the classifications of waste generated and specialized containers to cater for these wastes of which e-wastes is inclusive. This is in line with Act 917 and LI 2250.

2.2 Sanitation Sector Policy and Action Plans

The reviewed sector policy and action plans were applied to maintain a clean, safe, and pleasant physical environment of the handling sites and the transportation routes. The review covered:

- Environmental Sanitation Policy, 2010;
- National Environmental Sanitation Strategy and Action Plan, 2010; and
- District Environmental Sanitation Strategy and Action Plan, 2010.

2.2.1 Environmental Sanitation Policy

The Environmental Sanitation Policy (2010) addresses the limitations of the old policy (1999) to reflect the changing context of national and international development priorities. The policy is aimed at developing and maintaining a clean, safe and pleasant physical environment in all human settlements, to promote the socio-cultural, economic and physical well-being of all sections of the population. The policy focuses on 10 principal components of environmental sanitation of which two are relevant to this project – the collection and sanitary disposal of wastes and stormwater drainage.

2.2.2 National Environmental Sanitation Strategy and Action Plan

The National Environmental Sanitation Strategy and Action Plan (NESSAP), 2010 is a response to the need to refocus attention on environmental sanitation in Ghana. It provides action plans with a country-wide scope, laying the basis for working towards the achievement of the Environmental Sanitation Policy objectives. NESSAP translates the policy objectives into actionable targets and implementation packages for Metropolitan, Municipal and District Assemblies (MMDAs).

2.2.3 District Environmental Sanitation Strategy and Action Plan

The purpose of the District Environmental Sanitation Strategy and Action Plan (DESSAP, 2010) is to establish a framework for developing an effective and locally feasible environmental sanitation strategy and action plan, in line with the national policy. The DESSAP is focused on the districts as the primary service delivery and each district has been supported to develop their own. DESSAP also considers the availability of sufficient institutional capacity for the practical operation of environmental sanitation facilities and systems at the local level.

The ESMP provided a number of mitigating action plans to promote and maintain a safe and pleasant physical environment at the three handling sites and along the access routes to the Anyaa and Pokuase disposal sites, in line with the Environmental Sanitation Policy, 2010, NESSAP, 2010 and DESSAP 2010.

2.3 National Planning and Development Requirements

The relevant legislation and policy reviewed to facilitate sound planning and sustainable land use and development included:

- Land Use and Spatial Planning Act, 2016 (Act 925);
- Local Governance Act, 2016 (Act 936);
- National Building Regulations, 1996 (LI 1630);
- Ghana Building Codes (GS 1207:2018);
- Lands Commission Act, 2008 (Act 767); and
- Land Act, 2020 (Act 1036).

2.3.1 Land Use and Spatial Planning Act

The Land Use and Spatial Planning Act, 2016 (Act 925) establishes Districts as the planning authorities. The functions of the District Assembly shall be performed by the District Spatial Planning Committee in accordance with this Act and the Local Governance Act, 2016 (Act 936). The Act empowers the Physical Planning Department (PPD) of respective MMDAs to create planning areas (zones).

2.3.2 Local Governance Act

The Ministry of Local Government, Decentralization and Rural Development (MLGDRD) is responsible for the 16 administrative regions of Ghana. These regions are subdivided into 261 MMDAs. The Local Governance Act, 2016 (Act 936) mandates the MMDAs to take charge of the overall development of their respective areas. Under Act 936 the Assembly is the planning authority and therefore responsible for physical/spatial planning, and approval of all planning schemes, as well as for development control through the grant of permit for development.

2.3.3 National Building Regulations

The National Building Regulations, 1996 (LI 1630) regulates the haphazard and amorphous building of structures that affect the landscape of the country. The LI 1630 makes it an offence for any individual to undertake any development without the acquisition of a Building Permit from the relevant District Assembly. This ensures that buildings are well planned and are in conformity with the Assembly's planned designs of an area.

2.3.4 Ghana Building Code

The Ghana Building Code (GS 1207:2018) provides criteria to which buildings and structures are classified and used, requirements for land use, development and maintenance of buildings and building sites to minimize negative environmental impacts, limits to which a building can be built, the types of materials used in the building (combustible or non-combustible), provides detailed requirements for fire resistance rate.

Appropriate measures for planning the handling sites for installation of equipment and office structures as well as site development have been provided and are in line with the above legislations and the building code.

2.3.5 Lands Commission Act

The Lands Commission is charged with the management and administration of state and vested lands, with general functions as spelt out in Article 256 of the 1992 Constitution and the Lands Commission Act, 2008 (Act 767). The proprietary plan covering the site acquired for the project is plotted by the Commission in the government records. It is also responsible to ensure the acquisition is processed for approval by the Minister responsible for lands before an executive instrument is issued and gazetted.

2.3.6 Land Act

The Land Act, 2020 (Act 1036) seeks to revise and consolidate the laws on land, with the view to harmonising those laws to ensure sustainable land administration and management and effective land tenure. The Act seeks to consolidate the various legislation on land into one enactment to provide easy access to legislation on land and help remove the overlaps and inconsistencies associated with land legislation.

A separate Resettlement Action Plan (RAP) for the Odaw dredging project is being carried out to cover, among others, the handling sites, which will require consideration of the above legislations.

2.4 National Labour, Safety and Health Requirements

The provisions applied for the protection of workers, as well as promotion of health and safety and the general well-being including the public within the area of influence of the projects, included:

- Road Traffic Act, 2008 (Act 761);
- Ghana National Fire Service Act, 1997 (Act 537);
- Fire Precaution (Premises) Regulations, 2003 (LI 1724);
- National Health Policy, 2020;
- Public Health Act, 2012 (851);
- National Workplace HIV/AIDS Policy, 2012;
- National HIV and AIDS Policy, 2019;
- Imposition Restriction Act, 2020 (Act 1012);
- Labour Act, 2003 (Act 651);
- Factories, Offices and Shops Act, 1970 (Act 328);
- Workmen's Compensation Act, 1987 (PNDCL 187);
- National Employment Policy 2014;
- National Gender Policy, 2015; and
- Persons with Disability Act, 2006 (Act 715).

2.4.1 Road Traffic Act

The Road Traffic Act, 2008 (Act 761) makes provision for comprehensive regulation of traffic and road use to ensure safety and related matters on our roads. It provides methods and

measures to prevent road users from being killed or seriously injured. Typical road users include pedestrians, cyclists, motorists, vehicle passengers, horse riders, and passengers of on-road public transport.

Measures in line with this Act (and Traffic Impact Assessment conducted) to regulate traffic flow have been incorporated, and also improve the access routes to ensure safety of road users and the general public, particularly at Anyaa and Pokuase.

2.4.2 Ghana National Fire Service Act

The Ghana National Fire Service (GNFS) Act, 1997 (Act 537) re-establishes the Fire Service to provide for the management of undesired fires and to make provision for related matters. To achieve its objective; the Service organises public fire education programmes and provides technical advice for building plans and structural layouts to facilitate escape from fire, rescue operations and fire management.

2.4.3 Fire Precaution (Premises)(Amendments) Regulations

The Fire Precaution (Premises) Regulations, 2003 (LI 1724) requires a fire certificate for premises used as a public place or place of work. It is incumbent on any project developer to ensure that adequate provision and measures are introduced to minimize or prevent fire outbreaks.

Provisions have been made to address Act 537 and LI 1724 requirement to minimize or prevent fire outbreaks such as designating an area for smoking, conducting annual fire drills, and incorporating the requirements of GNFS for required action. Also, fire prevention and control measures have been incorporated in the action plan.

2.4.4 National Health Policy

The National Health Policy, 2020 serves as the basis for the development of health sector priorities and planning. It aims at creating wealth through health, and among other things places emphasis on improvements in personal hygiene, immunization of mothers and children, the practice of safe sex and the prevention of injuries at both workplaces and on the road.

2.4.5 Public Health Act

The Public Health Act, 2012 (Act 851) of Ghana was passed to prevent disease, promote, safeguard, maintain and protect the health of humans and animals, and provide for related matters. The Act has various groupings including communicable diseases, environmental sanitation, etc.

Provisions for the prevention and protection of occupational and public health and safety have been made, following analysis of the extent of risks posed by the handling of dredged material and the transportation of waste.

2.4.6 National Workplace HIV/AIDS Policy

The broad objectives of the National Workplace HIV/AIDS Policy, 2012 among others, is to provide protection from discrimination in the workplace to people living with HIV and AIDS; prevent HIV and AIDS spread among workers; and provide care, support, and counselling for those infected and affected.

2.4.7 National HIV and AIDS Policy

The National HIV and AIDS Policy, 2019 provides the overarching perspective, position and direction of Ghana, as it continues on its journey to reach the 90-90-90 fast track targets by 2020 and ultimately the SDG 3 specific target 3.3 which calls for an end to the epidemic of AIDS by 2030. The four objectives of the policy are to:

- Empower the population to prevent new HIV infections;
- Ensure the availability of and accessibility to prevention, treatment, care and support services;
- Mitigate the social and economic effect of HIV on persons infected and or affected by HIV; and
- Ensure the availability of adequate funding to execute the policy strategies.

To prevent workplace discrimination against persons with HIV and ensure basic human rights of all workers are protected, the relevant measures at the site preparation and material handling and transportation phases of the project, based on the National Workplace HIV/AIDS and National HIV/AIDS Policies have been provided.

2.4.8 Imposition Restriction Act

The Imposition Restriction Act, 2020 (Act 1012) provides for the imposition of restrictions that are reasonably required in the interest of public safety, public health on the movement or residence within Ghana of any person or persons generally, or any class of persons. This Act with the provisions of the Executive Instruments (EI 64 to date) is used to regulate the wearing of face masks by the public when moving out of homes and impose restrictions on public gatherings and travels to help reduce the spread of COVID-19.

Provisions have been made for the containment and prevention of COVID-19 transmission by allocating adequate budget to support implementation of the required protocols, e.g. promoting the use of face masks, in line with the Act 1012.

2.4.9 Labour Act

The purpose of the Labour Act, 2003 (Act 651) is to amend and consolidate existing laws relating to labour, employers, trade unions and industrial relations. The Act provides for the rights and duties of employers and workers; guarantees trade unions and freedom of associations and establishes the Labour Commission to mediate and act in respect of all labour issues.

The provisions under Part XV (Occupational Health, Safety and Environment), of the Act explicitly prescribes the duty of an employer to ensure that every worker works under satisfactory, safe, and healthy conditions. This is relied on extensively to provide mitigation measures at both site preparation, and material handling and transportation phases of the project.

2.4.10 Factories, Offices and Shops Act

The Factories, Offices and Shop Act, 1970 (Act 328) spells out the responsibilities of an employer in ensuring a safe and healthy work environment. It defines a factory to include any premises (whether in or not in a building) in which one or more persons are employed in manual labour in any process. The Act mandates the Department of Factories Inspectorate (DFI) to register such activities and ensure that internationally accepted standards of providing safety, health and welfare of persons are adhered to.

Measures to ensure a safe and healthy working environment as well as the safety and wellbeing of workers had been incorporated in the action plan following analysis of the extent of risks posed by the handling of dredged material.

2.4.11 Workmen's Compensation Act

The Workmen's Compensation Act, 1987 (PNDCL 187) holds employers responsible for the payment of compensation to workmen for personal injuries caused by accidents arising out and in the course of their employment. Where an employee sustains personal injury by accident arising out of, and in the course of employment, the employer is liable to pay compensation.

In cases of injuries arising out and in the course of employment, provisions for the workers' compensation have been provided in accordance with the Workmen's Compensation Act, 1987 (PNDCL 187).

2.4.12 National Employment Policy

The policy indicates that the key source of demand for labour emanates from the productive sectors of the economy, namely, agriculture, industry, and service. One of the key strategies of

the employment policy is to promote formal and non-formal employment through modernisation, improving productivity and promoting effective linkages between formal and informal workers.

2.4.13 National Gender Policy

The National Gender Policy, 2015 overarching goal is to mainstream gender equality concerns into the national development processes by improving the social, legal, civic, political, economic, and socio-cultural conditions of the people of Ghana particularly women, girls, children, the vulnerable and people with special needs, persons with disability and the marginalized.

2.4.14 Persons with Disability Act

The Persons with Disability Act, 2006 (Act 715) provides certain rights to protect persons with disabilities. The Act states that a person or an employer shall not:

- Discriminate against or subject a person with disability to degrading treatment;
- Discriminate against a prospective employee or an employee on grounds of disability;
- Call a person with disability derogatory names; and
- Post a person with disability to a section of the establishment not suited for the person.

The Act further provides that a person who employs a person with disability shall provide the relevant working tools and the appropriate facilities required for the efficient performance of the functions.

Action plans have been provided to protect and safeguard the interest of vulnerable groups of employees, and against discrimination, in line with the policies and the Acts above.

2.5 National Environmental Quality Standards

The reviewed national environmental quality standards applicable to the project – noise and dust and other emissions included:

- Ghana Standard for Health Protection – Requirements for Ambient Noise Control (GS 1222:2018);
- Ghana Standard for Environment and Health Protection – Requirements for Ambient Air Quality and Point Source/Stack Emissions (GS 1236:2019); and
- Ghana Standard for Environment and Health Protection – Requirements for Effluent Discharge (GS 1212:2019).

2.5.1 Ghana Standard for Health Protection – Requirements for Ambient Noise Control

The Ambient Noise Controls provide for maximum permissible levels of noise based on categorised zones (Table 2.1). The standard also provides noise requirement for handling sites which includes:

- Erecting an acoustic barrier around construction site; and

- Ensuring that the maximum noise level near the handling sites does not exceed 66dB(A) Leq (5min) in areas other than industrial areas.

Table 2. 1 Requirements for Ambient Noise Control

Zone	Permissible Noise Level in dB(A)	
	Day (6:00am-10:00pm)	**Night (10:00pm-6:00am)**
Residential Area	55	48
Educational, health facilities, offices, and law courts	55	50
Mixed used	60	55
Area with some light industry	65	60
Commercial Areas	75	65
Light Industry Areas	70	60
Heavy Industry Areas	70	70

The ESMP provides relevant mitigation measures including PPE supply and enforcement of use as well as noise monitoring based on the GS 1222, 2018. Noise baseline monitoring was conducted and compiled for the assessment, and the GPS coordinates of the sampling sites were taken as the reference location for future monitoring purposes and determination of change.

2.5.2 Ghana Standard for Environment and Health Protection– Requirements for Ambient Air Quality and Point Source/Stack Emissions

The Ghana Standard for Environment and Health Protection - Requirements for Ambient Air Quality and Point Source/Stack Emissions provides the maximum limit for ambient air pollutants (Table 2.2).

Table 2. 2 Requirements for Ambient Air Quality – Maximum Limit for 24 Hours

Substance	Maximum Limit (µg/m^3)
Sulphur Dioxide (SO_2)	50
Nitrogen Oxide (NO_2)	250
Total suspended particulate matter	150
PM_{10}	70
$PM_{2.5}$	35

Relevant ambient air quality baseline monitoring was conducted and compiled for the assessment, and the GPS coordinates of the sampling sites taken as the reference location for future monitoring purposes.

2.5.3 Ghana Standard for Environment Protection– Requirements for Effluent Discharge

The Ghana Standard for Environmental Protection – Requirements for Effluent Discharge require every undertaking to install pollution control system for treatment of effluent discharges from the operations, based on best available technology. In the absence of pollution control equipment, individual industries shall implement measures to control pollution. Effluent discharged from the tyre wash bays at the handling sites shall be within permissible levels specified in Table 2.3 below.

Table 2.3 Effluent Limitation (Washing Bays)

Parameter	Maximum Permissible Levels
Colour (TCU)	200
Conductivity	1500
pH	6-9
Temperature (^{0}C)	≤3 above ambient
Turbidty (NTU)	75
TSS (mg/l)	50
BODs (mg/l)	50
COD (mg/l)	250
Ammonia as Nitrogen (mg/l)	1
Nitrate as total (mg/l) Nitrogen (mg/l)	50
Oil and Grease (mg/l)	5
Phosphorus Total (mg/l)	2
Chromium Total (mg/l)	0.1

The ESMP provides relevant mitigation measures for wastewater discharge from the tyre wash bays at each of the handling sites in accordance with GS 1212:2019.

2.6 World Bank Requirements

The ESMP complies with the Safeguard Policies of the World Bank and other requirements. The operational policies reviewed and applied to reinforce the assessment process included:

- Environmental Assessment Policy OP 4.01;
- Involuntary Resettlement Policy OP 4.12;
- Gender and Development OP/BP 4.20; and
- WBG General Environmental Health and Safety Guidelines.

2.6.1 Environmental Assessment OP 4.01

This policy ensures that projects proposed for World Bank financing have undergone environmental assessment and are environmentally feasible and viable, and that decision making will be improved through appropriate analysis of actions and their probable environmental impacts. The OP 4.01 considers the following, among others:

- Impacts on the physical environment (air, water and land);

- Life environment, health and safety of populations; and
- Cultural and physical resources.

The Bank undertakes environmental screening to determine the appropriate extent and type of environmental assessment to be conducted; classifies the proposed projects into categories, depending on the type, location, project sensitivity, scale of the projects, and the nature and magnitude of their potential environmental impacts.

The proposed activities covered by the ESMP fall under category B, due to the potential adverse environmental impacts on the human population and environmentally important areas or resources that could be significant. These impacts are site-specific, and the ESMP examines the potential negative and positive impacts and develop measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

The methodology followed the requirement of OP 4.01 in assessing the project's potential negative and positive environmental impacts and provided relevant measures needed to prevent, minimize or mitigate for adverse impacts and improve environmental performance.

2.6.2 Involuntary Resettlement Policy OP 4.12

The main objectives of the Involuntary Resettlement Policy are to:

- Avoid or minimize involuntary resettlement whenever feasible;
- Develop resettlement activities as sustainable development programmes, providing sufficient investment resources to enable the displaced persons to share in project benefits;
- Meaningfully consult affected persons and give them opportunities to participate in planning and implementing resettlement programme; and
- Assist affected persons to improve their livelihoods and standards of living or at least restore them to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

Involuntary resettlement when unmitigated could give rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where their productive skills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost.

Properties, businesses and social and livelihoods impacts have been identified. A Resettlement Action Plan under preparation for the dredging and associated activities will fully address the concerns of property owners and other interested parties at the handling sites.

2.6.3 Gender and Development OP/BP 4.20

Gender assessment is based on analytic work and consultations conducted by the Bank or by other organizations. In the case where the need for priority gender-responsive action is relevant for a project financed by the World Bank, it is relevant to integrate gender assessment action to ensure the project design addresses the following aspects appropriately:

- Local circumstances that may affect the different participation of females and males;
- Contribution that females and males each could make to achieve the project's objectives;
- Ways in which the project might be disadvantageous to one gender relative to the other; and
- Proposed mechanisms for monitoring the different impacts on females and males.

The ESMP addresses OP/BP 4.20 requirements with provisions for fair working environment, non-discrimination, prevention of all forms of labour abuse and equal opportunities for workers, etc.

2.6.4 WBG General Environmental Health and Safety Guidelines

The World Bank Group (WBG) General Environmental Health and Safety (EHS) Guidelines is a technical reference document containing information on cross-cutting environmental, health and safety issues potentially applicable to all industry sectors. The General EHS guidelines, which prescribe performance levels and measures, are designed to be used together with the relevant Industry Sector EHS Guidelines. The General guidelines are in 4 main groups: Environmental; Occupational Health and Safety; Community Health and Safety; and Construction and Decommissioning.

Environmental, social, health and safety measures have been provided to address impacts at the site preparation, material handling and transportation phases. This is in line with the WBG General EHS specifically the occupational health and safety protocols.

2.7 Comparison of Ghana EA Regulations and the World Bank OP 4.01

The broad areas of differences addressed in Table 2.4 include the following:

- Impact category;

- Social assessment;
- Stakeholder consultation; and
- Minimization of displacement.

Table 2. 4 Key Differences Between Ghana EA Regulation and World Bank OP 4.01

Topic	National Requirements	WB Safeguards OP Policy	Gaps	Strategies in the ESMP
Impact Category	LI 1652 groups undertakings into Schedules 1, 2 and 5-related siting to facilitate screening into: • No EA required beyond Screening, • PEA required, or • EIA required	OP 4.01 classifies proposed projects into four categories: • Category A: project likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented and may affect broader area - requires EIA • Category B: potential adverse impacts are less adverse than Category A projects. Impacts are site specific - requires EA • Category C: project likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required. • Category FI: if proposed project involves investment of Bank funds through a financial intermediary, in sub-projects that may result in adverse environmental impacts.	The World Bank uses more detailed criteria of categories of assessment for screening decision making than Ghana legislation, but Ghana's is more precise, where the Schedules specify the projects.	Decision on level of EA was based on the type, location, sensitivity, scale of the project and the nature of its potential environmental and social impacts, especially for heavy metal exposure risks and cumulative traffic generation and accident risks. Both project screening methods required EIA
Social Assessment	Legislation has general guidelines for carrying out EIA but has no specific detailed provision for carrying out social impact assessments.	Assessment incorporates detailed social provisions, including gender and development, indigenous peoples, and physical cultural resources.	Ghana has no explicit provision, therefore the WB requirements on social aspects should be adopted.	Social aspects incorporated in the assessment include infringement on labour rights, gender-based violence and sexual exploitation and harassment, HIV/AIDS to meet WB requirements.
Stakeholder Consultation	Section 17(1) of LI 1652 mandates EPA to hold Public Hearing, especially where impacts are extensive or involve dislocation, relocation or resettlement of communities. This is in addition to the normal stakeholder consultations carried out by the proponent.	Affected persons and others with interest in the project should be meaningfully consulted throughout the assessment and stakeholder engagement plan prepared and followed. A grievance redress mechanism is also a requirement for any stakeholder to lodge complaint and seek redress	The WB provision appears more structured and systematic throughout the life cycle of the project	Incorporated and used a stakeholder engagement plan for this ESMP. The project implementation phase stakeholder engagement activities would also be carried out along with monitoring and evaluation, and also a developed comprehensive grievance mechanism.

Minimization of Displacement	Section 5(1) of LI 1652 requires an applicant to show a clear commitment to avoid any adverse environmental effects which can be avoided.	Requires avoidance of resettlement where possible and where impossible, minimized to the extent possible.	The LI is quite open on minimizing resettlement, while the WB's is much more explicit.	The project sites Odawna, Korle-na and Pasico have an ongoing RAP to cater for displacement issues.

2.8 Institutional Framework

The institutions who by virtue of their statutory mandates would be involved in the ESMP, preparation of sites, handling operations and waste transportation have been described below, and include:

- Ministry of Works and Housing;
  - Hydrological Services Department;
- Ministry of Environment, Science, Technology and Innovation;
  - Environmental Protection Agency;
- Ministry of Sanitation and Water Resources;
  - Water Resources Commission;
- Ministry of Roads and Highways;
  - Department of Urban Roads
- Land Valuation Division of Lands Commission; and
- Metropolitan Municipal and District Assemblies (MMDAs).

2.8.1 Ministry of Works and Housing

The Ministry of Works and Housing (MWH) - the lead implementing body of the GARID Project and the host of the Project Coordinating Unit (PCU) - is a GoG Central Management Agency responsible for formulating policies and programs for the housing and works sub-sectors of the economy. In line with Sections 11 and 13 of the Civil Service Act 1993, (PNDCL 327), and by Executive Instrument (EI. 28, 2017), MWH is mandated to initiate and formulate policies for the works (including drainage) and housing sector, as well as coordinate, monitor and evaluate the implementation of plans, programs, and performance of the sector for national development. The division with a role to play under the project is the Hydrological Service Division.

Hydrological Services Division

The Hydrological Services Division under the MWH is responsible for monitoring and evaluating project activities which include reviewing of reports by all project contractors to the ministry.

2.8.2 Ministry of Environment, Science, Technology and Innovation

The Ministry of Environment, Science, Technology and Innovation (MESTI) is the principal ministry responsible for guidelines for environmental policy formulation and coordination and supporting environmental sanitation regulations. The Ministry has the mandate to receive complaints from any persons aggrieved by a decision or action of the EPA and to set up or

appoint a panel to determine the case and advice the minister as appropriate. Any aggrieved by persons by the decision of the agency may appeal the Minister for resolution.

Environmental Protection Agency

The EPA is a body responsible for regulating the environment and ensuring the implementation of government policies on the environment. The functions of the agency include:

- Ensuring compliance with any laid down environmental impact assessment procedures in the planning and execution of development projects including compliance in the respect of existing projects;
- Promote effective planning in the management of the environment;
- Imposing and collecting environmental protection levies in accordance with the Environmental Protection Act 1994, Act 940 or regulations made under the Act; and
- Acting in liaison and cooperation with government agencies, district assemblies and other institutions to control pollution and generally protect the environment.

The project team will follow and abide by all EPA procedures in the implementation of the project.

2.8.3 Ministry of Sanitation and Water Resources

The Ministry of Sanitation and Water Resources (MSWR) is responsible for the implementation of the sanitation and water related policies and plans in the country. The Ministry has a mandate to provide sanitation services, etc.; ensure proper and timely collection and management of solid and liquid wastes; and set service standards and implement mechanisms for ensuring compliance and quality assurance, etc.

MSWR is implementing Component 2 of the GARID Project, including improving community-level solid waste management through provision of waste bins and skips and technical services for solid waste collection, and improving solid waste management capacity in Greater Accra by identifying, assessing and improving waste recycling, treatment and disposal facilities. Ministry of Sanitation and Water Resources will ensure smooth implementation and sharing of documentation.

Water Resources Commission

The Water Resources Commission (WRC) is responsible for granting licenses for any water use activity and the procedures as laid down in the WRC Act 1998 (Act 526) will be followed. The commission is also responsible for Planning for water resources development and management within river basins (catchments) as the natural units of planning collating, storing and disseminating data and information on water resources in Ghana.

All project activities requiring a license will receive assistance from the WRC and the Commission will therefore provide adequate guidance to ensure that the proper procedures are used.

2.8.4 Ministry of Roads and Highways

The Ministry of Roads and Highways (MRH) is responsible for the road-sector agencies in charge of constructing roads and associated structures such as road-side drains, bridges, culverts, etc. Affiliates like the Ghana Road Transport Coordinating Council coordinates private road transport organizations. The agency under the ministry with a role to play under the project is the Department of Urban Roads (DUR).

Department of Urban Roads

The responsibility for the construction of secondary and certain tertiary drains as well as the improvement of the Pokuase and Anyaa roads lies with the DUR. While DUR funds, procures and supervises the execution of works, these responsibilities are gradually devolved to the MMDAs.

2.8.5 Land Valuation Division of Lands Commission

The Land Valuation Division (LVD) is the statutory body ensuring that land required for projects are properly acquired and also transparent procedures are followed and fair and adequate compensation is paid. Though private firms may be invited to participate in the process, in case of disputes, the LVD would assist to ensure prompt settlement.

The displacement by the project (dredging works) affecting table-top vendors, etc. will be covered by a separate RAP.

2.8.6 Metropolitan Municipal and District Assemblies

Metropolitan, Municipal and District Assemblies (MMDAs) are responsible for the provisions of water and sanitation services within their respective areas of jurisdiction including the planning and implantation of projects as well as the social issues accompanied with the project.

Section 46 of the Local Governance Act 1993 (Act 462), which sets up MMDAs charges them to ensure public safety, including public protection from the adverse impact of floods. The Assemblies serve as the planning authority responsible for the overall development of their areas of jurisdiction. The proposed interventions fall within the jurisdiction of the Accra Metropolitan Assembly, Korle Klottey Municipal Assembly, Ga Central Municipal Assembly and the Ga West Municipal Assembly.

The assembly will generally ensure public safety including protection from adverse impacts in flood adaptation and waste management in their respective jurisdictions The various departments under the MMDAs with a role to play on the project have been provided in Table below.

Table 2. 3 Departmental Roles on the Project

Departments	Roles
Social Welfare and Community Development	• Conduct public educational campaigns and sensitisation programmes on GBV/SEA/SH • Settlement of grievances in the community

Urban Roads	• Improvements of the drainage systems along the roads including the Odaw. • Construction of selected secondary channels and infrastructure along the roads within the Accra Metropolitan.

3.0 HANDLING SITE ACTIVITIES AND WASTE TRANSPORTATION

3.1 Overview

The handling and transportation of dredged material from the Odawna, Korle-na and Pasico sites to the final disposal sites at Anyaa and Pokuase in the Greater Accra Region is a sub activity of Component 1 of the GARID project. The Component 1 on "Climate Resilient Drainage and Flood Mitigation Measures" has the overall aim of:

- Strengthening flood and solid waste management; and
- Improving the living conditions of the most vulnerable communities in the Odaw Basin in the Greater Accra Region.

The flood situation in the Greater Accra Region is mainly caused by the limited capacity and blockage of primary and secondary drains by solid waste materials and silt, partly due to a lack of efficient maintenance dredging in the drains, poor drainage, unregulated land use and the disfunction of an interception weir. Due to lack of postponed maintenance dredging, the volume of sediments in the Odaw Channel has grown and this must be removed and disposed of safely.

The Odaw River and associated drains from Caprice to the Sea require postponed maintenance dredging of sediments from previous years to restore the original design flow capacity of the channels. In subsequent years, annual maintenance dredging will be necessary to maintain the design flow capacity of the channels. It was for this purpose that the Environmental and Social Impact Assessment (ESIA) for the Deferred and Routine Maintenance Dredging of the Odaw Drainage Basin was commissioned and completed in September 2021.

The ESIA estimated the volume of the postponed maintenance dredging to be around 555,000m³ whereas the annual maintenance dredging volumes have also been estimated to be between 45,000m^3 -165,000m^3. Analysis of sediment from the Odaw Channel indicates that the dredged material is a mixture of gravel and sand which make up 75%, and silt and clay making up 25%. Overall, there appears to be enough sand and gravel content to make sand and gravel sales for beneficial use, particularly in the construction industry. The other potential benefits of the dredging include reducing the risk of flooding in the Odaw basin, the risk of loss of lives, and assets, as well as economic opportunities. It will also improve the visual impression and create a clean environment in and around the river and drains.

To realize the above benefits and avoid associated risks, the dredged material must be treated before disposal. This has necessitated the establishment of designated handling and disposal sites. The dredging, handling and disposal project has a planned duration of four (4) years, ending in 2026. While the ESIA covers the substantive dredging operation, the handling of the dredged material and disposal of the waste component are addressed by this ESMP. Thus, the proposed project covered under the ESMP is the maximum recovery of the reusable fraction of the dredged material as well as the collection, transportation and disposal of the unusable

fraction at the designated final disposal sites. The volume of material to be disposed of from maintenance dredging alone is estimated at about 20,000m^3 per year.

The designated sites are intended to create an obstruction-free work environment and to prevent washing back of the material into the Channel. The proposed handling sites are located along the Odaw Channel and include: Korle-na, Odawna, and Pasico (Figure 3.1). The handled dredged material will be transported by trucks on roads and finally disposed of at designated disposal sites at Anyaa in the Ga Central Municipality and Pokuase in the Ga West Municipality (Figure 3.1).

The description of the handling site activities and waste transportation to the disposal sites cover the following areas:

- Location of handling sites;
- Project components;
- Handling sites preparation phase activities;
- Material handling and transportation activities; and
- Decommissioning phase.

3.2 Project Location

The Ministry of Works and Housing under a Memorandum of Understanding (MoU) (Appendix 2) with the Accra Metropolitan Assembly and the Ngleshi Stool of James Town, Accra has obtained the project sites for the proposed handling activities for the duration of the project. The site plans for the proposed sites are presented in Figure 3.2 to 3.4.

3.2.1 Korle-na Site

The site is located along the Ring Road West Road, Accra and covers a total area of 3.81 acres consisting of a material handling area (2.39-acre) and an equipment yard (1.42-acre) at the southern and northern section respectively. The handling area will have the capacity to handle 33,123m^3 of dredged material at a time.

The equipment yard is an existing equipment holding and administrative area for Dredge Masters Limited (the contractor). The yard has an administrative building (fitted with offices, canteen, changing room, washrooms and fuel station) and a fuel station at the eastern and southern peripheral respectively. It also has parking area for trucks.

3.2.2 Pasico Site

The 1.80-acre Pasico site is located in between the Odaw Channel, Korle-Bu Road, and the premises of Pasico Ghana Limited, specifically on coordinates 5°32'18.2"N and 0°13'08.5"W. The site has the capacity to handle 14,334m^3 of dredged material at a time. The site has two channels draining into the main Odaw Channel - the main drain and a second one from the Pasico factory.

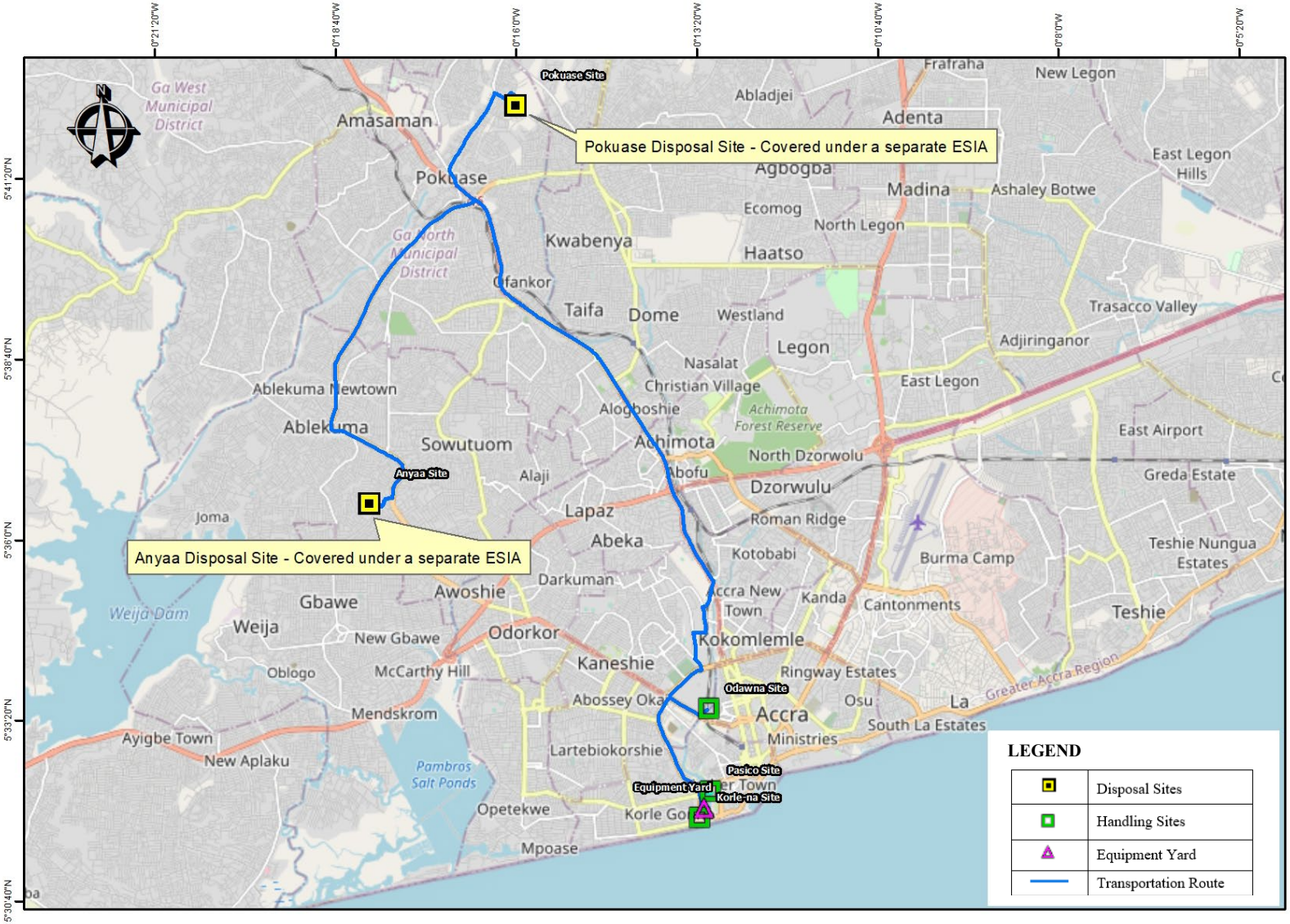


Figure 3. 1 Dredged Material Handling and Disposal Sites

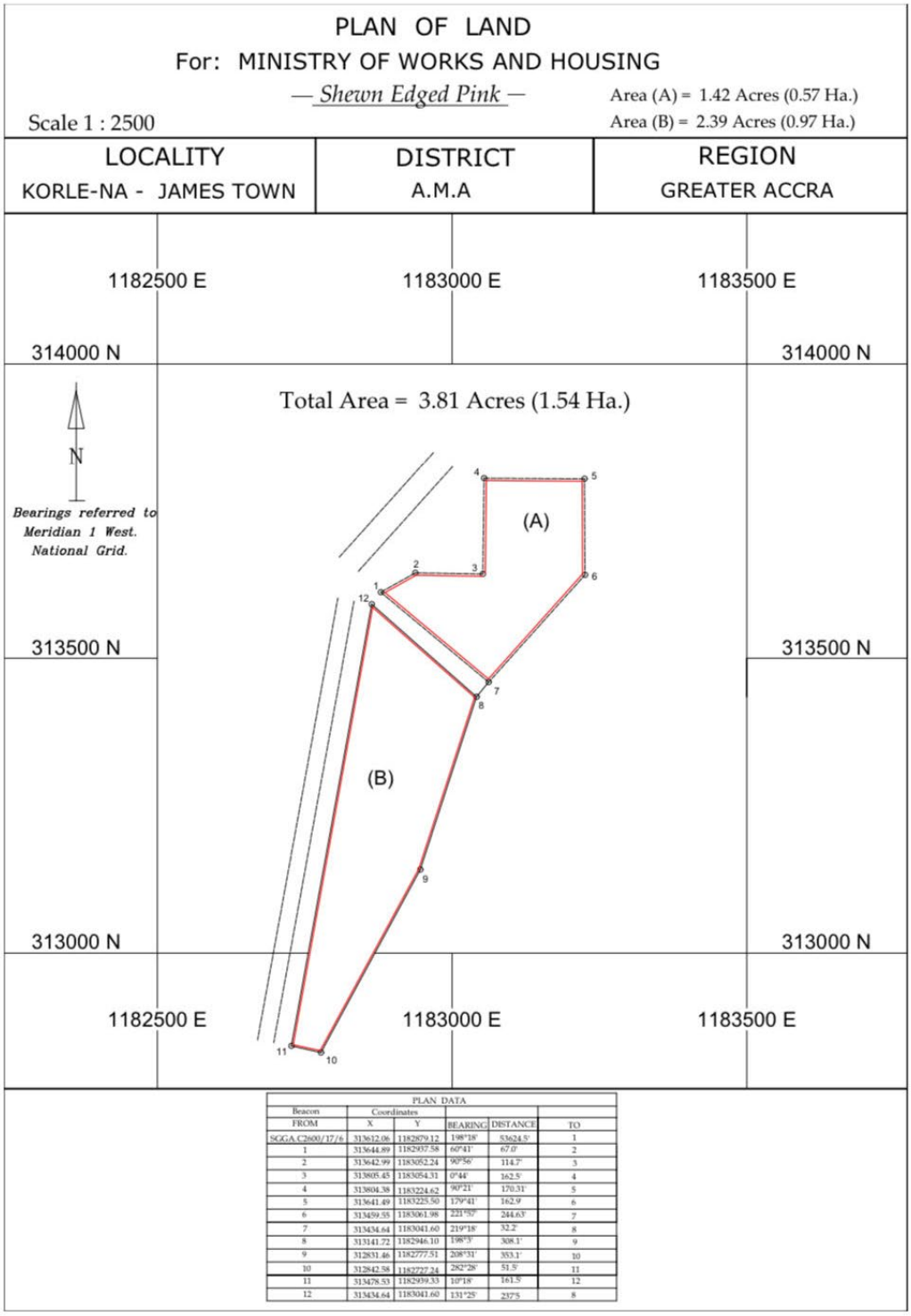
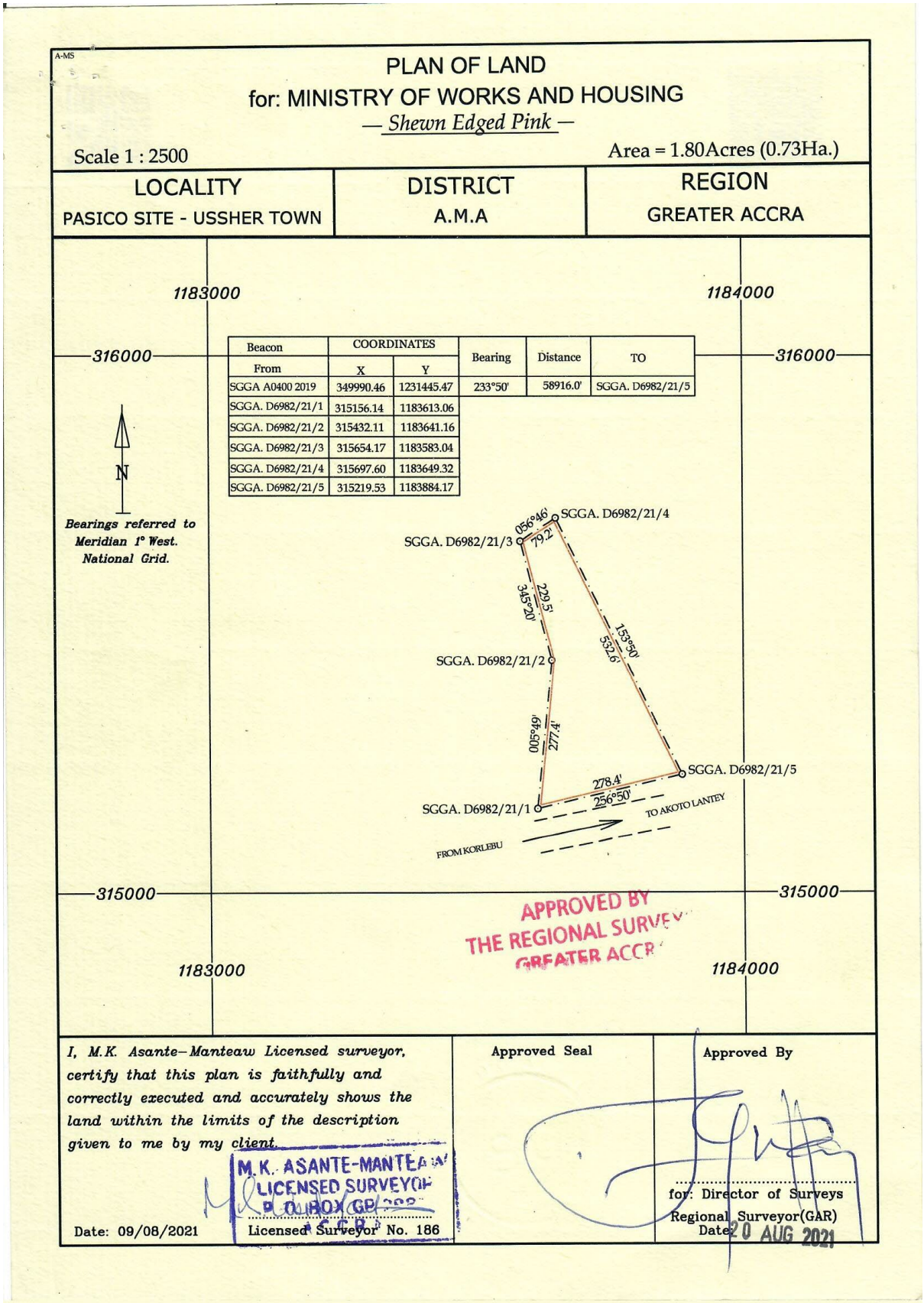


Figure 3. 2 Site Plan of the Korle-na Handling Site



Beacon From	COORDINATES X	Y	Bearing	Distance	TO
SGGA A0400 2019	349990.46	1231445.47	233°50'	58916.0'	SGGA. D6982/21/5
SGGA. D6982/21/1	315156.14	1183613.06			
SGGA. D6982/21/2	315432.11	1183641.16			
SGGA. D6982/21/3	315654.17	1183583.04			
SGGA. D6982/21/4	315697.60	1183649.32			
SGGA. D6982/21/5	315219.53	1183884.17			

Figure 3. 3 Site Plan of the Pasico Handling Site

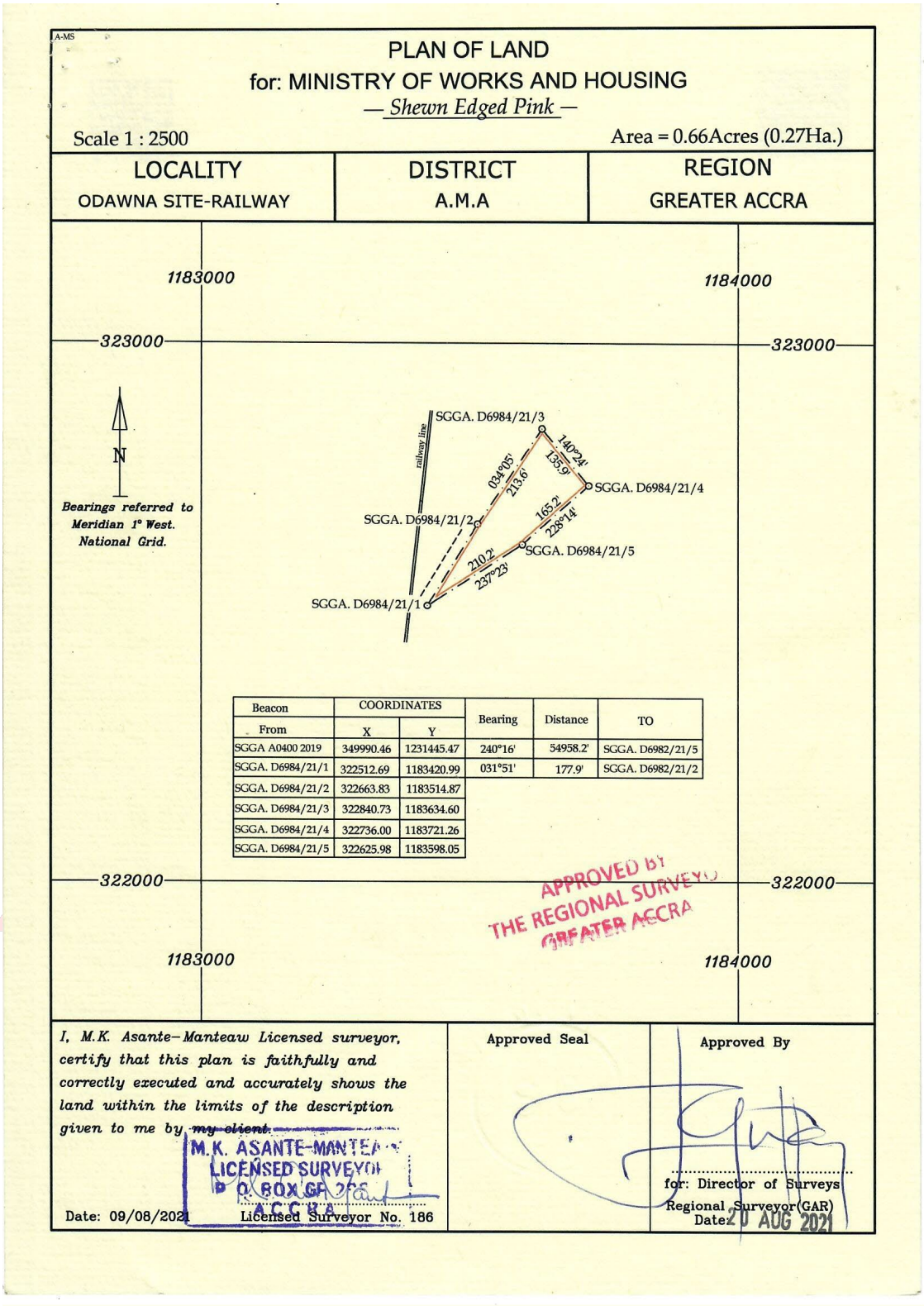


Figure 3. 4 Site Plan of the Odawna Handling Site

3.2.3 Odawna Site

The proposed 0.66-acre handling site is located at Odawna, adjacent the Odaw drainage channel near the Graphic Road and Railway Crossing. The site has the capacity to accommodate 9,138m^3 of dredged material before evacuation to the final disposal site.

3.3 Project Components

The components of the project covered under this ESMP are the activities at the handling sites, and the transportation of the handled material from the handling sites to the final disposal sites. The methods to be used for sediment handling (dredged material) was obtained from the contractor and presented below.

3.3.1 Handling Site Activity Components

The handling sites will be temporary holding areas for efficient dewatering and segregation of dredged material before being hauled to the Anyaa and Pokuase disposal sites. The activities to be undertaken at the sites for the handling of the dredged material will include:

- Spreading and aeration;
- Drying; and
- Sorting.

i) Spreading and Aeration

Spreading is the first step in the receipt of the dredged material at the handling site. For this, a bulldozer will be deployed to handle the material. Handling the material in this manner improves its drying time and allows aeration, which in turn assists in the degradation of the mineral oils and other contaminants in the dredged material. Aeration is the natural degradation of the mineral oils through contact with air. As the contamination is not considered to be significant (Royal Haskoning & SAL, 2021), aeration is sufficient.

ii) Drying

When material is excavated in a wet environment, it must be dried and aired before it can be transported to the disposal sites, to avoid leakage from the trucks and possible contamination of their travel routes (MWH, 2021). Drying and airing will also assist in the degradation of the contamination (mineral oils) which increases the potential for reuse of the material. To enhance drying, the surface for depositing dredged materials will be sloped and connected to high density polyethylene (HDPE) pipes, that will take drained water back to the Lagoon. Floating plastics in the drainage channel will be collected for sale to plastic recyclers.

iii) Sorting

A Cribus 3800 Komptec and a wheel loader will be installed at each handling site to separate the dried material into usable and non-usable materials. About 80% of the dried material will undergo sorting while the remaining 20% which consist of mostly fine sediments mixed with other material will be loaded into trucks for disposal due to its unsuitability for reuse.

Figure 3. 5 Typical Cribus 3800 Komptec and Wheel Loader

3.3.2 Transportation to Disposal Sites

Pre-arranged off-takers will be regularly admitted into the handling sites to load up the usable volumes of materials and transport them off the sites. The waste material will be transported to the final disposal sites at either Anyaa or Pokuase.

Deferred Dredging Material

The deferred dredging is anticipated to last for the first year of dredging and the material to be disposed of will be about 110,000m^3. Using a 20m^3 truck for disposal, a total number of 5,500 trips will be required, working four days in a week (i.e., 200 working days in the year). This gives 28 trips per day. The preferred haulage time is 9pm to 5am with trucks moving at 10-minute interval.

A total of 22,250 trips will be required for the collection of the reusable volumes by off-takers (using a 20m^3 truck). The daily collection per site will amount to 37 trips and this will be done at daytime i.e., 8am to 5pm.

Maintenance Dredging Material

The waste material from maintenance dredging to be disposed of is estimated to be 20,000m³ per year. Using a 20m^3 trucks for disposal, a total number of 1,000 trips per year will be required, which translates to about 20 trips per week, working for two days in a week.

During the maintenance dredging, a total of 7,250 trips per year will be required for the collection of the reusable volumes by off-takers (using a 20m^3 truck). The daily collection per site will amount to 12 trips and this will be done at daytime (i.e., 200 collection days in the year).

i) Transportation Route to Pokuase Disposal Site

The Pokuase Disposal Site can be accessed using the Nsawam Road. Trucks from the handling sites will use the Ring Road West through the Obetsebi Lamptey Circle (Kaneshie Interchange) towards Circle then unto the Nsawam Road. The trucks will veer off the Nsawam Road unto the Old Nsawam Road and finally travel about 3.3km through the Pokuase Community roads to the disposal site. The total travel distance is about 25.13km with a travel time of 40 minutes (for the night disposal option).

ii) Transportation Route to Anyaa Disposal Site

The Anyaa Disposal Site can be accessed using the Nsawam Road and the Pokuase Interchange to the Anyaa-Awoshie Road. Trucks from the handling sites will ply the Ring Road West towards the Circle Interchange, turn onto the Feo Oyeo Road to connect to the Nsawam Road and onto the Pokuase Interchange, where the trucks will again turn onto the Anyaa-Awoshie Road. The truck will then turn at the Ajos Junction and travel for 700m on the community access road to the disposal site. The total travel distance will be 32.4km in a travel time of about 40 minutes (for the night disposal option).

3.4 Sites Preparation Phase Activities

The existing structures onsite will be relocated (for Odawna and Pasico) and the ground surface levelled in. Then site layout and setting out will be undertaken. Areas for holding foundations of site handling equipment will be excavated to make way for reinforced concrete foundations.

Laterite will be spread and compacted on the cleared and levelled ground and then sloped HDPE pipes from the site towards the lagoon will be laid. Handling site container offices will be installed (mainly at the Odawna). After which sediment handling equipment (Cribus 3800 and wheel loader) will be transported to site and installed. In addition, earth drains to take out run-off during the drying of wet materials, and in the rainy season will be constructed around the handling sites. Lighting system will be installed at all the handling sites for visibility at night.

An estimated workforce of 100 workers will be employed during the site preparatory phase. This phase will last for about one (1) month. The site preparation will generally involve both manual and machinery works. The machinery and equipment that will be deployed during the site preparation will include:

- Bulldozer – site clearing;
- Grader – levelling of surfaces;
- Compactor – proof rolling of site surface; and
- Trucks – haulage of laterite to the sites and carting of site clearing waste from the sites.

As part of the site preparation activities, the access roads within Anyaa and Pokuase to be used for haulage will be improved. The improvement of these routes in covered under the ESIA for the disposal sites i.e., Anyaa and Pokuase. The main work to be carried out will include the following activities:

- Filling of potholes on sections of the roads and levelling uneven surfaces with appropriate laterite material and compaction;
- Providing surface dressing for the roads to minimize dust emission and noise nuisance;
- Widening narrowed portions of the roads to enable two trucks in opposite directions use them; and
- Shaping sides of the roads to direct stormwater away from the main roadway.

The specific site preparation activities for the proposed sites are presented below.

3.4.1 Korle-na Handling Site

The existing surface will be cleared of all materials and excavated 2m deep. Perforated PE plastic pipes will be laid in the excavated area before laterite is ramped to ensure that water draining from the dredged material flows back into the lagoon. A drain will be constructed along the main boundary road to control run-off from the road and the area. The perimeter of the site will be hoarded with wooden planks to a height of 2.5m to reduce visual intrusion, noise and dust emission and prevent unauthorised entry. Approximately 40% of the site will be dedicated to dredged material deposition, 50% to the handling operations and about 10% for access routes. The site would have separated routes for entry and exit of the site. Close to the exit gate, there will be a tyre wash bay to clean the tyres of trucks of mud.

3.4.2 Equipment Yard

A section of the site will be designated for servicing machinery and equipment. The area will be a concrete platform to prevent seepage of spilled oil and fouling of soil surface.

3.4.3 Pasico Handling Site

The site will be cleared, and the surface ramped with laterite. Perforated PE plastic pipes will be laid before the laterite is compressed. This will ensure that water draining from the dredged material flows back into the Odaw. The channel draining water from the Pasico factory through the site will be improved with culverts, while the main drain will be covered with concrete slabs. Other external drains will be improved to enhance run-off flow into the Odaw. Wooden planks will be used as a perimeter fence to reduce visual intrusion, noise disturbance and dust emission and prevent unauthorised entry. Close to the exit gate there will be a tyre wash bay to clean the tyres of trucks of mud.

About 35% of the site will be apportioned for the deposition of dredged material while about 55% and 10% will be allocated for handling operations and access routes respectively. There will be a common entry and exit point for trucks.

3.4.4 Odawna Handling Site

The area will be sectioned into two – about 40% and 50% allocated for the deposition and handling of the dredged material respectively, and about 10% for access road and container office structure.

The perimeter of the site will be fenced with a 2.5m high wooden hoarding panel to prevent unauthorized entry and also serve as a barrier to reduce visual intrusion, dust and noise disturbance. The fence will be fitted with an entry and exit gate at the north and western section of the site.

Drainage channels will be developed to intercept, collect and control surface water flows. The access road leading to the site will be improved for movement of the trucks. Close to the exit gate will be a tyre wash bay to clean the tyres of the trucks.

3.5 Material Handling and Transportation Phase

Dredged Masters Limited is the contractor that has been selected to undertake the dredging works, including the handling and transportation of dredged material as well as the site preparation activities. The contractor will be responsible for the provision of the relevant equipment and machinery including trucks, Cribus and wheel loader for the operation of the handling sites.

The equipment yard aside being an equipment holding area, will serve as the central operational office of the contractor. The workers will converge at the site for the necessary preparations and daily toolbox meetings before they are deployed to the Korle-na, Pasico and Odawna sites. The site will serve as an area for parking and storage of operational machinery and equipment for the project. Servicing of machinery and equipment will be carried out at the designated area to prevent seepage of spilled oil and fouling of soil surface. The machines and equipment will be greased with oil regularly to prevent corrosion and rusting due to its proximity to the sea.

The material handling phase will include a workforce of 66 (20 workers per site plus 6 managers), consisting managerial staff, truck drivers, machine operators, site officers and banksmen. Banksmen will be contracted to regulate the entry and exit of machines onto and from the main road.

A total of 14 20m^3-capacity trucks will be deployed for the haulage of un-usable dredged materials from the handling sites to the final disposal sites.

3.6 Decommissioning Phase

After the life span of the project (four years), the sites will be restored in a safe condition and handed over to AMA and the Ngleshi Stool of James Town as agreed in the MOU (Appendix 2).

4.0 ANALYSIS OF ALTERNATIVES

Analysis of alternatives will be done to establish the preferred or most environmentally sound and feasible option for achieving the objectives of the project. The following project alternatives will be considered and analysed:

1. Alternative analysis of waste transport route and timing;
2. Alternative periods for waste transfer to the Anyaa site; and
3. Alternative analysis of handling sites.

4.1 Alternative Analysis of Waste Transport Route and Timing

The distances between the handling and disposal sites are long with interconnected routes in between them (Figure 4.1), which therefore provide numerous route options for waste transportation. Due to the proximity of the Korle-na and Pasico sites to one another and with all the haulage routes passing through the Ring Road West/Guggisberg Road Intersection, towards the Obetsebi Lamptey Circle (with Korle-na and Pasico approximately 470m and 340m respectively from the intersection), the Korle-na site was used to represent both sites in the analysis of the routes.

The route from the Odawna site, however, uses the Graphic Road for about 1.47km and connects to the Obetsebi Lamptey Circle. From Obetsebi Lamptey Circle, it follows the same routes as the other two sites (Korle-na and Pasico). Since all three locations connect to the Obetsebi Lamptey Circle, the Korle-na site was adopted for the route analysis to represent all three sites.

The alternative routes from the Korle-na site to the Pokuase and the Anyaa disposal site were analysed.

4.1.1 Alternative Transportation Routes to Pokuase Disposal Site

The Pokuase disposal site can be accessed using the Nsawam Road. Trucks from the handling sites will use the Ring Road West and at the Obetsebi Lamptey Circle (Kaneshie Interchange) could ply the following alternate routes (Figure 4.1):

- Route A - continue on the Ring Road West, turn to the Feo Oyeo Road and onto the Nsawam Road to Pokuase;
- Route B - continue on the Ring Road West towards Kwame Nkrumah Circle to the Nsawam Road, then to Pokuase; or
- Route C - turn onto the Dr Busia Highway (Kaneshie), then onto the Anyaa-Awoshie Road to Pokuase.

Ring Road West towards Circle to Pokuase

For the route towards Kwame Nkrumah Circle, there are two options (Table 4.1) - the trucks can use either:

- The road under the overpass at the Kwame Nkrumah Circle Interchange to the Roundabout and turn onto the Nsawam Road; or
- At the Roundabout at the start of the Kwame Nkrumah Circle Interchange, turn onto the Feo Oyeo Road and use the Dadeben Road, Abotia Street, Otublohum Road onto the Obibini Street to access the Nsawam Road.

Ring Road West to Busia Highway and Anyaa-Awoshie Road to Pokuase

For the route through the Dr Busia Highway, the trucks will turn at the Obetsebi Lamptey Circle onto the Korley Kojo Avenue, Twin Twina Street, onto the Anyaa-Awoshie Road and cross the Nsawam Road to Pokuase (Table 4.1).

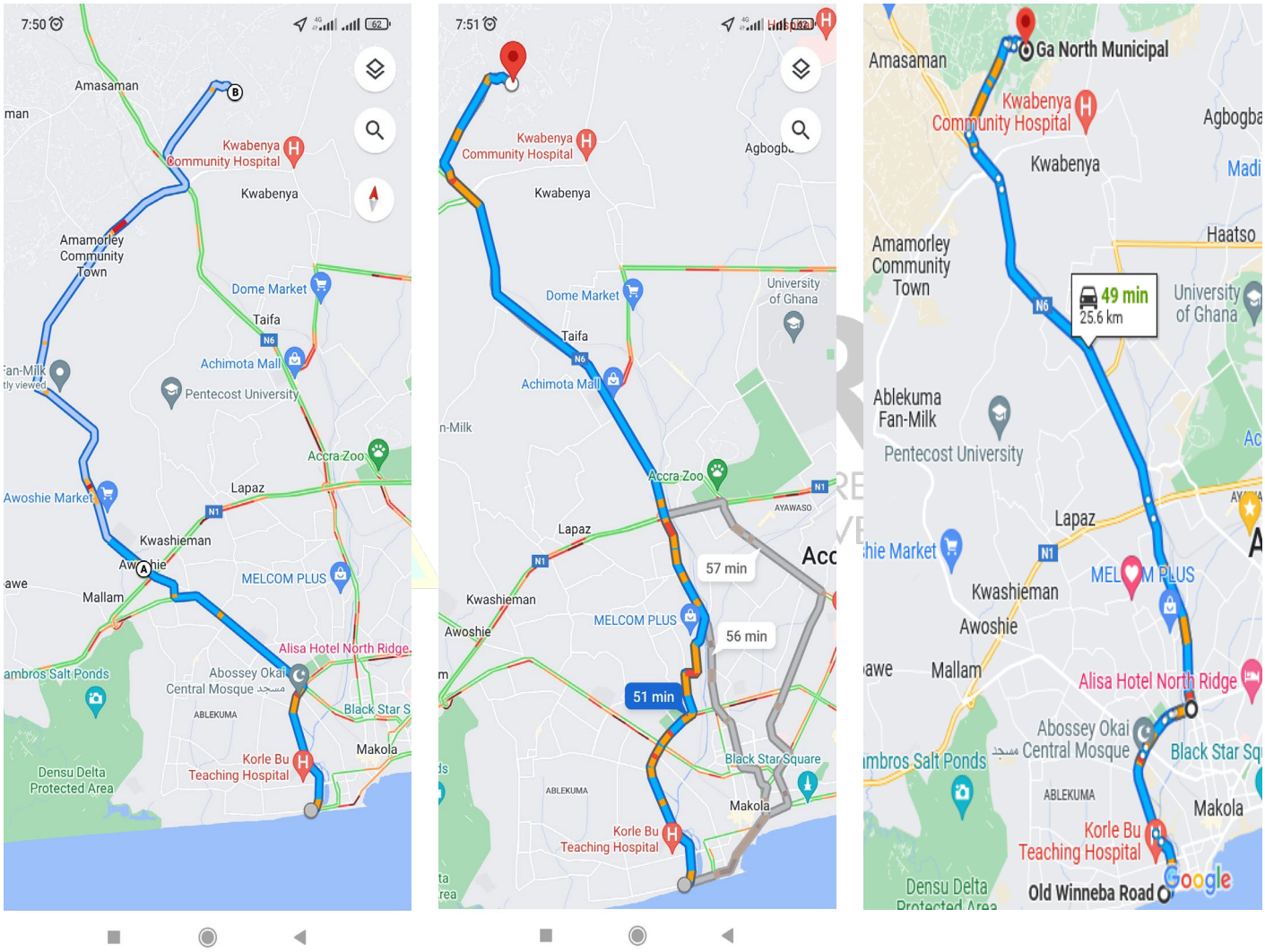


Figure 4. 1 Alternative Routes to the Pokuase Disposal Site

Table 4. 1 Route Length and Travel Times to Pokuase Disposal Site

Route	Connecting Roads	Length (Km)	Total Travel Length (Km)	Travel Time (Mins)	
				Minimum	Maximum
	Ring Road West	4.83	25.08	40	120

A. Korle-na through Feo Oyeo Road / Nsawam Road to Pokuase Site	Feo Oyeo Road	0.4			
	Dadeben Road	0.75			
	Abotia Street	0.35			
	Otublohum Road	0.7			
	Obibini Street	1.0			
	Nsawam Road	13.75			
	Pokuase Community roads	3.3			
B. Korle-na through Vodafone Office / Nsawam Road to Pokuase Site	Ring Road West	5.48	25.13	40	120
	Nsawam Road	16.35			
	Pokuase Community Roads	3.3			
C. Korle-na through Anyaa-Awoshie to Pokuase Site	Ring Road West	3.63	29.13	46	135
	Dr Busia Highway	4.9			
	Korley Kojo Avenue	0.4			
	Twin Twina Street	0.7			
	Anyaa-Awoshie Road	15.75			
	Nsawam Road	0.45			
	Pokuase Community Roads	3.3			

The route to the final disposal site in Pokuase from the Nsawam Road will make use of community roads that are interconnected in nature, hence provide various accesses to the disposal sites. All these accesses are un-engineered routes, passing through residential areas. The most direct road is about 3.3km from the Nsawam Road through the Old Nsawam Road to the Pokuase Zonal Council Office stretch and finally through the community roads to the site. The stretch has about 1.5km in a bad state.

Travel duration on the routes was estimated using Google Earth live travel time durations at various times in the day (and confirmed by driving along the routes), and the distance covered under each route is presented in Table 4.1.

The shortest route is the Korle-na through Feo Oyeo (Fan Milk area) to the Pokuase disposal site (Route A: 25.08km), whilst the longest route is through the Anyaa-Awoshie Road (Route C: 29.13km). Route B is 25.13km. However, the estimated minimum travel duration on Routes A and B is 40 minutes during the free-flow time and increases to about 120 minutes during peak hours.

Between routes A and B, the preferred alternative route to the Pokuase disposal site is Route B. It has the advantage of being more direct than Route A, which is rather winding and uses many connecting roads to access the Nsawam road.

4.1.2 Alternative Periods for Waste Transfer to Pokuase Site

The congested nature of all the three routes identified for waste transfer from the handling to the disposal site poses a challenge for daytime haulage of the waste. The estimated minimum travel duration on Routes A and B is indicated as 40 minutes during the free-flow time. This, however, increases three-fold to about 120 minutes during peak hours. The free-flow time

represents very low traffic periods, usually night-morning hours between 9pm to 5.30am; while the peak hours may be taken generally as the daytime traffic flow, but with intensity in the morning from about 6am to 10am and from 3pm to 8pm.

Daytime Waste Transfer Option

The fleet of waste disposal trucks would add on to the existing vehicular traffic volumes on some of the busiest roads in the City of Accra, contributing to the daytime traffic congestion. The resultant three-fold increase in travel time for the waste trucks would translate into high greenhouse gas (GHG) emissions cumulatively, contributing to Ghana's share of GHG effects, responsible for global warming and related climate change impacts. The rate of vehicular accident risks and breakdowns on the road also increase with more vehicular traffic and congestion.

The waste trucks must avoid being obstructed or involved in accidents that could lead to abandonment on the road, due to its content, which may give off unpleasant smell or leak its content onto the road. Thus, daytime waste haulage is a less preferred option.

Night-time Waste Transfer Option

The route to the final disposal site in Pokuase will ply community roads. Sections of the road – about 1.5km are in a bad shape, apart from being un-engineered routes pass through residential areas. The use of the road would create inconveniences and noise nuisance for residents, especially those living along the access roads.

The residents are, however, accustomed to some level of noise in the past when the quarry sites now being converted into disposal sites were operational. Engagement with the residents indicated that if only the roads could be improved, in addition to other standard safeguards measures (installation of speed ramps, institution of speed limits, etc) then the nuisances from the movement of the waste trucks at night could be tolerable.

Since night-time traffic (representing free-flow time) gives an estimated minimum travel duration between the handling sites and the Pokuase disposal site, this would be the preferred waste haulage period, if the above conditions on road improvements are carried out. It follows also, that if the night-time haulage is adopted then either Route A or B with the estimated 40-minute travel duration would perform creditably.

4.1.3 Alternative Transportation Route to Anyaa Disposal Site

The two main alternative routes considered for transporting the waste from Korle-na to the Anyaa disposal site are through (Figure 4.2):

- The Dr Busia Highway, then onto the Anyaa-Awoshie Road; and
- The Kwame Nkrumah Circle Interchange to the Nsawam Road, then to the Pokuase Interchange and the Anyaa-Awoshie Road.

Using the Dr Busia Highway to the Anyaa-Awoshie Road

Trucks from the handling sites accessing the Anyaa-Awoshie Road (to the disposal site) will ply the Ring Road West and turn onto the Dr Busia Highway at Obetsebi Lamptey Circle. From the Dr Busia Highway, the two alternate routes to accessing the Anyaa-Awoshie Road (Table 4.2) are using:

- The Mallam Interchange; or
- The Twin Twina Road in Odorkor.

The route from the Anyaa-Awoshie Road into the Anyaa community have interconnections and provide various means of accessing the disposal site. However, all pass-through residential areas with un-engineered routes. The most direct road is about 700m from the Anyaa-Awoshie Road. This route, however, has another challenge, the trucks need to make a U-turn movement at the Fan Milk traffic light to connect at the Ajos Junction.

Using the Nsawam Road to the Anyaa-Awoshie Road

The alternative route would be to use the Nsawam Road and the Pokuase Interchange to the disposal site at Anyaa. Trucks from the handling sites will ply the Ring Road West towards the Kwame Nkrumah Circle Interchange, turn onto the Feo Oyeo Road to connect to the Nsawam Road and onto the Pokuase Interchange, where the trucks will turn again onto the Anyaa-Awoshie Road (Table 4.2).

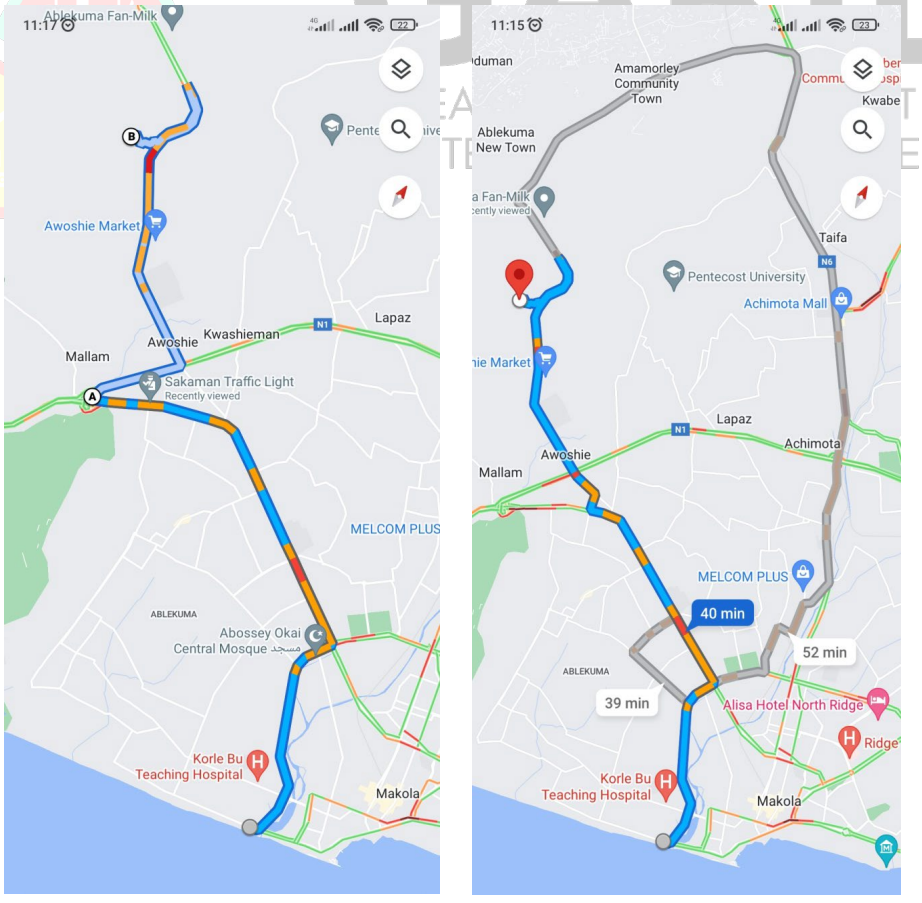


Figure 4. 2 Alternative Routes to the Anyaa Disposal Site

Table 4. 2 Route Length and Travel Times to Anyaa Disposal Site

Route	Connecting Roads	Length (Km)	Total Travel Length (Km)	Travel Time (Mins)	
				Minimum	Maximum
Korle-na through Odorkor to Anyaa	Ring Road West	3.63	17.40	30	100
	Dr Busia Highway	4.9			
	Korley Kojo Avenue	0.4			
	Twin Twina Street	0.7			
	Anyaa-Awoshie Road	7.07			
	Anyaa community Roads	0.7			
Korle-na through Mallam Interchange to Anyaa	Ring Road West	3.63	19.95	30	110
	Dr Busia Highway	7.25			
	George Bush Highway	1.2			
	Anyaa-Awoshie Road	7.17			
	Anyaa Community Roads	0.7			
Korle-na through Pokuase Interchange to Anyaa	Ring Road West	4.83	32.40	40	120
	Feo Oyeo Road	0.4			
	Dadeben Road	0.75			
	Abotia Street	0.35			
	Otublohum Road	0.7			
	Obibini Street	1.0			
	Nsawam Road	13.97			
	Anyaa-Awoshie Road	9.7			
	Anyaa Community Roads	0.7			

Travel duration on the routes was estimated using Google earth live travel time durations at various times in the day and the distance covered under each route (Table 4.2). The travel times were confirmed by driving along the routes.

The shortest route from the Korle-na site will be through Odorkor to the Anyaa disposal site covering about 17.4km, whilst the longest route will be via the Nsawam Road/Pokuase Interchange covering 32.4km. The shortest route is, however, not recommended for use without junction design works at the Fan Milk Intersection. The median width at the Fan Milk Intersection is 9m instead of the recommended 18m to allow for truck turning (AASHTO, 2001). The above constraint is applicable to the Korle-na through Mallam Interchange to Anyaa route too. Therefore, the preferred route to the Anyaa disposal site would be the Nsawam Road - Pokuase Interchange to Anyaa.

4.2 Alternative Periods for Waste Transfer to the Anyaa Site

The challenge posed for daytime haulage of the waste due to road congestion on all the identified routes for the transfer of waste from the handling sites is similar to the situation described in Section 4.2 above. The estimated minimum travel duration during the free-flow time from the Korle-na to Anyaa through Odorkor and Mallam Interchange is 30 minutes, whiles through Pokuase Interchange is 40 minutes. The peak hour flow estimates are – through

Odorkor is 100 minutes, Mallam Interchange is 110 minutes, Pokuase Interchange is 120 minutes.

4.2.1 Daytime Waste Transfer Option

The fleet of waste disposal trucks would add on to the existing vehicular traffic volumes on these very busy roads, contributing to the daytime traffic congestion experienced daily in Accra. The resultant three-fold increase in travel time for the waste trucks in the daytime would translate into cumulatively high GHG emissions, contributing to Ghana's share of GHG effects, responsible for global warming and related Climate Change impacts. The rate of vehicular accident risks and breakdowns on the road could also increase with more vehicles on the road and traffic congestion.

The waste trucks must avoid being involved in potential accidents that could lead to abandonment on the road, due to its content, which may give off unpleasant smell or leakage onto the road. Thus, daytime waste haulage is a less preferred option.

4.2.2 Night-time Waste Transfer Option

The route to the final disposal site in Anyaa uses community road - passing through residential areas. The 700m access from the Ajos Junction to the disposal site is in a bad shape, apart from it being an un-engineered route. The use of the road would create inconvenience and noise nuisance for residents, especially those living along the access roads.

Residents' engagement, however, indicated that if only the access road could be improved, in addition to other standard safeguards measures, the nuisances from the movement of the waste trucks could be tolerated.

Since night-time traffic (representing free-flow time) gives an estimated minimum travel duration between the handling sites and the Anyaa disposal site, this would be the preferred waste haulage period, if the conditions on road improvements are carried out.

4.3 Alternative Analysis for Handling Sites

The five (5) options considered in the selection of handling sites are as follows:

- Odawna;
- Pasico;
- Korle-na;
- Site B - Mortuary Road; and
- Avenor.

4.3.1 Odawna Handling Site

The location of the Odawna site (Figure 3.1) by the Odaw Channel makes it convenient to deposit dredged materials on-site, thus avoiding the need to transport them to a distant handling site. The limited activity in the area means that there would be minimal displacement of people and businesses, making the site appropriate for the handling of dredged materials. Additionally,

the collaboration and coordination of activities among MWH, AMA, and Ngleshi Stool of James Town through an MOU makes the site readily available for handling activities and helps to achieve the project aim.

4.3.2 Pasico Handling Site

The Pasico handling site (Figure 3.1) covers 1.8 acres of land and has the capacity to handle 14,334m3 of dredged materials. Its location on the banks of the left arm of the Odaw Channel makes it convenient for the deposition of dredged materials. Presently, refuse skips and pig sties occupy the site, but the owners have indicated their willingness to lease it to MWH for the intended handling activities.

4.3.3 Korle-na Handling Site

The Korle-na site (Figure 3.1) comprises a land area of 3.81 acres, with an equipment yard occupying 1.42 acres in the north and a material handling site covering 2.39 acres in the south. The material handling site is situated on the banks of the lower lagoon of the Korle, making it advantageous for the easy deposition of dredged materials. The site is designated to provide temporary support for dredged material handling activities and will be transferred to AMA and the Ngleshi Stool of James Town after the dredging activities are completed.

4.3.4 Site B – Mortuary Road

Site B - Mortuary Road (Figure 4.3) was originally intended to be the primary handling site for dredged materials from the Odaw Channel. The site is located on the western bank of the Odaw near Mortuary Road. However, during the ESIA for the dredging project, Zoomlion Ltd used the site as an unofficial disposal site for municipal waste.

To prepare the handling site, part of Site B - Mortuary Road was to be made available to the Contractor, with 76,000m^3 of material disposed of by Zoomlion Ltd being excavated and transported to the Anyaa site to create space and an access road. Unfortunately, MWH and Zoomlion Ltd failed to reach an agreement, and the GARID Project funds could not be utilized to finance the evacuation of the municipal waste to the Anyaa site. Furthermore, the ministry was unable to secure funds from the Government of Ghana for this purpose.

4.3.5 Avenor Site

The proposed Avenor Site (Figure 4.4) was selected, subsequently the leaseholder refrained from participating in the project and rather opted to put the site to commercial use.

Figure 4. 3 Site B - Mortuary Road

Figure 4. 4 Avenor Site

4.3.6 Preferred Alternative for Handling Sites

Site B - Mortuary Road and the Avenor Site are not suitable for use as handling sites for dredged materials due to issues such as Zoomlion's depositing of municipal waste at Site B - Mortuary Road and the Avenor Site leaseholder's decision not to participate in the project.

However, according to the ESIA assessment, the Korle-na, Pasico, and Odawna sites are available for temporary handling activities due to their proximity to the Odaw basin and Korle Lagoon. These sites were available for carrying out the proposed handling activities with minimal displacement of people and economic impact.

Additionally, at the end of the project's four-year lifespan, the sites will be restored to a safe condition and handed over to the AMA and the Ngleshi Stool of James Town, as outlined in the MOU (Appendix 2). Therefore, the preferred handling sites for dredged materials are the Korle-na, Pasico, and Odawna handling sites.

5.0 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

5.1 Introduction

The baseline information for relevant sections of the Accra Metropolis and the Korle Klottey Municipality which lie in the Odaw and Korle basins as well as data on the Odaw channel and the Korle Lagoon were provided in the ESIA for the Deferred and Routine Maintenance Dredging of the Odaw Drainage Basin (September 2021). As an Addendum to the ESIA, the baseline information provided here is only supplementary, largely site-specific in focus on the three project sites.

The baseline information (in the ESMP) on traffic flow characteristics between the handling sites and the final disposal sites, and the un-engineered access corridors within the Anyaa and Pokuase community, did not include information related to the Ga Central and Ga West municipalities. The baseline information on the municipalities have been covered in separate ESIAs for the Anyaa and Pokuase final disposal site. The baseline information in the ESMP for the three project sites and the traffic and road network conditions covered the following:

1. Location and land use;
2. Drainage conditions;
3. Ambient air quality;
4. Ambient noise;
5. Heavy metal concentration and distribution;
6. Road network and traffic conditions;
7. Climate conditions;
8. Health and disease conditions;
9. Social issues; and
10. Waste management.

5.2 Baseline Study Approach and Methodology

The physical environment baseline information was obtained mainly from the ESIA of the Deferred and Routine Maintenance Dredging of the Odaw Drainage Basin and literature sources, complemented with field surveys/environmental media monitoring, including drainage studies and heavy metal distribution analysis.

Engagement with various stakeholders provided useful local knowledge of the areas on issues such as adequacy of drains and flood occurrence, noise and odour nuisance, while Traffic Impact Assessment (TIA) and road network surveys yielded important baseline information for the various transportation routes. Literature review examined various sources including:

- Population and Housing Census, General Report Volume 3A_Population of Regions and Districts (2021);
- Population and Housing Census, General Report Volume 3E_Economic Activity (2021);
- EIA for Deferred and Routine Maintenance Dredging of the Odaw Basin (September 2021);
- Draft Scoping Report for EIA of the Anyaa Disposal Site (May 2022); and
- Traffic Impact Assessment for the Transportation of Dredged Material from the Handling Sites to the Final Disposal Sites (June, 2022).

5.3 Site Locations and Land Use

The Pasico and Korle-na sites are located in the Accra Metropolitan Area whilst the Odawna site is located in the Korle Klottey Municipality (which was carved out of the AMA in 2019), all within the Greater Accra Region. These proposed sites are all within the Odaw-Korle catchment area.

5.3.1 Korle-na Site

The site covers a total land area of 3.81 acres and houses an equipment yard (1.42-acre) at the northern sections and a material handling site (2.39-acre) at the south. The site shares boundary with the Ring Road West and St Mary's Senior High School to the west, GOIL Gas Station and AMA Ablekuma South Sub-Metro Office to north-west, a road reservation to the south-west and the Korle-na drainage channel to the east.

The equipment yard currently serves as an equipment holding and administrative area for Dredge Masters Limited. The yard has an administrative building (fitted with offices and washrooms) and a fuel station at the eastern and southern peripheral respectively. It also has parking area for trucks (Figure 5.1).

Figure 5. 1 Existing use of the Equipment Yard

The equipment yard and the handling site is separated by a drain. The closest facilities to the handling site are the St Mary's School dormitory and the AMA Ablekuma South Sub Metro office, located about 60m and 46m respectively from the site. Figure 5.2 shows the Korle-na site and the adjoining land use.

Figure 5. 2 Korle-na Site and Adjoining Land Use

5.3.2 Pasico Site

The proposed site covers an area of 1.8 acres and is located between longitude 5°32'18.35"N and latitude 0°13'08.75"W. The site shares boundary with the Odaw Channel to the north-west, Pasico Ghana Limited to the east, and the Guggisberg Avenue Road to the south. The Mudor Waste Treatment Company is located across the road (35m) opposite the project site (Figure 5.3).

The area is currently used by waste pickers as a collection point for plastic waste and also has sties in which pigs are reared. A waste skip is situated on the site for the collection and temporary holding of waste generated within the area (Figure 5.4)

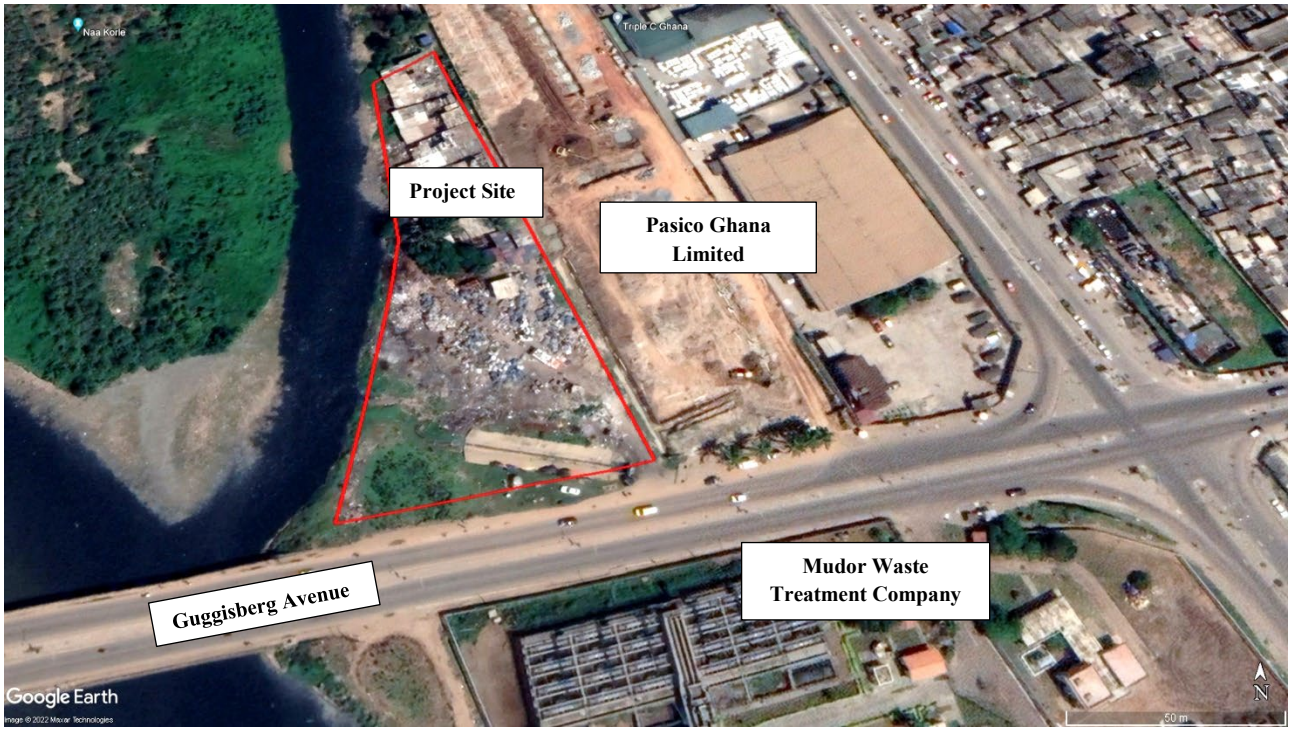


Figure 5. 3 Pasico Site and Adjoining Land Use

Figure 5. 4 Pig Sties and Waste Skip on the Pasico Site

5.3.3 Odawna Site

The proposed site is situated on a 0.75-acre land located between longitude 5°33'30.6"N and latitude 0°13'10.25"W. The site shares boundary with the Odaw drainage channel to the south, a plastic recycling factory (Space Plast) to the north-east and a railway line and a rail reservation to the west. Figure 5.5 shows the project site and the adjoining land use.

The project site houses two shacks occupied by some informal settlers and is also used as temporary parking area by truck drivers within the area. The rail reservation is occupied by persons engaging in informal commercial activities such as vulcanizer shops, drinking spots, mechanic and sitting area.

Figure 5. 5 Odawna Site and Adjoining Land Use

5.4 Drainage Conditions

Korle-na Site

The Korle-na site is located between two rectangular outfall concrete drains at the northern and southern section of the site which discharges into the Korle Lagoon (Figure 5.6). The drains outlet from Korle Gonno are of dimensions 4m (width) x 1.8m depth, 65.0m long and 2.6m x 0.9m depth, 18m long respectively. The drain located at the southern section is in a good condition while the one at the northern has some sections of the drain wall down or collapsed. The drainage channels are filled with silt and plastic materials. There is a sag section on the Ring Road West dual carriage in front of the site where the run-off from the road collects and creates a pool along the road section of the site.

Northern Section Drain

Southern Section Drain

Collapsed Northern Drain Walls

Figure 5. 6 Drainage Channel at the Korle-na Site

Pasico Site

The site borders the Odaw River near the Pasico Factory. At the entrance of the proposed site is an outlet of a concrete trapezoidal drain of top width 9.0m and 3.0m bottom width, with some section not lined. There is also a silted drainage channel from Pasico Ghana Limited site through the project site. Both drains discharge into the Korle Lagoon opposite the site. There is also covered shoulder drain along the adjoining Guggisberg Avenue which traps run-off from the road. Figure 5.7 shows the drainage channels within the project area.

Trapezoidal Drain

Drainage Channel from Pasico Ghana Limited

Figure 5. 7 Existing Drainage Channel at the Pasico Site

During heavy rainfall, the proposed site floods due to:

- Siltation of the drain along the Guggisberg Avenue, run-off finds its way onto the site then to the lagoon;
- Overflow from the trapezoidal drain onto the site;
- Run-off from Pasico Ghana Limited being discharged unto the site; and
- Siltation of the lagoon causing it to overflow its banks.

Flood water can rise during heavy down pour to about 1m from the ground. Figure 5.8 shows an interviewee indicating the water levels during flooding on the site.

Figure 5. 8 Flood Water Levels at Pasico

Odawna Site

There is an existing unlined trapezoidal drain from the STC Bus Terminal area through a rectangular underpass culvert to the Odaw River. The untarred road from Kwame Nkrumah Interchange to the site sloped gently towards the site. During the raining season, run-off flows on the untarred road due to the unchanneled run-off and floods the project site (Figure 5.9). The silted Odaw channel overflows its banks during heavy rains causing flooding on the site as well.

Drainage Channel from STC Area

Existing State of Project Site

Figure 5. 9 Drainage Condition at Odawna Site

5.5 Ambient Air Quality

Ambient air quality monitoring was undertaken at 2 selected locations at Korle-na and Odawna, and one location at the Pasico Site from 20th – 30th May, 2022. The study monitored particulates ($PM_{2.5}$, PM_{10} and TSP) and gaseous emissions (NO_2 and SO_2) over a 24-hour period. The results of monitoring were compared with the Ghana Standards categorisation for

commercial area of $PM_{2.5}$ as 35µg/m^3, PM_{10} as 70µg/m^3, TSP as 150µg/m^3, NO_2 and SO_2 as 150µg/m^3. The sampling locations for each site is presented in Table 5.1. The monitoring results are captured in Appendix 4.

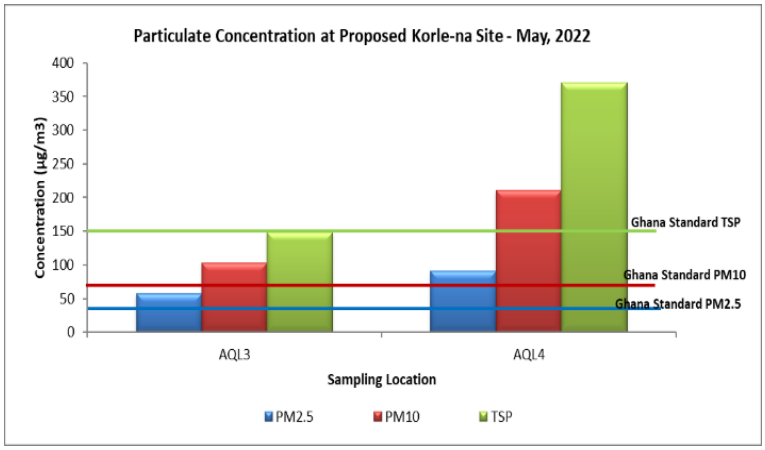
Table 5. 1 Air Quality Sampling Location at the Project Sites

Project Site	Sampling Location	GPS Coordinates	
		Latitude (N)	Longitude (W)
Korle-na	• **North-west** –Sampling unit positioned about 4m from St. Mary Girls School fence wall which is about 77m from the proposed handling area. • **North-east** – Sampling unit were positioned close to the Ablekuma South Sub metro main gate.	5.533465° 5.533873°	-0.221783° -0.221289°
Odawna	• **West** – Sampling unit positioned about 30m from Space Plast Factory's main gate and 35m west of the project site. • **East** – Sampling unit positioned about 25m from Zoato's Corner Drinking Spot and 95m from the proposed holding site.	5.559179° 5.558405°	-0.219498° -0.218800°
Pasico	• **East** – Sampling unit mounted on top of the Pasico factory's fence wall.	5.538188°	-0.218724°

Korle-na Site

Particulate concentrations recorded at all locations ranged from 57.9µg/m^3 to 91.2µg/m^3, 102.8µg/m^3 to 210.8µg/m^3 and 148.8µg/m^3 to 370.4µg/m^3 for $PM_{2.5}$, PM_{10} and TSP respectively, and were above the Ghana Standards except for TSP at the north-eastern section of the site which was within the required limited. The exceeded concentration is attributed to the frequent vehicular movement on the Ring Road West as well as blown dust particles from exposed surfaces.

At Korle-na, the concentrations recorded for NO_2 and SO_2 at the selected locations were largely within the Ghana standard of 150µg/m^3 (both parameters). Gaseous emission sources included those from intermittent movement of vehicles/tricycles and domestic activities. The results however indicate NO_2 and SO_2 levels were largely within the acceptable limits (Figure 5.10).



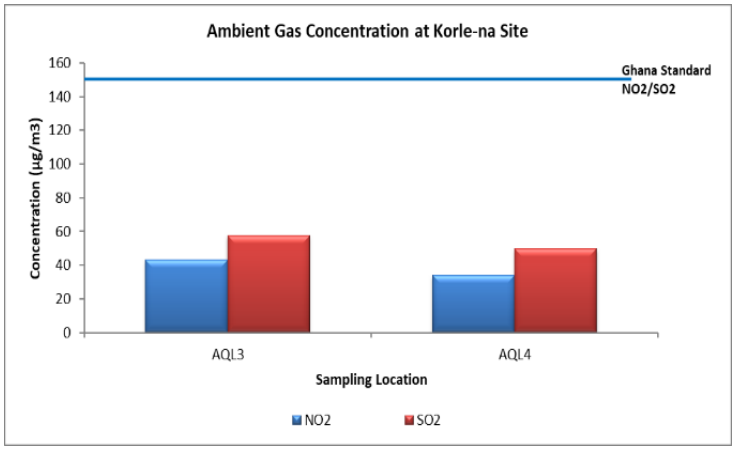
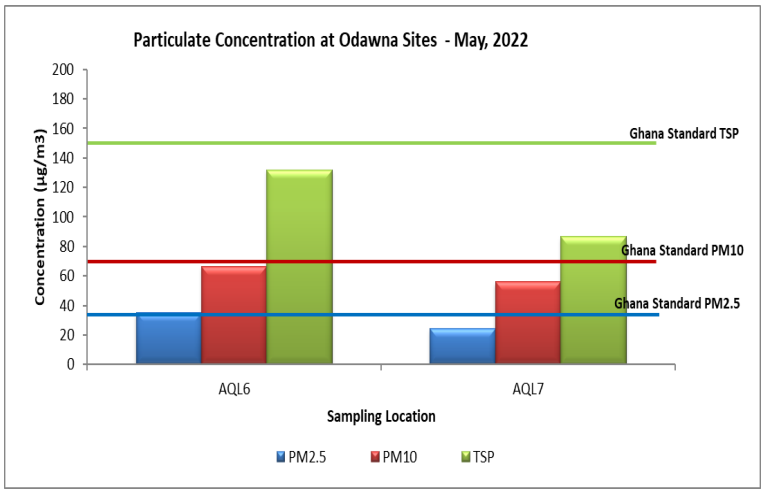


Figure 5. 10 Comparison of Air Monitoring Result to the Ghana Standards – Korle-na Site

Odawna Site

Particulate concentrations recorded at all locations ranged from 24.3µg/m^3 to 35µg/m^3, 56.1µg/m^3 to 66.7µg/m^3 and 86.8µg/m^3 to 131.9µg/m^3 for $PM_{2.5}$, PM_{10} and TSP respectively, and were all within the Ghana Standards. Sources of particulates included intermittent movement of light vehicles and tricycles and fugitive dust blown by wind from exposed surfaces. Nevertheless, the results show that the ambient air quality is generally good in respect of particulate concentrations.

At Odawna, the NO_2 and SO_2 concentrations recorded at the selected locations were largely within the Ghana standard of 150µg/m^3 (both parameters). Gaseous emission sources included those from intermittent movement of vehicles/tricycles and domestic activities. The results however indicate NO_2 and SO_2 levels were largely within the acceptable limits (Figure 5.11).



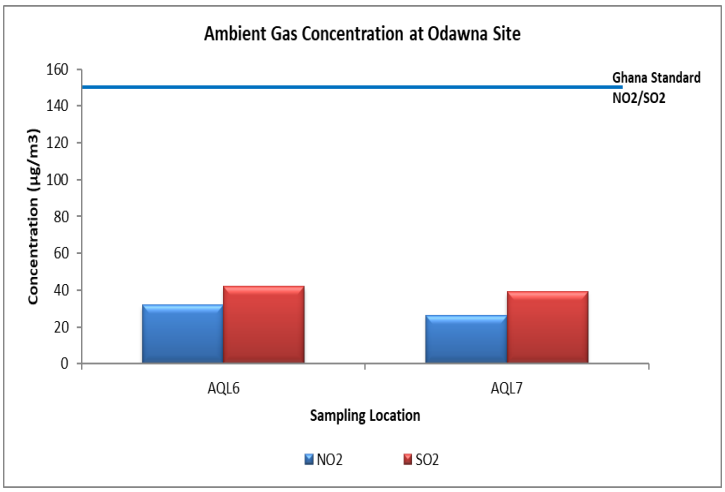


Figure 5. 11 Comparison of Air Monitoring Result to the Ghana Standards – Odawna Site

Pasico Site

Particulate concentrations recorded at all locations was 78.3µg/m^3, 179.7µg/m^3 and 187.8µg/m^3 for $PM_{2.5}$, PM_{10} and TSP respectively, and were all above the Ghana Standards. The exceeded concentration is attributed to the frequent vehicular movement on the Guggisberg Avenue Road, burning of plastics and used tyre as well as blown dust particles from exposed surfaces.

Concentrations recorded for NO_2 and SO_2 at selected locations were largely within the Ghana standard of 150µg/m^3 (both parameters). Gaseous emission sources included those from intermittent movement of vehicles/tricycles and domestic activities. The results however indicate NO_2 and SO_2 levels were largely within the acceptable limits (Figure 5.12).

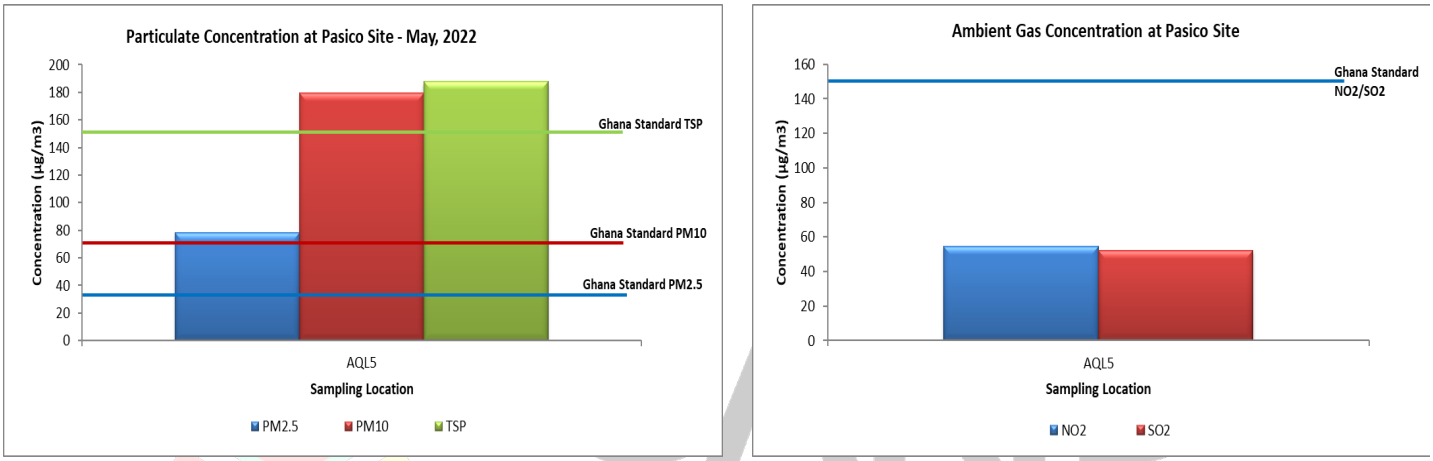


Figure 5. 12 Comparison of Air Monitoring Result to the Ghana Standards – Pasico Site

5.6 Ambient Noise

Noise levels were recorded at 2 selected locations (same as for air quality) at Korle-na and the Odawna sites as well as one location at the Pasico Site and their surroundings over a 24-hour period from 20th – 30th May, 2022. The results of monitoring were compared with the Ghana Standards categorisation for light industrial area of 65dB(A) for day-time and 60dB(A) for night-time. Details of the monitoring results are captured in Appendix 4.

Korle-na Site

Equivalent noise levels (LA_{eq}) recorded ranged from 61.6dB(A) to 63.4dB(A) for daytime and 68.1dB(A) to 73.1dB(A) for night-time. Noise levels recorded for daytime where largely within the Ghana Standards. However, noise levels recorded at the selected locations for night-time exceeded the Ghana Standards and this could be attributed to road traffic noise due to frequent movement of vehicles (Figure 5.13)

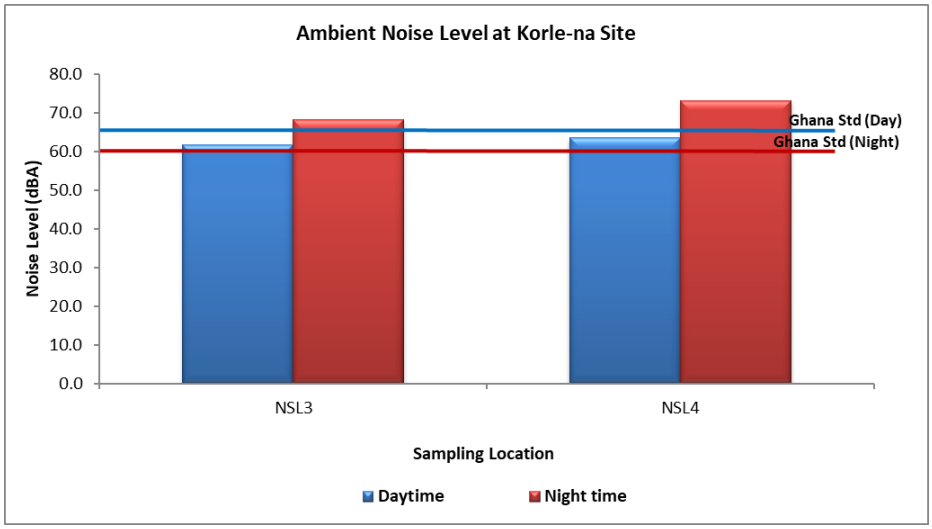


Figure 5. 13 Comparison of Recorded Noise Levels to the Ghana Standards – Korle-na Site

Odawna Site

Equivalent noise levels (LA_{eq}) recorded ranged from 60dB(A) to 60.3dB(A) for daytime and 58.6dB(A) to 62.1dB(A) for night-time. Noise levels recorded for daytime and night-time (at the eastern section of the site) were largely within the Ghana Standards. However, noise levels recorded at the western section for night-time exceeded the Ghana Standards and this could be attributed to activities of the drinking spot close to the site (Figure 5.14)

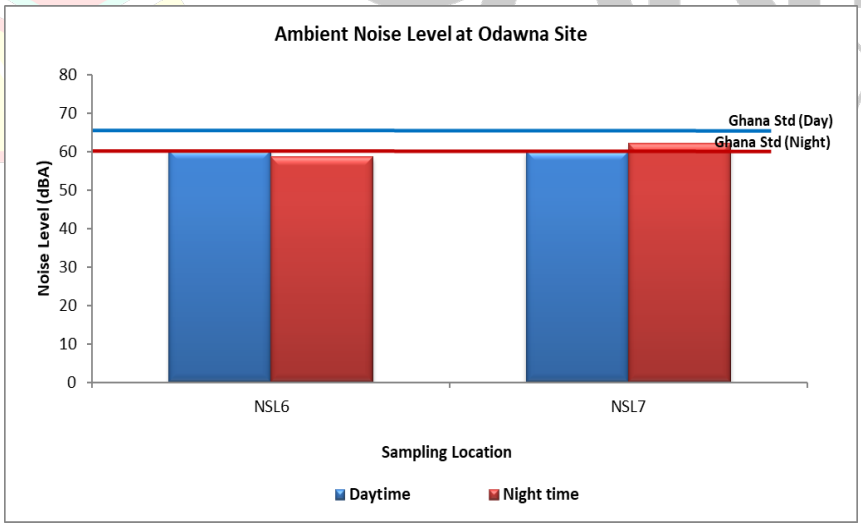


Figure 5. 14 Comparison of Recorded Noise Levels to the Ghana Standards – Odawna Site

Pasico Site

Equivalent noise levels (LA_{eq}) recorded was 66dB(A) for daytime and 67.2dB(A) for night-time. However, noise levels recorded at the selected locations for day-time and night-time exceeded the Ghana Standards and this could be attributed to road traffic noise due to frequent

movement of vehicles and the surrounding commercial activities within the area (Figure 5.15).

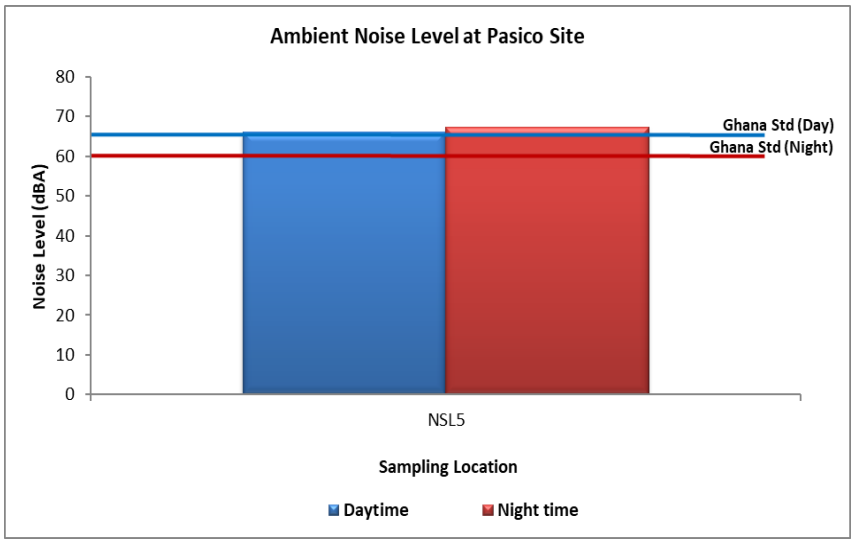
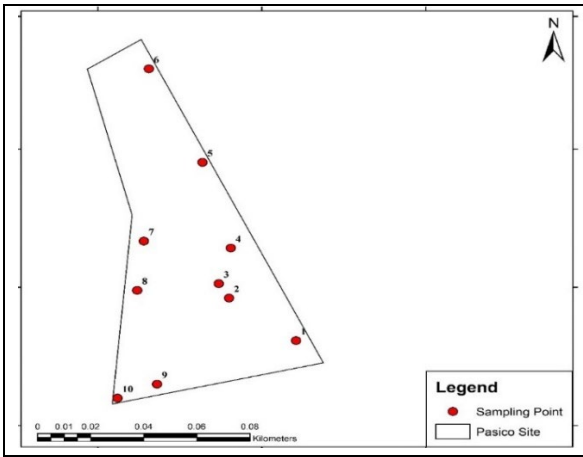
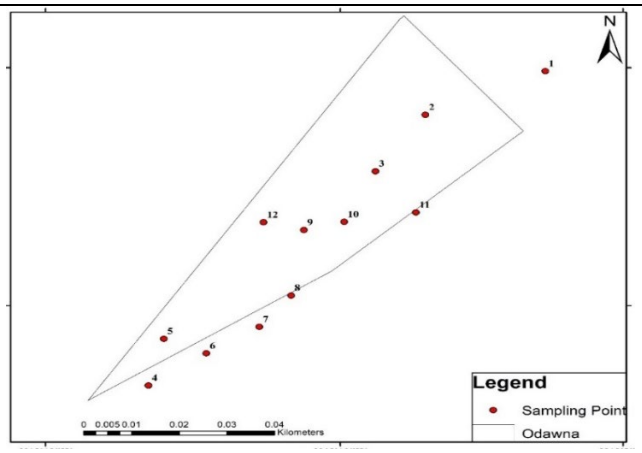
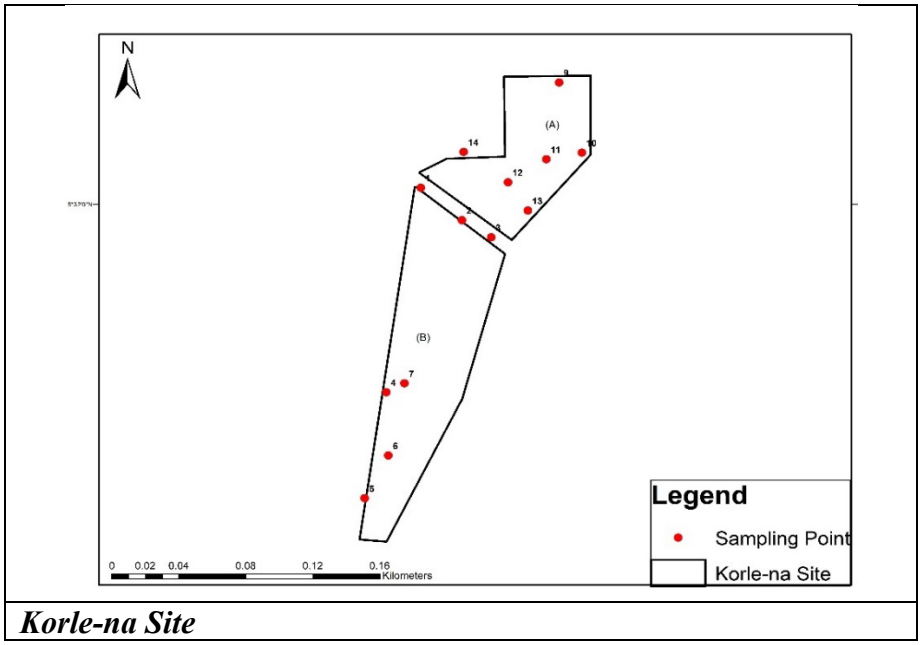


Figure 5. 15 Comparison of Recorded Noise Levels to the Ghana Standards – Pasico Site

5.7 Heavy Metal Concentration and Distribution

Heavy metal analysis of soils of the 3 sites was conducted to determine the presence, concentration and distribution of the heavy metals. The sampling points were established based on a grid system developed for each site. Samples were taken at both the soil surface and at 3.6-inch depth and an Innov-X SYSTEMS XRF device used for the field analysis and determination of heavy metals. The XRF results were validated and confirmed with laboratory analysis (conducted at Water Research Institute of CSIR) (Appendix 3.2). The sampling points for the 3 sites is presented in Figure 5.16.

	
Pasico Site	***Odawna Site***



Korle-na Site

Figure 5. 16 Sampling Locations for the Project Sites

5.7.1 Korle-na – Heavy Metals Concentration and Distribution

Five heavy metals: Iron (Fe), Copper (Cu), Zinc (Zn), Lead (Pb), and Cobalt (Co) were encountered at the fourteen pre-selected sampling points at the Korle-na site. Only Zn and Co recorded values above the WHO Guidelines. Zn was present at all the sampling points, while Co was detected at only two sampling points (Table 5.2). The high values of Zn and perhaps Co could be attributed to dredged material (previously located on the material handling site) which also contained some municipal waste dumped at the site.

Table 5. 2 Heavy Metal Concentration at Korle-na

Sampling Points	Fe	Cu	Zn	Pb	Co
1	12,416	30	129	33	ND
2	12,505	32	123	26	ND
3	14,251	33	118	47	ND
4	16,810	45	189	54	ND
5	19,782	38	179	68	276
6	14,623	50	96	25	ND
7	12,632	ND	81	24	ND
8	556	ND	85	12	ND
9	1165	ND	95	12	ND
10	8560	23	888	12	53
11	44556	ND	185	6	ND
12	4482	ND	185	ND	ND
13	143030	ND	185	ND	ND
14	1566	ND	189	ND	ND
WHO Guidelines	***543,000***	***4,300***	***16***	***420***	***24***

***Results in ppm **ND=Not detected*

5.7.2 Pasico - Heavy Metals Concentration and Distribution

Five heavy metals: Fe, Co, Zn, Pb, and Cu were encountered at the ten pre-selected sampling points at the Pasico site. Only Zn, Co and Pb recorded values above the WHO Guidelines. Zn was present at all ten sampling points and Co in three locations, with values all exceeding the Guidelines. Pb occurred in nine locations, with only one sampling location recording high value above the Guideline (Table 5.3). The high values of Co, Pb and Zn could be attributed to the use of the site as a collection point for waste pickers (Figure 5.17).

Table 5. 3 Heavy Metal Concentrations at Pasico

Sampling Points	Fe	Co	Zn	Pb	Cu
1	10,074	167	360	85	39
2	14,491	ND	248	99	85
3	8,451	ND	1,283	255	602
4	1,251	206	161	289	55
5	8,679	ND	250	32	45
6	7,048	ND	10,183	620	707
7	18,541	327	343	82	174
8	12,383	ND	202	83	94
9	8,478	ND	30	ND	26
10	16,400	ND	203	57	55
WHO Guidelines	***543,00***	***24***	***16***	***420***	***4,300***

*** Results in ppm* **ND=Not detected*

Figure 5. 17 Existing Activities at the Pasico Site

5.7.3 Odawna Heavy Metals Concentration and Distribution

Five heavy metals: Fe, Co, Cu, Zn, and Pb and were detected at the thirteen pre-selected sampling points at the Odawna site. Only Zn, Co and Pb recorded values above the WHO Guidelines. Zn was present at all the sampling locations and Co in five locations, with all values exceeding the WHO Guidelines. Pb occurred in all, except one location, and also with only one sampling location recording high value above the Guidelines (Table 5.4). The high values of Co, Pb and Zn could be attributed to deposited assorted waste from flooding of the Odaw drainage (Figure 5.18), and for Pb in particular the dismantling activities including vehicle parts and other gadgets at the site.

Table 5. 4 Heavy Metal Concentrations at Odawna

Sampling Points	Fe	Co	Cu	Zn	Pb
1	11,744	190	63	258	45
2	5,759	ND	28	121	17
3	13,451	212	74	192	50
4	4,308	ND	ND	230	842
5	5,407	124	ND	72	14
6	6,559	125	ND	118	37
7	5,697	ND	ND	458	15
8	4,499	ND	ND	26	ND
9	10,635	ND	ND	474	46
10	5,695	ND	ND	99	25
11	5,770	ND	ND	97	16
12	14,408	271	ND	198	29
13	12,956	ND	ND	191	39
WHO Guidelines	***543,000***	***24***	***4,300***	***16***	***420***

***Results in ppm* ***ND = Not detected*

Figure 5. 18 Existing Activities at the Odawna Site

5.8 Road Network and Traffic Conditions

5.8.1 Road Conditions

Transportation to Pokuase

The main route leading to the Pokuase disposal site is the Nsawam Road. Trucks from the handling sites can use the Ring Road West. From the Ring Road West at the Kaneshie Interchange, there are two alternative routes to accessing the Pokuase disposal site - the Ring Road West continuation towards Circle or Anyaa-Awoshie Road via the Dr Busia Highway.

For the route towards Circle, there are two options, either the road under the overpass at Circle and turning at the roundabout onto the Nsawam Road or using the roundabout at the start of

the Circle Interchange and moving onto the Feo Oyeo Road and finally use the underpass at Alajo junction to access the Nsawam Road.

The Pokuase site is about 3.3km from the Old Nsawam Road Junction, off the Nsawam Road, through to the Pokuase Zonal Council Office Road then the community roads to the sites. The community road stretch is untarred (Figure 5.19).

Figure 5. 19 Pokuase Community Road Leading to Disposal Site

Travel duration on the routes as estimated using Google Earth live travel time durations at various times in the day and the distance covered under each route is presented in Table 4.1 and 4.2. The travel times were also confirmed by driving along the routes. The route from the handling sites through Feo Oyeo (Fan Milk area) to the Pokuase disposal site covers a distance of about 25.08km and is the shortest. The minimum travel duration on the route is 40 minutes during the free-flow time, which increases to about 120 minutes during peak hours.

Figure 5.20 shows the relative locations of the handling and disposal sites.

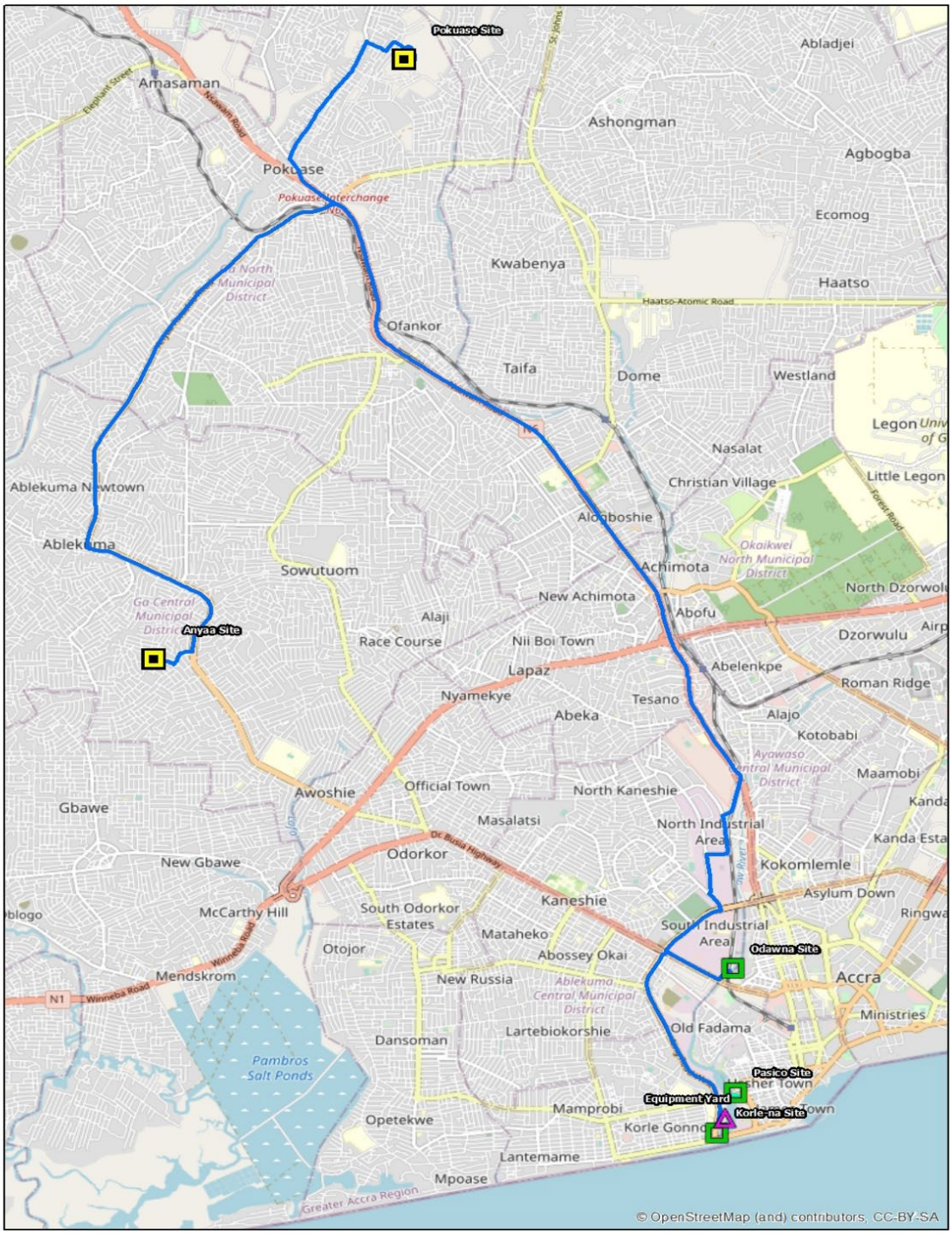


Figure 5. 20 Relative Location of Handling and Disposal Sites

Transportation to Anyaa

The main route leading towards the Anyaa disposal site is the Anyaa-Awoshie Road. Trucks from the handling sites can make use of the Ring Road West and turn onto the Dr Busia Highway. From the Dr Busia Highway, two routes are available to accessing the Anyaa-Awoshie Road - the Mallam Interchange or the Twin Twina Road in Odorkor. The route from the Anyaa-Awoshie Road into the Anyaa Community is interconnected in nature, hence provide various means of accessing the disposal site. These, however, go through residential areas with un-engineered routes. The most direct road is about 700m from the Anyaa-Awoshie

road at the Ajos Junction (slip road). The total travel distance is 17.40km from the handling sites to the Anyaa disposal site.

Another challenge, however, associated with this route is the need for trucks to do a U-turn movement at the Fan Milk traffic light (Figure 5.21). This will pose a difficulty for trucks to turn. The recommended median width to allow for truck turning is 18m (AASHTO, 2001), however, the median width at the Fan Milk Intersection is 9m.

The trucks can therefore be re-routed to the longer Nsawam Road through the Pokuase Interchange to the disposal site at Anyaa. This covers a total distance of 32.40km - almost double the distance through Odorkor. The minimum travel duration on this route is 40 minutes during the free flow time but increases to about 120 minutes during peak hours.

Fan Milk Intersection

Slip Road to Anyaa Community

Anyaa Community Road to Disposal Site

Figure 5. 21 Access Route to Anyaa Disposal Site

5.8.2 Traffic Count and Assessment

The Traffic Impact Assessment methodology used to perform the following is in Appendix 6:

- Review existing traffic conditions of adjacent roads to proposed development;
- Predict potential traffic interference due to proposed development on existing road networks; and
- Assess entry and exit points for the proposed development.

Existing Traffic and Road Network Information

Five major intersections along the routes were considered to estimate the impact of the haulage activities on traffic performance. Table 5.5 outlines the intersection, the control types and types of movements.

Table 5. 5 Intersections, Control Types and Movements at the Intersections

Name of Intersection	Types of Intersections	Intersection Control	Type of Movements
Ring Road West/Guggisberg Avenue intersection	X-junction	Signalized	All movements allowed except for U-turns
Otublohum Road/Obibini Street intersection	T-junction	Un-signalized	All movements allowed
Fan Milk Junction	T-junction	Signalized	All movements allowed
Anyaa-Awoshie Slip Road/NIC Road (Ajos junction)	T-junction	Un-signalized	All movements allowed
Old Nsawam Road/Pokuase Zonal Council Road intersection	T-junction	Un-signalized	All movements allowed

The average traffic flow for 12 hours over the 3 days is recorded as 3,035 vehicles (both directions) on the Pokuase Zonal Council Road, 320 vehicles (both directions) on the Anyaa Community Road 1 referred to as NIC road and 2,444 vehicles on the Anyaa Community Road 2 also known as Peniel Apartment Road. For vehicle classification, it is observed that all the roads leading to the disposal sites are mostly used by private cars (Saloons, SUVs and Pick Ups) and Taxis. Private cars and Taxis accounted for 55.9% of all counts on the Pokuase Zonal Council Road, 69.2% on the NIC Road and 86.7% on the Peniel Apartment Road. Large vehicles including heavy trucks and buses accounted for 3.7% of all counts on the Pokuase Zonal Council Road, 2.8% on the NIC Road and 1.6% on the Peniel Apartment Road. These values showed that truck usage on the Pokuase disposal site road is higher than on the Anyaa disposal site road (Table 5.6).

Table 5. 6 Traffic Composition

Road Name	Pokuase Zonal Council Road		Anyaa Community Road 1 (NIC Road)		Anyaa Community Road 2 (Peniel Apartment Road)	
Vehicle Type	**Traffic Volume**	**Percentage (%)**	**Traffic Volume**	**Percentage (%)**	**Traffic Volume**	**Percentage (%)**
Taxis	595	19.6	66	20.7	1,067	43.6
Saloon Cars/ SUV/4x4	1,101	36.3	155	48.5	1,055	43.1
Trotro up to 23-seater	79	2.6	7	2	24	1
Medium/Heavy Bus	18	0.6	4	1.2	16	0.7
Light/Medium Trucks	58	1.9	36	11.1	34	1.4
Heavy Trucks	93	3.1	5	1.6	23	0.9
Motorcycles	987	32.5	45	14.1	168	6.9
Bicycles	105	3.4	3	0.8	59	2.4
Total	**3,035**	**100.0**	**320**	**100.0**	**2,444**	**100.0**

It was observed that roads within the vicinity of disposal sites mostly operated under un-congested conditions due to low traffic flows. The Pokuase Zonal Council Road throughout its length enjoys moderate traffic flows during both peak and off-peak periods; recording a maximum traffic flow of 495 vehicles per hour. The routes from the handling sites are mostly

very busy with high traffic flows and congestion. Tables 5.7 and 5.8 present the record for the maximum traffic flow for weekday and weekend respectively.

Table 5. 7 Weekday Traffic Volume

Road Name		**Maximum Peak Hourly Flows (One-Way) (Vehicles/Hour)**	
		AM	**PM**
Pokuase Zonal Council Road	From Disposal Site	270	179
	Towards Disposal Site	495	419
Old Nsawam Road	From Nsawam Road	392	317
	Towards Nsawam Road	630	757
Anyaa Community Road 1	Towards Anyaa-Awoshie Road	30	15
	Away from Anyaa-Awoshie Road	13	20
Anyaa Community Road 2	Towards Anyaa-Awoshie Road	170	163
	Away from Anyaa-Awoshie Road	139	161

Table 5. 8 Weekend Traffic Volume

Road Name		**Maximum Peak Hourly Flows (One-Way) (Vehicles/Hour)**	
		AM	**PM**
Pokuase Zonal Council Road	From Disposal Site	244	209
	Towards Disposal Site	432	461
Old Nsawam Road	From Nsawam Road	412	359
	Towards Nsawam Road	725	701
Anyaa Community Road 1	Towards Anyaa-Awoshie Road	14	15
	Away from Anyaa-Awoshie Road	8	18
Anyaa Community Road 2	Towards Anyaa-Awoshie Road	61	63
	Away from Anyaa-Awoshie Road	63	60

A flow profile showing the average hourly traffic flow pattern for both weekdays and weekends along the route is shown in Figures 5.22 to 5.26. The Anyaa-Awoshie Road and the Nsawam Road have high traffic speed ranging between 50 to 70km/h. Speeds observed ranged between 20 to 30km/h on community roads leading to the Anyaa and Pokuase disposal site due to the uneven nature of the roads. The adopted baseflows from the TIA is presented in Appendix 6.2.

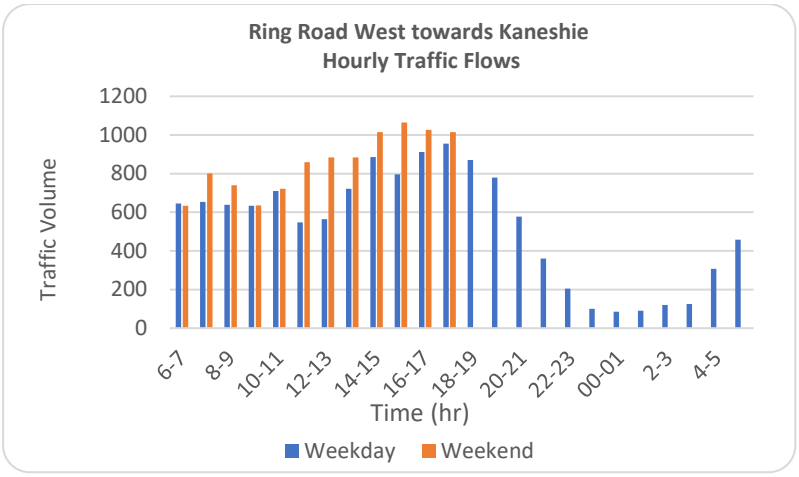


Figure 5. 22 Ring Road West Road Hourly Traffic Variations

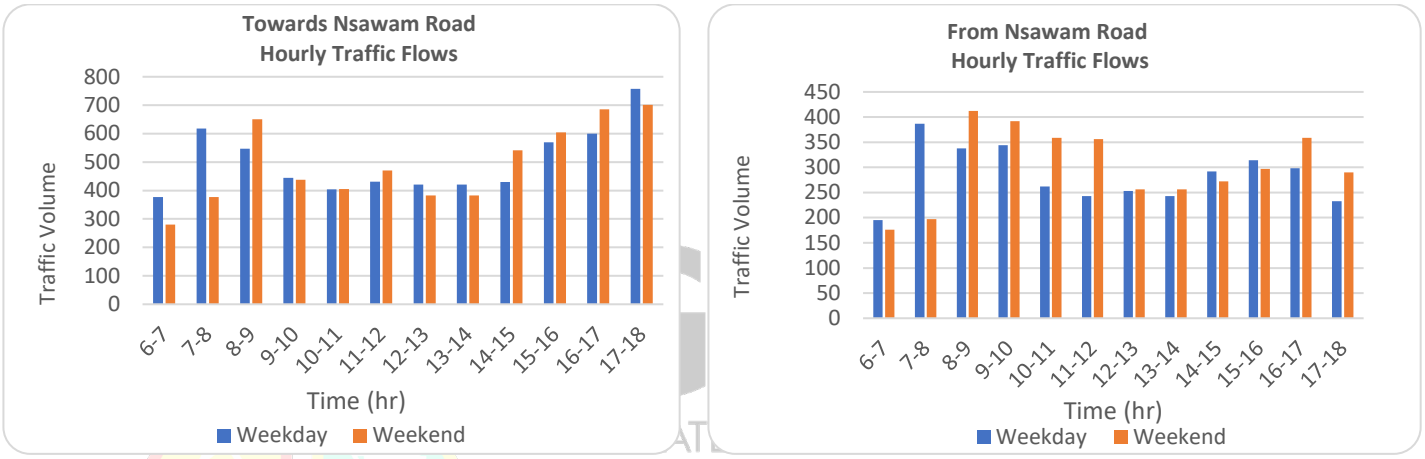


Figure 5. 23 Old Nsawam Road Hourly Traffic Variations

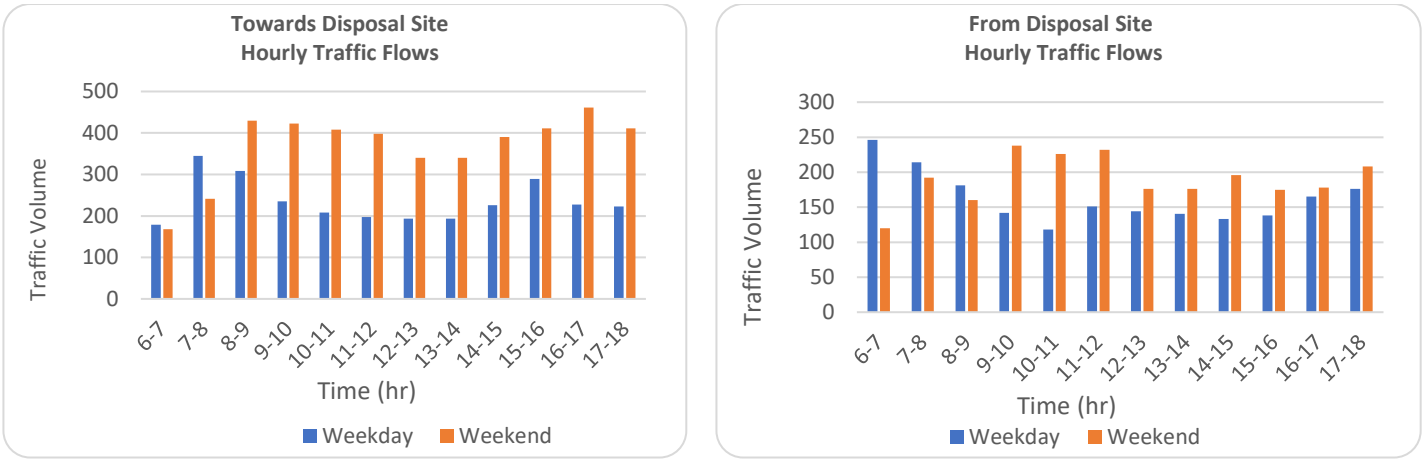
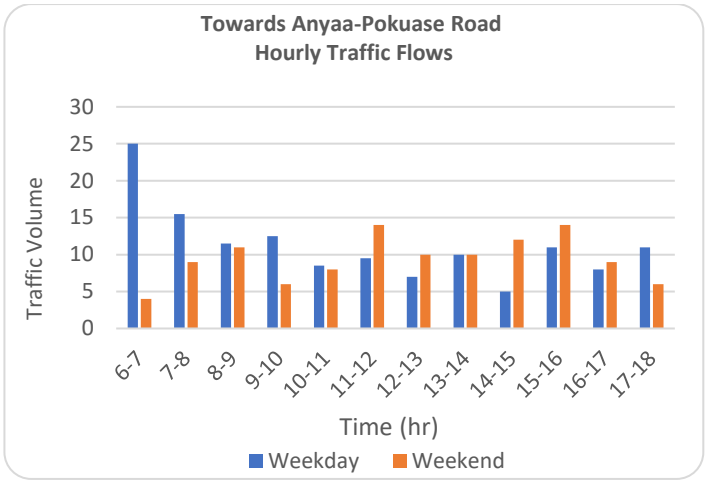


Figure 5. 24 Pokuase Zonal Council Road Hourly Traffic Variations



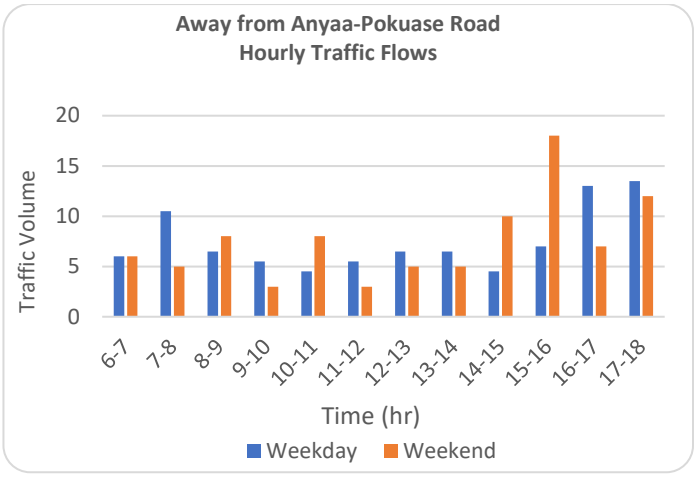
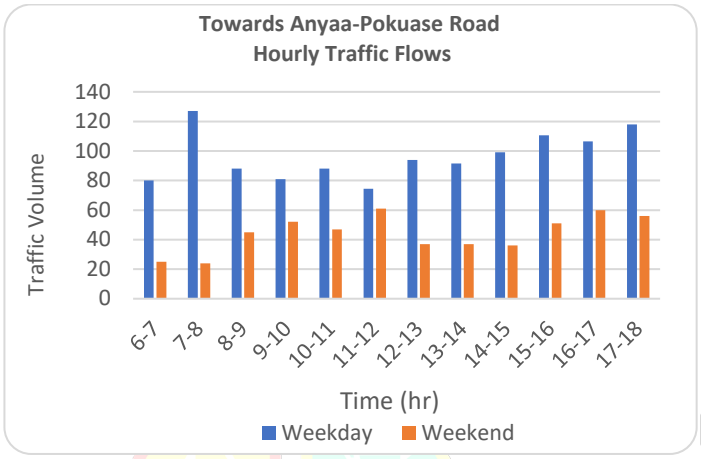


Figure 5. 25 Anyaa Community Road 1 Junction Hourly Traffic Variations



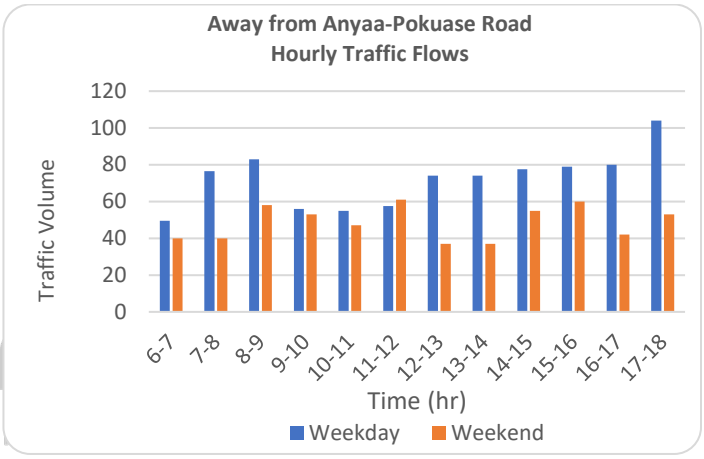


Figure 5. 26 Anyaa Community Road 2 Junction Hourly Traffic Variations

5.9 Climate

5.9.1 Rainfall

The Odaw Basin lies in the Coastal Savannah Zone which has two rainy seasons. The average annual rainfall is about 730mm, which falls primarily during the two rainy seasons. The first begins in May and ends in mid-July. The second season begins in mid-August and ends in October. Rain usually falls in high intensity, short duration storms and gives rise to local flooding where drainage channels are obstructed.

5.9.2 Temperature

There is very little variation in temperature throughout the year. The mean monthly temperature ranges from 24.7°C in August (the coolest) to 28°C in March (the hottest) with annual average of 26.8°C. Relative humidity is generally high varying from 65% in the mid-afternoon to 95% at night.

5.9.3 Wind

The prevailing wind direction in Accra is North-North Easterly (NNE) – usually in the months of January, March, April, May, October, November and December. In the months of July, August and September the prevailing wind direction is North-North Westerly (NNW). From the wind rose (Figure 5.27), about 60% of the wind blows towards the north to north-east direction, 26% towards the north-northwest and 7% towards west-southwest at a low-speed ranging between 0.5-2.1m/s.

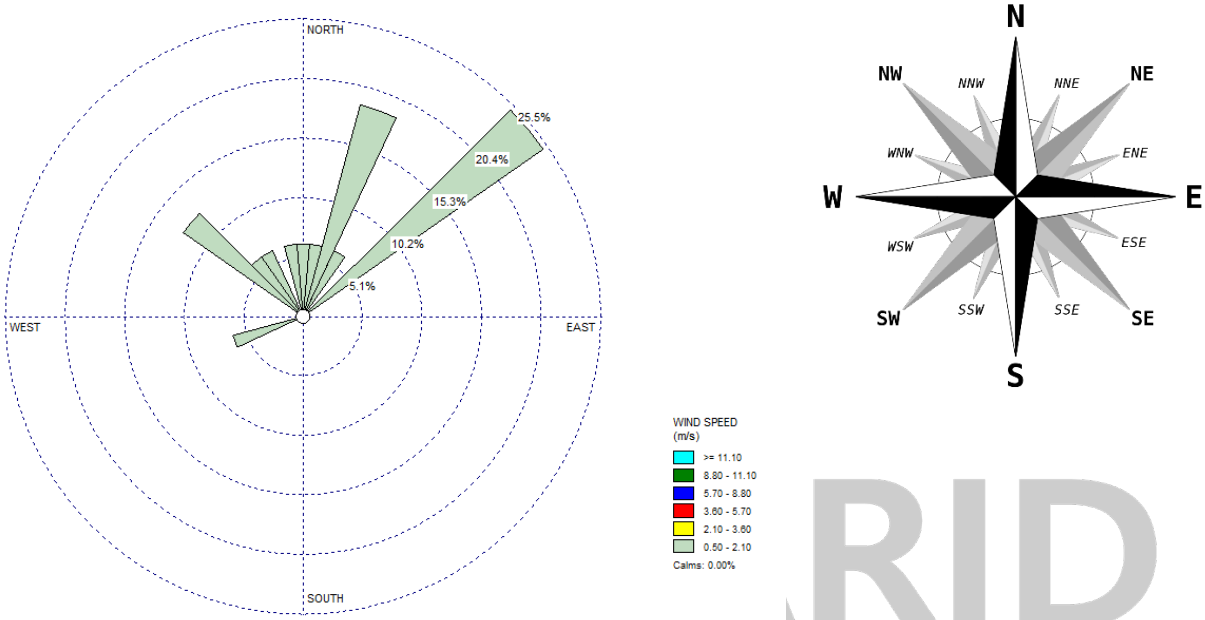


Figure 5. 27 Wind Rose Showing Wind Speed and Direction

5.9.4 Evaporation

From the evaporation data (Appendix 5), the highest evaporation rates are mostly recorded in March, with an average evaporation of 5.35mm/day. Figure 5.28 shows a graph of the evaporation pattern.

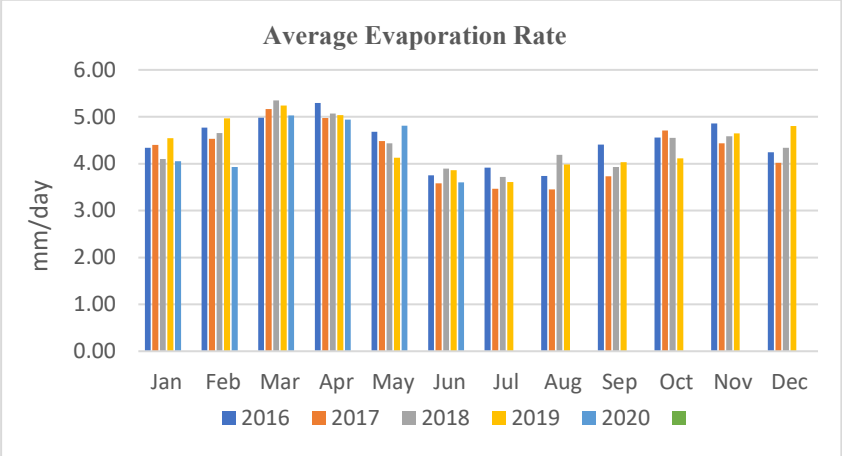


Figure 5. 28 Average Evaporation Pattern

5.10 Health and Disease Conditions

Trends in disease conditions have been described at national, regional (Greater Accra Region) levels. The description covers the various health conditions under the following:

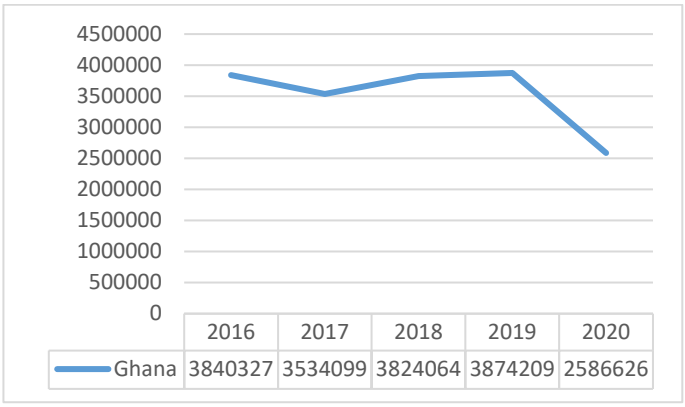
1) Respiratory diseases -
   a. Acute respiratory diseases;
   b. Pneumonia;
   c. Asthma; and
   d. Chronic obstructive pulmonary disease.
2) Sexually transmitted infections -
   a. HIV/AIDS;
3) Non-communicable diseases – Hypertension; and
4) COVID-19 pandemic.

5.10.1 Respiratory Diseases

a) Acute Respiratory Diseases - Upper Respiratory Tract Infections

Upper Respiratory Tract Infection (URTI) is a viral infection of the nasal passages and throat, transmitted through contact with body fluids of an infected person through coughing and sneezing. Sharing enclosed spaces with an infected person is especially a high-risk factor for spreading the disease.

In Ghana, upper respiratory tract infections rank 2nd or 3rd among the top five OPD cases reported in the health facilities (DHIMS, 2020). The cases have been rising gradually in 2019, however, the year 2020 recorded a significant fall in cases. The Greater Accra Region generally showed peaking trend from 2016 to 2018, decreased in 2019 and started rising in 2020. Figure 5.29 shows the URTI trends in Ghana and Greater Accra.



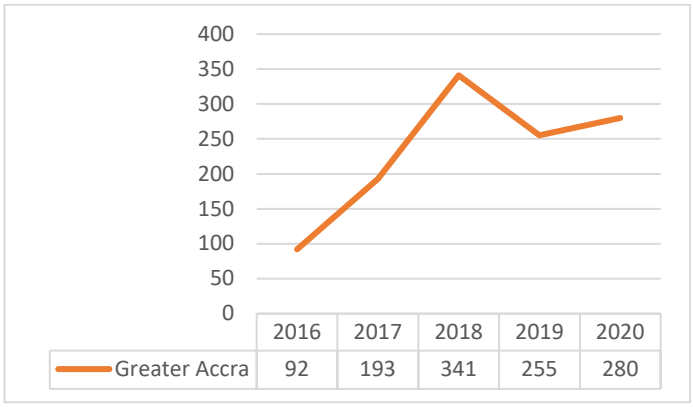


Figure 5. 29 URTI Trend in Ghana and Greater Accra

***Source**: Facts and Data Sheet, Ghana Health Service*

a) Pneumonia

Pneumonia is an infection of the lungs caused by bacteria, fungi or virus which results in the accumulation of fluid in the air sacs. It is airborne and usually transmitted through respiratory droplets of an infected person, etc. Risk factors include exposure to fine particulate matter,

household air pollution, smoking and existing medical conditions such as asthma, chronic obstructive pulmonary disease, and heart disease.

Pneumonia is life-threatening especially to vulnerable people such as the aged, children and infants. According to the WHO, 15% of under-five mortality is attributed to pneumonia (WHO, 2019b). Pneumonia falls among the top ten causes of hospital admissions in Ghana (GHS, 2018) and it is the third most common cause of death in Ghana, with a mortality rate of 5.72% (GHS, 2018). Pneumonia has high mortality risks for children under five especially in sub-Saharan Africa; this is reflected in the Ghana Health Service report (2018); it is among the top five causes of under-five mortality, with a mortality rate of 3.71%. The same source also lists pneumonia as the fourth cause of hospital admissions for children under five years.

Pneumonia cases in Ghana showed an increase from 2016-2019 while a reduction in cases was observed in 2020. Greater Accra recorded a significant fall in cases from 2018 to 2019 and increased in 2020. Figure 5.30 shows the Pneumonia trend in Ghana and Greater Accra Region.

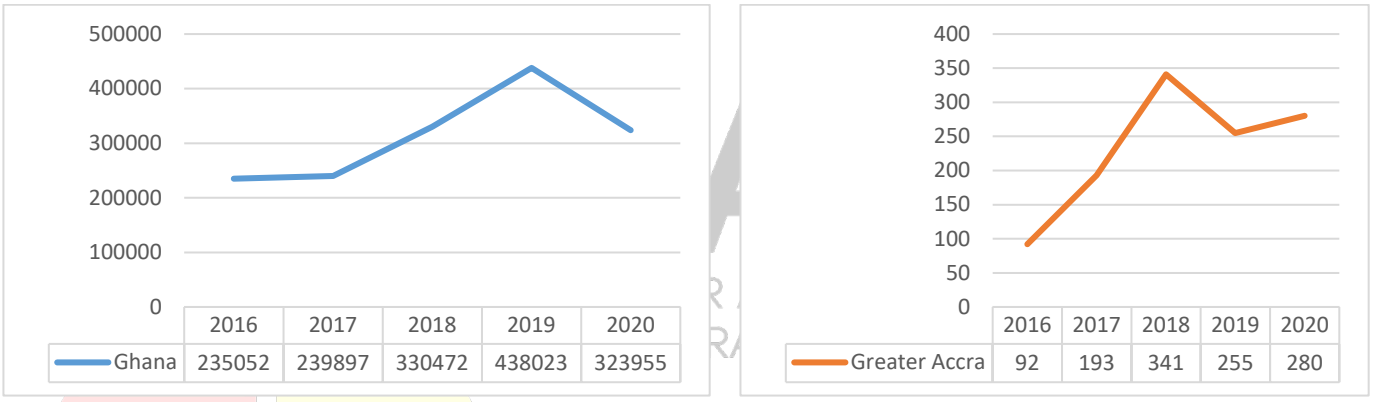


Figure 5. 30 Pneumonia Trend in Ghana and Greater Accra
***Source**: Facts and Data Sheet, Ghana Health Service*

a) Asthma

Asthma is a long-term disease which affects both adults and children. It is known to be the most common chronic disease among children. Asthmatic symptoms include narrowing of the airways in the lungs, tightness in the chest, difficulty in breathing, coughing, wheezing and shortness of breath. These symptoms can be avoided by avoiding asthmatic triggers such as dust and pollen and using medication to control symptoms. Figure 5.31 shows the Asthma trend in Ghana and Greater Accra.

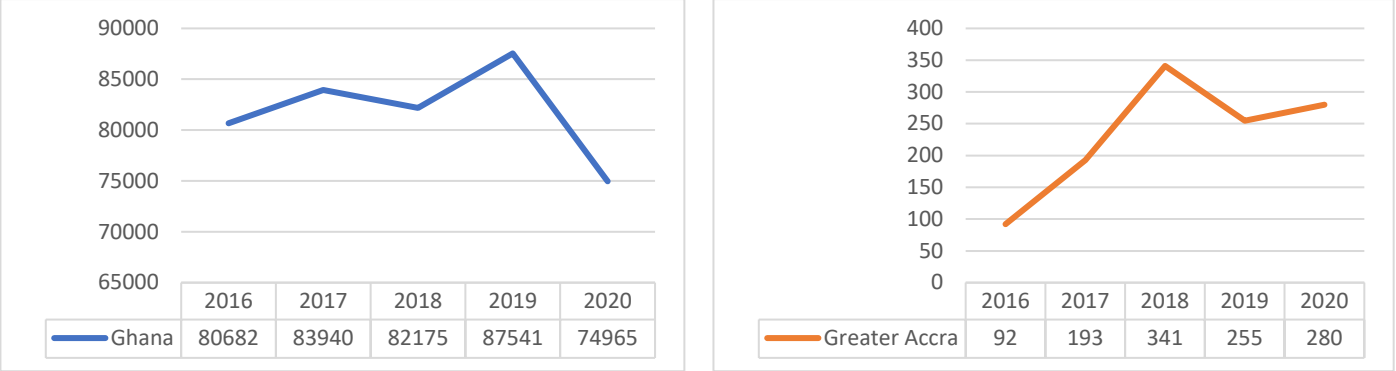


Figure 5. 31 Asthma Trend in Ghana and Greater Accra
***Source**: Facts and Data Sheet, Ghana Health Service*

In Ghana, asthma is prevalent and has shown mixed trends from 2016 to 2019 but decreased in extensively in 2020 while Greater Accra showed an increase in cases from 2016 to 2018, decreased in 2019 and started rising in 2020.

a) Chronic Obstructive Pulmonary Disease

Chronic Obstructive Pulmonary Disease (COPD) are a group of diseases that cause blockage in the flow of air and other breathing-related problems. It may present as emphysema or chronic bronchitis. It is the third leading cause of death in the world, with over 3 million deaths in 2019 (WHO, 2019). It results from long term exposure to particulate matter, harmful gases, tobacco smoke, occupational dust and fumes, chemicals and indoor air pollution. Symptoms include difficulty in breathing, wheezing and coughing.

In Ghana, COPD is quite prevalent and has shown mixed trends between 2016 and 2020. In Greater Accra, there was a general increase in cases from 2016 to 2018, a decrease in cases on 2019 and a steady rise in 2020. Figure 5.32 shows the COPD trend in Ghana and Greater Accra.

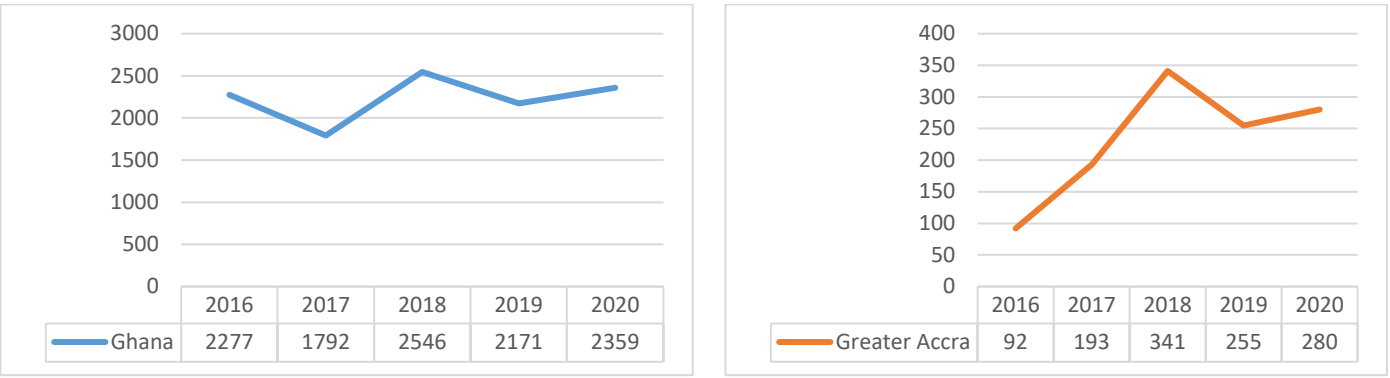


Figure 5. 32 COPD Trend in Ghana and Greater Accra
***Source**: Facts and Data Sheet, Ghana Health Service*

5.10.2 Sexually Transmitted Infection

a) HIV/AIDS

HIV/AIDS is a major public health issue. It has infected and claimed millions of lives globally. HIV was among the top five causes of mortality in Ghana for 2015 and 2016 (GHS, 2017). Heterosexual contact is one of the primary modes of transmission in Ghana according to GHS. Information derived from Ghana HIV fact sheet (2020), indicate a total of 346,120 persons living with HIV. Nonetheless, there is still a high level of stigmatization (index of 18.1%) among people living with HIV. For AMA and Korle Klottey the current estimate of adult HIV prevalence is 2.2% and 2.7% respectively.

The National AIDS/STI Control Programme coordinates efforts to control the spread of HIV and other STIs using strategies such as surveillance, awareness creation, monitoring, testing services, prevention of mother-to-child transmission and screening for pregnant women attending ANC clinics. Effective HIV prevention programmes, treatment and care has also made the disease manageable, with a decline in mortality rates.

HIV testing has been encouraged over the years to improve surveillance and slow the spread of infection. The proportion of people tested positive for HIV to the proportion tested has seen a general decline at both the national and regional level (Greater Accra Region). Figure 5.33 shows the HIV/AIDS trend in Ghana and Greater Accra.

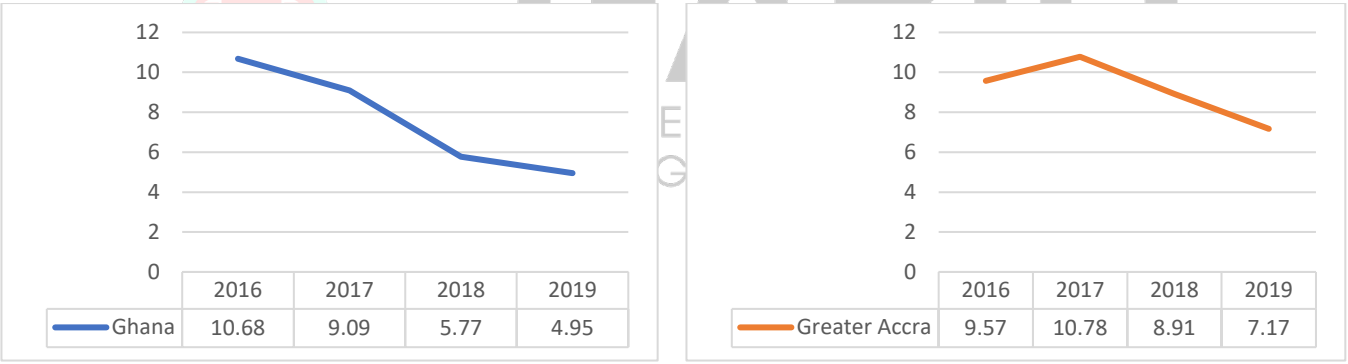
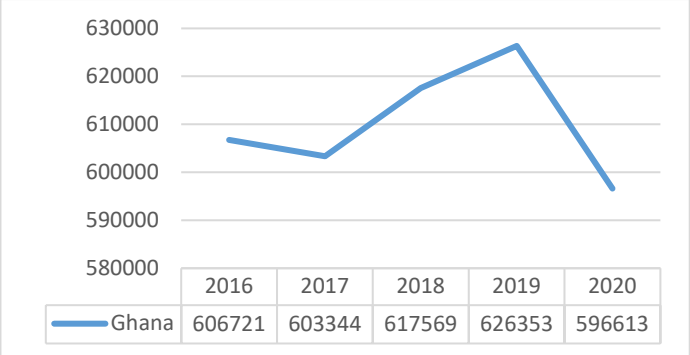


Figure 5. 33 HIV/AIDS Trend in Ghana and Greater Accra

***Source**: Facts and Data Sheet, Ghana Health Service*

5.10.3 Non-Communicable Diseases - Hypertension

Hypertension or high blood pressure is a serious medical condition, which increases the risk of other chronic diseases affecting the heart, kidney and brain. The rate of hypertension in Ghana is increasing, and as such has become a highly prevalent chronic disease in Ghana. Current statistics put the prevalence of hypertension in Ghana at 19% to 48% (GHS, 2017). In 2016, hypertension was listed among the top five and top ten causes of hospital admissions and hospital mortalities respectively in Ghana (GHS, 2017). It has also been among the top 10 causes of outpatient morbidity for the past decade (GHS, 2017) in Ghana. Figure 5.34 shows the hypertension trend in Ghana and Greater Accra.



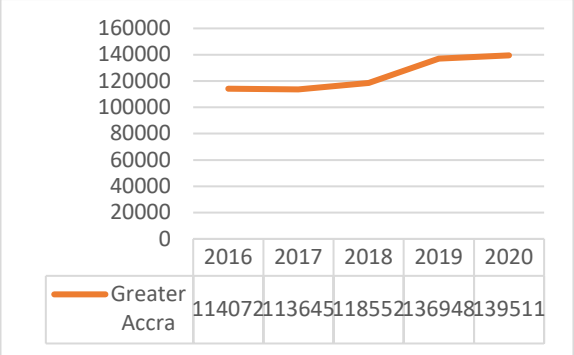


Figure 5. 34 Hypertension Trend in Ghana and Greater Accra

***Source**: Facts and Data Sheet, Ghana Health Service*

Ghana recorded increasing cases of hypertension from 2017 to 2019, with fall in cases in 2020. However, the Greater Accra Region consistently recorded increasing cases over the period 2017-2020.

5.10.4 COVID-19 Pandemic

The Coronavirus is highly contagious and can spread easily from person to person mainly through respiratory droplets, when an infected person (with the virus) speaks, coughs, or sneezes near another person and the droplets land. The virus could be acquired also if one touches the mouth, nose, or eyes after touching a surface or object that has the virus on it. The virus can last on surfaces for varying periods (Table 5.9) where one can pick it and get infected.

Table 5. 9 Lasting Duration on Surfaces

Surface	**Duration**
Plastic	Up to 3-7 days
Paper	Up to 4 days
Glass	Up to 4 days
Cardboard	24 hours
Wood	Up to 2 days

***Source:** Dan Brennan, MD (2022)*

COVID-19 is a distressing pandemic with grave socio-economic impacts and debilitating health effects and mortality globally. Ghana, for instance declared a three-week lockdown in March - April 2020 in the epicentres of infection - some districts in Accra and Kumasi areas. A third wave (delta variant) of infection is being experienced, with Ghana beginning to record high infection spikes from the beginning of July. As at June 29, 2022 the recorded figures in Greater Accra presented by the Ghana Health Service are as follows:

- Active cases – 1,008
- Confirm cases – 95,157
- New cases – 78
- Deaths – 240

- Recoveries – 93,831 (i.e., 98.6% recovery rate)

AMA and Korle Klottey also recorded 17 and 2 new cases as of that date, with AMA recorded the highest amongst the MMDAs in Greater Accra.

5.11 Social Issues

5.11.1 Labour Rights

Formal employment in Ghana is characterized by the presence of structures that protect employee rights including employment protection, conditions of employment, remuneration and termination of employment, eliminating bad employment practices. For informal employment, however, the absence of such structures is the norm.

Informal work in Ghana is characterised by underemployment, bad working conditions, uncertain work relationships, low wages, exposure to bad environmental and other hazardous conditions and lack of job security and social protection, including pension, maternity leave and paid sick leave (Osei-Boateng and Ampratwum, 2011). Many employers in the informal sector, however, do not honour labour obligations set out in the National Labour Act (Osei-Boateng and Ampratwum, 2011).

Ghana has a higher participation of males in the labour force and higher proportion of men in paid employment than women (DTDA, 2020), and there is evidence that women are underrepresented in managerial positions (Naami, 2015). Again, Persons with Disability (PWD) struggle with finding meaningful employment. An estimated 80-90% of PWD of working age in developing countries are unemployed (Naami, Hayashi and Liese, 2012), and the situation is worse for female PWD (Naami, Hayashi and Liese, 2012). Also, the 2021 PHC indicates the proportion of men to women working as plant and machine operators in the is (97.35%) and (2.65%) respectively.

5.11.2 Gender-Based Violence and Sexual Harassment

Gender-based violence (GBV) refers to harmful acts directed at an individual based on their gender and is rooted in gender inequality, abuse of power, and harmful norms (UNHCR, 2021). Victims of GBV are usually women and girls, with an estimated one in three women worldwide experiencing some form of sexual or physical violence in their lifetime (UNHCR, 2021). In Ghana, about 27.7% of women have experienced at least one form of domestic violence (physical, economic, psychological, social and sexual violence) (IDS and GSS, 2016).

GBV can also take place in public spaces such as the workplace. The risk of exposure to violence is often greater in jobs and sectors where work is informal or precarious, where wages are low, no opportunity to join or form trade unions and where management accountability is low (ITUC, 2016). Segregation into jobs or occupations which are mainly female or mainly male also often increases the risk of exposure to GBV, whether from

colleagues or members of the public (ITUC, 2016). Women in male-dominated sectors such as construction and transport can also be more exposed to forms of GBV (ITUC. 2016).

5.12 Waste Management

According to the 2021 PHC, in Ghana, 33.4% of households have their solid waste collected (by waste management companies), 37.5% dispose of their waste at public dumps/waste skips and 29.1% is left uncollected. In urban areas such as where the project sites are located, solid waste collection is strikingly higher at 51.4%.

6.0 PUBLIC / STAKEHOLDER INVOLVEMENT

6.1 Purpose of Stakeholder Engagement

Stakeholders were engaged as required by good EA practice in line with the Ghana Environmental Assessment Regulations, 1999 (LI 1652). The World Bank Group's Environmental Assessment Policy (OP 4.01) also addresses the requirements for stakeholder consultation as part of the EA process and the stakeholder engagement helped to engender openness and transparency in eliciting stakeholder contribution, which was beneficial in informing the assessment process and for enhancing social acceptability of the project. Effective stakeholder engagement can generally improve the environmental and social sustainability of projects and make a significant contribution to successful project design and implementation.

6.2 Previous Stakeholder Engagements Held

The Environmental and Social Impact Assessment conducted for Deferred and Routine Maintenance Dredging Odaw Drainage Basin, Accra, Ghana involved extensive stakeholder consultations carried out by the MWH PIU and GARID PCU since July 2021. The MWH PIU and GARID PCU has been engaging the key stakeholders involved in the siting of project facilities as well as owners of the land. Key outcomes from the previous stakeholder engagement held was carved out of the EIA for Anyaa, EIA for Pokuase and the RAP for Pokuase, Odawna (Appendix 8) and Pasico. The key stakeholders comprised regulatory bodies, local government institutions and community members (Appendix 10.1).

The identification of stakeholders was based on an appreciation of the interest and influence of various organization/institutions, communities/persons in relation to the project. The main methods for engaging stakeholders included one on one interviews, reference group discussions, and review of relevant reports with the following groups/persons.

6.3 Categorisation of Stakeholders

The stakeholders were categorised into government agencies, local government, enforcement and protection agencies, surrounding communities, project affected persons and disposal sites. The list of all stakeholders is given in Appendix 10.2.

6.4 Stakeholder Notification and Engagement Planning

Stakeholders identified through the mapping exercise were notified for engagement through an introductory letter (Appendix 7). Formal letter of introduction from the MWH was sent to the various stakeholders requesting for their involvement in the consultative engagement process. Scoping notices were not administered at the project sites as this report is an ESMP.

After the notification (Appendix 10.3) and confirmation of appointment with stakeholders, consultations with the various stakeholders were conducted on the scheduled meeting days and time. The engagements were organized between May 2022 and June 2022. These took

place through face-to-face interviews and phone calls. Subsequent communication was held via emails and phone calls as follow-up to clarify information provided at the first engagement or to request for relevant documents.

The engagement schedule employed showing the respective engagement tool used, the key contact person and their contact details are indicated in Appendix 10.4.

6.5 Stakeholder Engagement Highlights

Highlights of the issues/concerns and suggestions from the stakeholder engagements are summarized in Table 6.1 and presented in detail in Appendix 9. This informed the assessment of potential impacts as well as appraised the management and monitoring plans.

Table 6. 1 Major Highlights from Engagements

Stakeholder	Key Highlights/Concerns
Households along the route (Anyaa)	• The road leading to the disposal site is in a bad condition and should be improved. • Streetlights should be provided at the sections of the route that have none as well as in the neighbourhood. • The disposal site should be well levelled to prevent dumping of waste. • There is a community association, with a rep from each household, that handles affairs and welfare of community members. Grievances that may arise as a result of the project must first be channelled to this association. • Project reports should be made available to the association. • Accumulated sand at the disposal site should be sprayed with disinfectants to prevent the spread of odour and disease.
Community Association	• To establish a sound coherence between the neighbourhood and the project activities, the appropriate measures must be put in place and protocols followed to prevent any form of nuisance. • Reports associated with the project should be made available to the community association. • The community association has the capacity to handle any form of grievances.
Ablekuma South Sub-Metro Office	• Vibrations do not disturb so much and is bearable. • No complaints have been received by the schools. • Community awareness campaigns on health and safety should be intensified.
St. Mary's Senior High School	• The dormitories are close to the site and students are likely to be affected by noise generated by trucks at night. • Vibrations caused by the machines could, over a period, collapse the weak walls of the school. • The open drain which passes through the St. Mary's Senior High School and crosses the road into the Korle lagoon emanates foul smell and should be covered.
Trust Sports Emporium Ltd.	• Noise and vibration are not of major concern. • There is less traffic congestion along the Korle-na route, however there is increased traffic from the sports facility during heavy events. • Efficient regulation of trucks will be necessary to prevent traffic and accidents.

	• Trucks could use an alternative route (possibly the route from the traffic light) on days where there is an event at the facility.
Ashiedu Keteke Sub-Metro Office	• The Mudor and Ngleshi areas dump their refuse at the Pasico site. • The site has one skip (12 cubic yards) which is at full capacity. • The siting of the skip during project implementation is of major concern. • There is a need for the provision of 3 large skips (of 23 cubic yards). • Two access routes should be created at the project site to ease movement of vehicles. • Traffic regulators will be required during the operational phase.
Odawna Assemblyman and Community Members	• Flooding is a major problem, exacerbated by the accumulation of waste in the gutters which impedes the flow of runoff and the footpath/bridge. An alliance has been formed to help with waste management. • The recent heavy rains have caused displacement of properties, with dead bodies discovered at the Odawna Site. • The bridge should be raised to reduce flooding.
Windyhills Resident's Association	• The refuse to be deposited at the sites should be sprayed with disinfectants to prevent any health-related issues. • The road leading to the disposal sites should be constructed to help minimise dust and noise impacts. • The project manager should be introduced to the association for constant engagement on the MOU.

6.6 Proposed Project Lifecycle Stakeholder Engagement

Meaningful stakeholder engagement during the life cycle of the project, is an essential aspect of good project management and provides opportunities for the MWH, GARID Project team as well as AMA, the Stool and other stakeholders to solicit feedback to inform various aspects of the site preparation and material handling and transportation phase, implementation, monitoring and evaluation. This section outlines the strategic approach the project will use to engage with key identified stakeholders, relying on different methods and techniques based on the anticipated suitability for the category of stakeholder.

Timing and advanced planning of engagement is one key element that ensures that consultations are relevant, information is readily accessible to the project community and interested parties, and that facilitates informed participation. The various categories of stakeholders, project stage, engagement tool that would be used, purpose of the engagement and the responsible personnel for carrying out the engagement has been indicated in Appendix 10.5.

7.0 ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS

The potential impacts and risks assessed were based on the baseline conditions and the predicted change in the environmental and social variables with implementation of the handling site activities and waste transportation; various stakeholder inputs on perceived impacts; and specialized knowledge of the experts . The assessment of adverse impacts covered mainly the various site preparation and material handling activities and waste transportation to the disposal sites. The beneficial impacts including sale of the recovered gravel and sand were fully addressed in the ESIA for the Deferred and Routine Maintenance Dredging Project.

The potential adverse impacts and risks assessed at the site preparation and material handling and transportation phases included the following:

1) Potential traffic impacts and accident risks;
2) Noise and vibration impacts;
3) Dust and other emission impacts;
4) Occupational health and safety risks;
5) Public/community health and safety risks;
6) Heavy metal exposure risks;
7) Visual intrusion;
8) Potential flood risks at the project sites;
9) Waste handling and disposal impacts;
10) Potential fire risks;
11) Infringement on labour rights;
12) Potential gender-based violence and sexual exploitation and abuse;
13) Potential risk of spread of HIV and STIs;
14) Potential transmission of COVID-19; and
15) Physical and economic displacement.

7.1 Methodology for Assessing and Ranking Impacts

The likelihood of occurrence of adverse environmental and social risks and impacts associated with the project as well as the level of significance were evaluated, based on a modified methodology for assessing and ranking impacts adapted from the International Organisation for Standardisation (ISO) 14001 Environmental Systems Handbook (Whitelaw, 2004). The ranking system used eight assessing criteria, qualitatively scoring 'low', 'medium'/'moderate' or 'high' scores for ranking variously the likelihood of occurrence and significance of impacts. The eight criteria for assessing and ranking impacts used are listed and further outlined below:

a) Knowledge about similar/past projects;
b) Level of risk of impact;
c) Actual or potential nuisance;
d) Spatial scale of impacts (spatial extent);
e) Timescale of impacts (temporal extent);

f) Inducing future incompatible activities;
g) Legislative requirements and standards; and
h) Information availability.

a) Knowledge of Similar/Past Projects or Project Environment

The knowledge of similar projects or various aspects of a project or in relation to the project environment. Aspects and related activities that have had environmental and social problems in the past would have a higher score, since they would have a higher likelihood of occurrence as compared to incident-free record of other activities. Likewise, aspects that generated complaints in the past would be deemed significant.

b) Level of Risk of Impact / Likelihood of Impact Occurrence

This looked at the probability of impact (or risk) occurrence (i.e. likelihood), and the likely consequences should an incident occur. It also assessed concerns such as whether there could be associated risks before and even after mitigation measures are taken (residual risks).

c) Actual or Potential Nuisance

Actual or potential damage or nuisance that the impact could cause surrounding areas or recipients, or any potential nuisance resulting from the proposed activities to the public or other sensitive receptacle within the area of influence. Also considered impacts that are direct or indirect, reversible or irreversible

d) Spatial Scale of Impacts

The spatial extent of impacts considered were whether local only (spatially limited), or community-wide, or district-wide effects or at the national scale.

e) Time Scale of Impacts

The duration over which impacts would occur or would be experienced (duration of exposure). Impacts could be intermittent or occasional, or frequent, persistent, but of less acute or long-term consequence (less serious) than effects with serious and/or long-term consequences.

f) Future Induced Activities

The likelihood of induced activities or adverse situations that may arise (could be cumulative) in the future due to the presence of the project, and what the nature or scale of these potential activities or situations could be (social- or environmental- or health-wise). Any likelihood of future incompatible activities or situations in the area of influence that may affect the objective of the project.

g) Legislative Requirements and Standards

The available legislation, policy, standards/discharge limits or guidelines in place to facilitate evaluation of significance and management of impacts; where available the relevant aspects or impacts were considered less significant, or otherwise considered significant.

h) Information Availability

For lack of information to base a satisfactory assessment on, the relevant aspect or impact was considered significant. In other words, knowledge gaps in the assessment meant it would be based on inadequate

information/data, potentially introducing a high degree of uncertainty, hence an evaluation of high significance.

7.2 Potential Adverse Risks and Impacts

7.2.1 Potential Traffic Impacts and Accident Risks

The 14No. 20m^3 trucks to be involved in the transfer of the 110,000m^3 deferred dredging material will require a total number of 5,500 trips, working for four days in a week (200 working days in the year) for a year, this translates into 28 trips per day. For the maintenance dredging, these 14No. 20m^3 trucks to be involved in the transfer of the 20,000m^3 waste material at a rate of 1000 trips per year for the projected four (4) years to the Pokuase disposal site will translate into about 20 trips per week (2 days per week).

The roads to be used by the project are those within the vicinity of the proposed handling and disposal sites as well as the routes connecting these sites. The 25.13km route to the Pokuase disposal site impacts the Ring Road West through the Obetsebi Lamptey Circle, the road under the overpass at the Kwame Nkrumah Interchange, the roundabout turn onto the Nsawam Road, and the Pokuase community roads. For transportation to the Anyaa disposal site (32.4km), the roads to be impacted include the Ring Road West towards the Kwame Nkrumah Interchange, the Feo Oyeo Road, the Nsawam Road, Pokuase Interchange, Anyaa-Awoshie Road, and the Anyaa community access roads via the Ajos Junction.

The estimated trips could generate traffic congestion conditions, cumulative GHG emissions and potentially be associated with accidents. The traffic generation impacts and associated potential accidents arising from the project include the following:

- Site entry and exit conflict on the major access roads;
- Potential accident risks from additional generated traffic and road conditions;
- Cumulative traffic impacts from transportation of waste to the disposal sites; and
- Limited storage space at handling sites.

Site Preparation Phase

The existing one-way entry and exit point at all the handling sites could potentially create a conflict situation when trucks deliver the laterite for site preparation is entering or exiting. The untarred stretches and tarred sections of the Anyaa and Pokuase community roads that have several potholes could create risks of road traffic accidents. The bad nature of these roads presents a risk to motorists as drivers in an attempt to swerve off potholes and undesirable portions of the roads could collide with oncoming vehicles or could veer off the road crashing into nearby structures or pedestrians.

The movement of trucks on the various site also poses a risk to the workers (about 25) on each of the site during the site preparation phase of the project. Due to the restricted space on the site, these 20m^3 trucks could easily knockdown workers when manoeuvring on-site. The site preparation phase is short - term, hence the impact is of low significance.

The enumerations under the workplace accidents for the material handling phase also applies to this phase (Section 7.2.4).

Material Handling and Transportation Phase

Potential Accident Risks from Additional Generated Traffic and Road Conditions

The transfer of waste to both disposal sites would constitute a major contribution to traffic involving about 5,500 truck trips per year. From the traffic count and assessment (Appendix 6), traffic flows on the Nsawam Road are high, compared to traffic flows on the other impacted roads leading to both sites. Nonetheless, the introduction of waste trucks could impact both sets of roads and increase the existing traffic situation thereby creating delays for residents and commuters traveling to their place of work, especially at peak hours on the community roads and the main Nsawam Road. The estimated traffic impact will occur only if the waste disposal material is transported during the daytime. Otherwise, the impact of night-time transport of the material would be significantly low because of reduced vehicular activity.

Reckless driving of trucks which includes over-speeding, tailgating, aggressive driving, drunk driving, distracted driving, failing to use turn signals, and failure to yield the right-of-way can cause road accidents and potential injuries and fatalities. This could be as a result of the nonchalant attitude of drivers or lack of understanding the code of driving, road signs and signals. Driver fatigue could also result in such accidents.

Trucks could breakdown on the road particularly on the community roads at Anyaa and Pokuase due to the poor nature of some of these sections of the road or the state of the truck or a combination of both. This could result in other vehicles running into broken-down trucks especially at night due to the absence of proper lighting. This could significantly impact the haulage routes and intersections with potential high accident risks. Broken-down trucks could also cause delays resulting in long traffic hold-ups along narrow roads to the disposal sites within the proposed communities.

Limited Storage Space at Handling Sites

In the event that the demand for the recovered usable fractions of the dredged material is not as envisaged, the material will take up space at the site. The resultant insufficient storage space at the handling sites would not be able to accommodate the estimated quantities over the entire duration of the project. This could pose significant challenges at the handling sites because of the reduced space for operations. It could also have the potential to increase on-site accidents since vehicles would operate within the limited space with workers and would also have limited room to manoeuvre and ultimately delay the project when the storage space has been exhausted.

Cumulative Traffic Impacts from Transportation of Dredged Material

The resultant travel time for the waste trucks would translate into high carbon emissions cumulatively, contributing to Ghana's share of GHG effects, responsible for global warming and related climate change impacts.

The likelihood of cumulative traffic impacts as a result of simultaneous transfer of waste to the disposal sites from the various handling sites is high considering the estimated quantum of waste to be transported over the next 4 years, especially because of the generated traffic on the already congested Nsawam Road and Kwame Nkrumah Interchange area.

Also, during peak traffic hours, waste trucks will have to manoeuvre through traffic and travel time could double, which would aggravate traffic congestion and increase CO_2 emissions. Simultaneous transfer of waste to the disposal sites would result in the generation of considerable amount of GHGs responsible for the greenhouse effect, which contributes to global warming. Daily traffic congestion on long-term basis (throughout the project lifecycle) would cumulatively contribute to significant climate change impact. This would be at variance with the climate change policy which seeks to lessen the potential hardships posed by factors contributing to climate change hindering sustainable development.

The cumulative trips over the project life span also have the potential to further deteriorate the unengineered 700m access road from the Ajos Junction to the Anyaa disposal site as well as the 1.5km access to the Pokuase disposal site. The nature of these roads generates dust and noise when vehicles ply them as discovered during engagements and` therefore the weight of the 20m^3 trucks would increase the deterioration of the road and generate even more dust and noise which would disgruntle residences along these roads.

Conflict from Entry, Exit and Parking of Trucks

The existing one-way entry and exit point at all the handling sites could potentially create a conflict situation when:

- Trucks and other vehicles entering these facilities stop and gauge for an acceptable gap before manoeuvring, causing other vehicles following to also stop;
- Trucks parking along public roads whiles awaiting to enter the site;
- Trucks and other vehicles leaving these sites stop at the junction and gauge for an acceptable gap before entering the road; and
- Two trucks, one leaving and the other entering approach the entry and exit point at the same time.

These scenarios illustrated above could cause congestion particularly during the material handling and transportation phase especially since trucks are known to be slow whiles turning. Vehicles accessing the site that park along the shoulders of the road will become a nuisance on the main roads and become a major point of vehicular conflict.

The sale of aggregates and sand recovered from the dredged material could potentially generate minimal traffic considering the traffic volume on the major roads leading to the 3 handling sites. The estimated daily trips of 37 and 12 for the sale and transportation of aggregates and sand from the deferred and maintenance dredging respectively would add to traffic volume in the vicinity of the handling site and impact on daytime traffic flow with the

potential for increased accident risk. Also, these trucks could also park along the shoulders of the roads while waiting their turn and become a nuisance to other road users.

7.2.2 Noise and Vibration Impacts

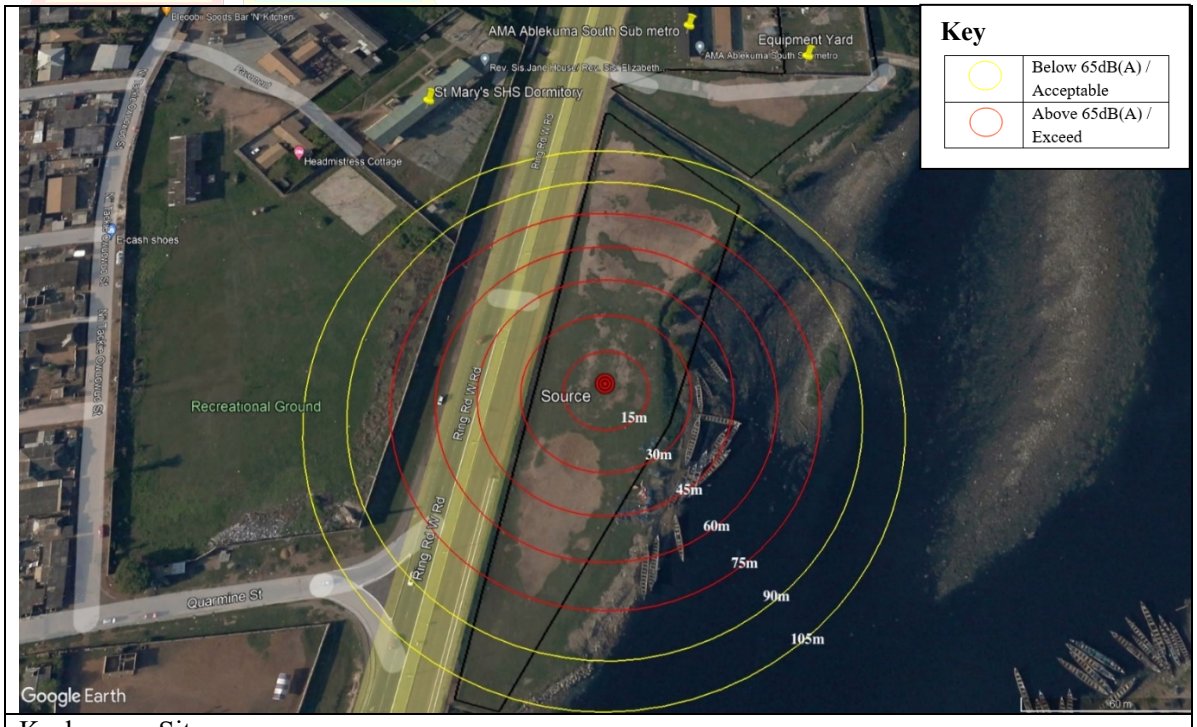
The use of bulldozers for site clearing; wheel loaders and the Cribus 3800 Komptec for material handling; and tipper trucks for waste transportation could increase the noise and vibration levels at the handling sites and on the access routes to the disposal sites. Baseline noise at the sites except for Pasico were largely within the Ghana Standard (65dB[A]) for daytime noise, whereas for nighttime, all sites exceeded the Ghana Standard (60dB[A]).

Table 7.1 shows the noise levels of the various machinery and sound attenuation during use. The bulldozer is the noisiest followed by the tipper truck, Cribus and the wheel loader. A compactor will also be used at the site preparation stage, but its noise level of 57dB(A) is well within the acceptable limit of 60dB(A) (GS 1222, 2018) even for night-time. Using the noisiest machine i.e., the bulldozer, operating from the centre of the sites, the sound attenuation diagram (Figure 7.1) shows the receptors for the various sites.

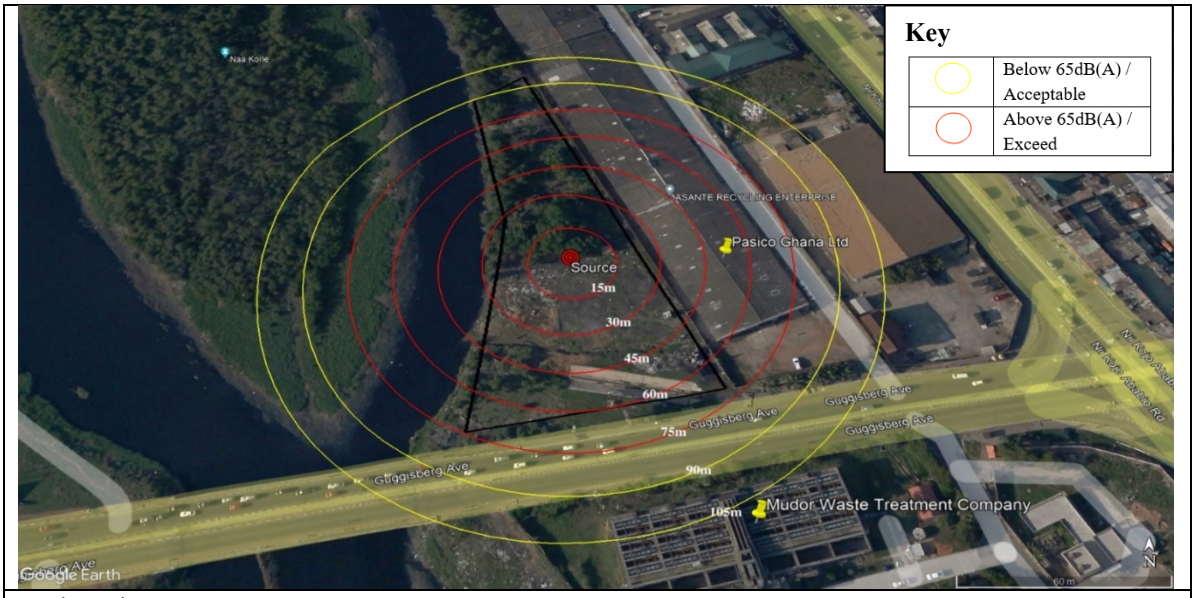
Table 7. 1 Equipment Noise and Sound Attenuation from Source

Equipment Type	Noise (dB[A])	Sound Pressure Level (dB[A])						
		15m	30m	45m	60m	75m	90m	105m
Bulldozer	102.5	79.0	73.0	69.4	66.9	65.0	63.4	62.1
Wheel loader	72.4	48.5	42.5	38.9	36.4	34.5	32.9	31.6
Tipper truck	96.0	72.5	66.5	62..9	60.4	58.5	56.9	55.6
Cribus 3800 Komptec	98.0	74.5	68.5	64.9	62.4	60.5	58.9	57.6

***Source**: CEHRT Ghana, 2022*



Korlena-na Site



Pasico Site

Odawna Site

Figure 7. 1 Noise Attenuation Levels to Receptors at the Handling Sites

Site Preparation Phase

The use of bulldozers for site clearing at Pasico and Odawna will last for a very short duration, not exceeding a day at a site (due to the small sizes of the sites). The effects of bulldozer noise could be severe on workers who may be exposed to levels ranging from 102.5dB to 79.0dB within a 15m working distance from the equipment. At Pasico, the Pasico Ghana Ltd workers could be exposed to noise levels ranging from 73 – 65dB(A), which is above the Ghana Standard. Sections of the Odawna Garage, Wire Weaving Ghana, Letap Pharmaceutical Company and plastic recycling factory would be moderately exposed (Figure 7.1). The effects on travellers on the Guggisberg Avenue and the Ring Road West will only be transient.

Though the duration of exposure to noise is short the receptors could be stressed or annoyed by high noise levels. Therefore, the significance of the impact is ranked moderate.

Material Handling Phase

The deployment of the bulldozer, Cribus 3800 Komptec and Wheel loader would generate noise level of 102.5dB(A), 98dB(A) and 72.4dB(A) respectively at source. Noise from the Wheel loader (at the handling sites) will attenuate to less than 50dB(A), which is within the Ghana Standard at about 15m from the source, thereby posing a risk only to persons within 15m from the source. For the Cribus and the trucks, the noise will largely be experienced within 30m from the source, i.e., exposure to 68.5dB(A) and 66.5dB(A) respectively.

Aside workers who would largely be within the exceeded limit area at all sites, at Pasico, the workers at Pasico Ghana Limited and users of the Guggisberg Road would also be within the exceeded limit area. At the Odawna site and similar to the site preparation phase, sections of the Odawna Garage, Wire Weaving Ghana, Letap Pharmaceutical Company and plastic recycling factory could be exposed to noise. With a separation distance of 60m to 75m from the boundary of the Korle-na site, the potential noise exposure of the dormitory block of St Mary's SHS, the AMA Office and the adjoining factories at Odawna would be moderate, i.e., about 59.9dB(A) which is within the acceptable limit.

The above noise levels and the potential health risk posed to the public are low, despite the use of the Cribus and the wheel loader throughout the day for the 4-year project duration. With regards to exposure of the workers to noise, daytime workers engaged in material handling and processing will be exposed to high noise levels from the operation of the bulldozer (102.5dB(A)), Cribus (98dB(A)), and wheel loader (72.4dB(A)). On the other hand, night-time workers will be exposed to noise from the wheel loader (72.4dB(A)) and trucks (72.5dB(A)) which will be involved in the loading and movement of materials to the final disposal site.

Long-term exposure - about 8 hours per day, could predispose daytime workers to significant health risk, hence the significance is ranked high, whereas the significance for the exposure of nighttime workers is ranked moderate since the duration of exposure will only be during the loading of the trucks (i.e., 10 trucks/day/site in year one and 7 trucks/day/site after year one).

Similarly, prolonged exposure to vibration from machinery use - bulldozer, Cribus, and the wheel loader over a long period could result in Whole Body Vibration (WBV) of workers operating the machinery. WBV is transmitted through the seat, feet, or hands of workers who operate these machines over rough and uneven surfaces as the main part of their job. The significance of prolonged exposure over the project lifespan of four years could be moderate, resulting in musculoskeletal disorders including back pain.

Transportation Phase

The tipper trucks (96.0dB) only entering, loading and departing the sites will be the main sources of noise at the handling sites and along the disposal access routes. The receptors of noise along the access routes to the disposal sites could include residents:

- Along the 700m stretch from the Ajos Junction to the Anyaa disposal site; and
- On the 1.5km Pokuase community access road to the final disposal site.

However, the movement of haulage trucks on access routes to the Anyaa and Pokuase disposal site will generate noise. The number of trips (28) and the night disposal option on the uneven, un-engineered road access would increase noise generation that could expose people in the communities, especially in roadside households, to disturbance and stress. The significance of the impact on the receptors is ranked moderate.

7.2.3 Dust and other Emissions Impacts

Air quality can be degraded during the site preparation and material handling and transportation phases of the project through the generation of mainly particulates and some Volatile Organic Compounds (VOCs). This could adversely affect air quality on-site and in the neighbourhood of the handling sites, and on the access routes to the disposal sites.

The ambient air quality baseline for the sites indicated that $PM_{2.5}$, PM_{10} and TSP values were largely above the Ghana Standards, except for the Odawna site. The values recorded for NO_2 and SO_2 concentrations were generally within the acceptable limits of the Ghana Standards. The high particulate levels were most likely from road/traffic emissions on the Guggisberg Avenue, Ring Road West and the Old Winneba Road – all busy roads.

The main sources of the dust and emission at the site preparation phase include:

- Bulldozer clearing and levelling operations;
- Delivery of laterite for site filling and filling activities; and
- Foundation for installations and drain construction.

The potential sources of the dust and emission impacts during material handling phase include:

- Use of bulldozer, wheel loader and Cribus in the handling operations; and
- Odour from dredged material.

The potential source of dust and emission impacts at the transportation phase could involve dust and vehicular emissions from haulage trucks in transit to disposal sites.

Site Preparation Phase

Dust and other emissions during site preparation will emanate from the following activities:

- Excavating foundation for equipment installations and drain construction;
- Delivery and tipping of filling material (laterite) on-site;
- Emissions from operational machinery and Tipper trucks; and
- Movement of trucks on untarred site surfaces.

These activities could generate high amounts of dust and exhaust emissions from the bulldozer and the compactor, as well as cement dust from construction of drains and foundation for installations. The duration will, however, be short-term, only up to a month, with emissions generated only within this period, and the effects largely localized. Given, however, that the ambient particulate levels already exceed the acceptable limits for three of the sites except Odawna, the cumulative dust generation could exacerbate the local air quality conditions. The risk of workers developing significant health conditions (including respiratory diseases, asthma, nausea, headaches, impaired vision and irritation of the eyes and nose) is ranked moderate.

Material Handling Phase

Material handling activities including the use of the bulldozer in spreading of material, removal of plastics and sorting of the dredged material by the Cribus 3800 Komptec will generate dust and emissions. However, due to the high moisture content of the material, dust would be very minimal.

Odour generated during the dredging process, will be transient and not considered a significant nuisance. Also, odour from the dredged material deposited will quickly dissipate once the dredged material is exposed to the weather (sunlight). Also, the handling sites are located close to the Atlantic Ocean and the land-bound breeze will enhance dispersal of the odour. Furthermore, dredged materials deposited at the Korle-na site in the past did not pose odour nuisance to St. Mary's SHS. However, the foul-smelling open drain that passes through St. Mary's SHS which crosses the road into the Korle (at the Korle-na site) is the source of odour nuisance. The gentle slope of the drain and the deposition of solid waste impede free flow of wastewater, hence the odour.

From the wind rose, about 60% of the wind blows towards the north to north-east direction, 26% towards the north-northwest and 7% towards the west-southwest at a low-speed ranging between 0.5-2.1m/s (Figure 5.27). Odour generated from the dredged material would potentially be directed towards the Korle-Lagoon about 60% of the time and 7% of the time towards the St. Mary's SHS (west-southwest direction) at a low wind speed. In line with the ESIA for the Deferred and Routine Maintenance Dredging of the Odaw Drainage Basin, the effects of the odour will be largely localized, minimal and temporal.

Transportation Phase

Vehicular emissions from the 14 waste trucks in transit to the disposal sites and dust blown from the dredged waste would expose residents along the access routes to potential dust and odour nuisance. The movement of trucks on un-engineered and dusty sections of the access roads will also throw dust into the air. The potential receptors of dust and vehicular emissions along the access routes to the disposal sites would be mainly roadside households/residents:

- Along the 700m stretch from the Ajos Junction to the Anyaa disposal site; and
- On the 1.5km Pokuase community access road to the final disposal sites.

The health implications associated with exposure to dust and other emissions are respiratory diseases (including upper respiratory tract infection, pneumonia, asthma, and chronic obstructive pulmonary disease), nausea, headaches, impaired vision, and irritation of the eyes and nose. The level of dust emissions is likely to be limited due to the high moisture content of the material at the handling sites and the waste in transit as well as the short stretches of the dusty access roads to the disposal site. The significance of the potential health risks to the exposed receptors is ranked moderate.

7.2.4 Occupational Health and Safety Risks

Hazards arising from the dredging project could impair the health and well-being of workers. These could be in a form of falls, burns, loud machinery noise, traffic collisions or knockdowns, etc. The occupational health and safety risks at both the site preparation and material handling phases could be associated with the following sources listed below.

Site Preparation Phase

- Traffic impact and accident risks;
- Dust and other emissions;
- Noise and vibration;
- Heavy metal exposure risks;
- Potential fire risks; and
- Workplace accidents.

Material Handling Phase

- Traffic impact and accident risks;
- Dust and other emissions;
- Noise and vibration;
- Heavy metal exposure risks;
- Potential fire risks; and
- Knockdown of workers by machinery.

Traffic Impact and Accident Risks

Traffic accidents associated with the transportation of the waste have been treated separately under Section 7.2.

Dust and Other Emissions

The sources of dust and its effects on workers have been assessed under section 7.2.1.

Noise and Vibration

Noise and vibration effect on workers have been assessed under section 7.2.2.

Heavy Metal Exposure Risks

Heavy metal exposure effects on workers have been assessed under section 7.2.5.

Potential Fire Risks

Fire risks and its effects on workers have been assessed under section 7.2.9.

Site Preparation Phase

The site preparation activities would expose the workers involved to health and safety risks and hazards. Workers would be exposed to polluted air due to mainly fugitive particulate emissions from earth-moving activity, dust entrainment due to movement of construction equipment on exposed surfaces, and exhaust emissions from construction vehicles and equipment. Also, workers would be exposed to high level noise which could result in hearing impairment and lack of concentration with the attendant potential for accidents and injuries.

Working tools placed haphazardly in walkways could cause trips and falls. Manual handling activities like the lifting of concrete blocks, cement bags, and removal of metal scraps could be done in a repetitive and forceful manner, which could result in injuries.

The site preparatory phase activities will, however, be completed within one month, which makes the potential risks only short-term, and also confined to specific work areas (3 sites). Despite that a few of the associated injuries may be serious and fatal, hence, the significance of site preparatory phase is considered moderate.

Material Handling Phase

Material handling will involve the use of machinery such as wheel loaders, bulldozers, Cribus 3800 Komptec, trucks etc. Poor or unsupervised manoeuvring could result in collision between trucks or knockdown of workers. Workers could also be knocked down by the frequent movement of machinery at the handling sites. Other contributing factors may include careless driving, as well as disregard for site safety precautions. This could result in injuries and fatalities. If these fatalities are severe, it could also result in loss of man hours, or more money spent in treating the victim if the workers are not covered with workmen's compensation insurance. Hence, the significance of workplace accidents at the material handling phase is considered high.

7.2.5 Public/Community Health and Safety Risks

The project activities will pose health and safety risks to the community at the site preparation, material handling and transportation phases.

Site Preparation and Material Handling Phases

- Dust and other emissions;
- Noise and vibration;
- Heavy metal exposure risks; and
- Visual intrusion.

Transportation Phase

- Knockdowns by haulage trucks

Dust and Other Emissions
The sources of dust and its effects on the community/public have been assessed under section 7.2.1.

Noise and Vibration
Noise and vibration effects on the community/public have been assessed under section 7.2.2.

Heavy Metal Exposure Risks
Heavy metal exposure effects on workers have been assessed under section 7.2.6.

Visual Intrusion
Heavy metal exposure effects on workers have been assessed under section 7.2.7.

Transportation Phase
Knockdowns by Haulage Trucks
The use of tipper trucks for transporting waste to the disposal sites could pose safety risks to the Anyaa and Pokuase communities. Reckless driving of trucks which includes over-speeding, tailgating, drunk driving, fatigue, failing to use turn signals, and failure to yield the right-of-way could cause knockdowns of pedestrians/residents including children along community roads. Such incidents could result in severe injuries and fatalities. Hence, the significance of the knockdowns at the transportation phase is considered high.

7.2.6 Heavy Metal Exposure Risks
Analysis of the level of heavy metal contamination showed the presence of Iron (Fe), Cobalt (Co), Copper (Cu), Zinc (Zn) at all the material handling sites. However, Zn and Co concentrations were above the WHO Guidelines in all the 3 sites. High levels of Lead (Pb) were also detected at the Pasico and Odawna sites. The introduction of Zn, Co and Pb into the human system could pose dire health consequences (Table 7.3).

Site Preparation Phase
The project activities that could potentially expose workers and the public to heavy metal poisoning during site preparation activities include:

- Excavation and other earthworks on the sites that could mobilize the heavy metals buried in the soil/ground;
- Movement on the sites with shoes or/and vehicle tyres picking heavy metals on the soil surfaces; and
- Contamination associated with transfer of excavated spoil for disposal.

During the site preparation activities, excavation and other earth works for foundation platforms and drain construction, will mainly involve manual digging which could expose workers to the high levels of Co and Zn at all the 3 sites. For Pasico and Odawna sites, workers will be further exposed to Pb poisoning. Workers' hands and fingers, clothes, and boots could

be contaminated with the heavy metals that can be ingested with food. Also, they could carry the contamination home and on public transportation through their clothes and boots to various destinations, thereby spreading the contaminant.

Clearing of the sites will leave the topsoil loose and the heavy metals readily mobilized and the windblown generated dust laden with heavy metals could be inhaled by workers. The working gear of workers could also pick up the contaminated soil particles and act as an agent of distribution of the contaminant.

The excavated spoil and ground clearing of the sites may be transferred to the anywhere else for disposal. The heavy metal contaminated spoil and site cleared waste could spread the contaminants to the disposal areas. This could be picked by workers, blown by wind to other places and surfaces, dispersing and distributing and exposing such people and areas to potential heavy metal contamination.

The potential Co and Zn exposure risk during the site preparation phase (up to one month) and the significance of consequent health effects on workers would be moderate for Korle-Na site. Also, the significance of health effects from Pb, Co and Zn exposure would, however, be high for the Pasico and Odawna sites, in spite of the short duration.

Material Handling Phase

The material handling activities could expose workers to heavy metal poisoning through the following:

- Potential washing of heavy metals by run off into the channel/lagoon; and
- Non-adherence to basic hygienic practices such as regular handwashing and changing into home attire after work.

The heavy metal contaminants within the soil can be washed into the channel/lagoon during the rainy season. This could potentially contaminate the water column and sediments which can be redeposited in the dredged material. This could pose occupational health risks to the handling site operators and also contaminate the waste to be transported to the final disposal site.

Non-observance of personal hygiene and practices by workers, including changing working clothes after work and regular washing of hands could expose the family of the workers to the contaminants especially the children. Exposure to these heavy metals over a long period of time could cause dire health consequences, as shown in Table 7.3.

Table 7. 2 Effects of Heavy Metal Exposure

Heavy Metal	**Effect**	
Zinc	***Short Term*** • Stomach cramps • Nausea	***Long Term*** • Anaemia • Nervous system disorders

	• Vomiting	• Damage to the pancreas • Lowered levels of "good" cholesterol
Cobalt	• Vomiting and nausea • Vision problems • Heart problems • Thyroid damage	
Lead	• Acute central nervous system injuries (stroke, traumatic brain injury, and spinal cord injury) • Lung dysfunction • Haematological changes (Anaemia) • Brain and nervous system, slowed growth and development, learning and behaviour problems, and hearing and speech problems in children	

Source: *Balali-Mood et al., 2021; MdoH, 2019*

For the Korle-na site, the potential exposure to Co and Zn during the material handling phase (up to four years), and the significance of consequent health effect on workers would be moderate. However, the significance of the health impacts from Pb, Co, and Zn exposure would be high for the Pasico and Odawna locations.

7.2.7 Visual Intrusion

The location of two of the handling sites (Korle-na and Pasico Sites) are directly along major roads (the Ring Road West and Guggisberg Avenue) respectively, and in the open view of travelling passengers. The peak and lowest traffic volumes for the Ring Road West are about 768 and 411 per hour respectively, whilst those for the Guggisberg Avenue are 2,645 and 1,662 per hour for the peak and lowest traffic volumes respectively (Figure 7.1). A dormitory block of the St Mary's SHS at Korle Gonno and an office structure belonging to AMA Ablekuma South Sub-Metro Office also overlook the Korle-na site.

Highest Peak Values (6:45 – 7:45 Saturday)

Lowest Peak Values (11:45 – 12:45 Monday)

Figure 7. 2 Base Flows Adopted for the Korle Bu Traffic Signal

The Odawna site is observable from the Graphic Road Overpass (on the Railway Crossing), whilst the Pasico site faces the Guggisberg Avenue Road and is adjacent the Mudor Waste Treatment Company. The Odawna site has a community known as Odawna Garages adjacent to the site.

Site Preparation Phase

Site preparation phase will involve the use of machinery such as backhoe, rollers and trucks. Drivers and the public not used to seeing this, could slow down to view the on-going preparatory activities. This could lead to traffic congestion and delays, or even vehicular accidents on the Guggisberg Avenue (for Pasico), Graphic Road Overpass (for Odawna), and the Ring Road West (for Korle-na). The site preparation phase activities will be carried out in one month and the impact will be short-lived, hence the significance is moderate.

Material Handling Phase

The material handling phase could create visual intrusion problems. The specific activities and sources of potential visual intrusion include:

- Stockpiling of dredged material; and
- Handling site activities involving machinery operation.

Stockpiling of Dredged Material

Due to the limited space available at the handling sites, the dredged materials could be stockpiled to towering heights, which would dominate the surrounding landscape. This would pose visual offense to the numerous road users and people in nearby facilities. This would include:

- For Korle-na site– occupants of a minimum of 411 vehicles per hour on the Ring Road West and other occupants of the St. Mary's SHS dormitory and offices of AMA Ablekuma South Sub-Metro;
- For Pasico site – occupants of a minimum of 1,662 vehicles per hour on the Guggisberg Avenue and nearby Pasico factory and adjacent Mudor Waste Treatment Company; and
- For Odawna site – travellers on the Graphic Road Overpass, Odawna Garages, Letap Pharmaceutical Limited and people living adjacent to the site.

Handling Site Activities Involving Machinery Use

The change in land use activities of the sites, particularly the introduction of equipment and machinery during the material handling and transportation phase could catch the eyes of road users and the travelling public. Travelling commuters/drivers and the public not used to seeing this, could slow down to view the on-going handling activities. This could lead to traffic congestion and delays, or even vehicular accidents on the Guggisberg Avenue (for Pasico), Graphic Road Overpass (for Odawna), and the Ring Road West (for Korle-na) Thus, the significance is ranked high.

Transportation Phase

Convoy Movement of Waste Trucks Potentially Causing Visual Nuisance

During the transportation phase, fleet of trucks (14 trucks per day) will be regularly admitted into the handling sites to load and transport waste materials to the Anyaa and Pokuase sites. These trucks could move in a convoy and potentially cause visual nuisance from uncovered dredged materials in transit. This could affect the usual view of the nearby residents along the disposal routes which would be felt throughout the project life cycle.

Waste Spills from Haulage Trucks Along Project Routes

In transporting the waste after the sorting process, the tailgate of the trucks could go loose causing potential spillage and leaving trails of the waste on the road. This problem could arise particularly on the access routes, off the main Nsawam Road and the Anyaa-Awoshie, Pokuase Interchange, leading to the disposal sites. These are mainly the untarred and bumpy accesses within the Anyaa (700m from the Ajos Junction) and Pokuase (1.5km) communities, which could cause the tailgate locks to loosen up.

The waste released/spilled could pose unsightly scene and stench nuisance to road users and residents along these access routes. Also, uncovered and over loaded waste trucks could spill the waste along the route. The waste trails on the road could pose a nuisance and unsanitary menace for residents and road users. The visual effect and its nuisance, especially to the nearby residents of the various handling sites and communities along the Anyaa and Pokuase disposal site will be long term as the effect would be felt throughout the project life cycle, hence the significance of this impact is high.

7.2.8 Potential Flood Risks of Project Sites

Flooding occurs at three of the sites – Korle-na, Pasico and the Odawna sites.

Korle-na Site

There is a sag section on the Ring Road West dual carriage in front of the site where the road runoff collects and creates a pool along the road section of the site due to unavailability of a roadside drain. The runoff from the road flows across the site to the Odaw River. Stakeholder engagement also revealed that flooding occurs at the site when the Odaw River overflows its bank during rainy season and high tide weaves from the sea. The bank of the Odaw shows signs of erosion caused by flooding of the Odaw River.

Pasico Site

The sources of flooding are the outlet flow from the trapezoidal drain in front of the site and from the surrounding area through the Pasico Yard. Runoff from the adjoining Guggisberg Avenue due to siltation of road shoulder drain contribute to flooding of the area. Stakeholder engagement revealed also that flooding occurs at the site when the Odaw River overflows its banks in rainy season.

Odawna Site

The runoff from the Kwame Nkrumah Circle area and its environs is responsible for flooding of the site. Stakeholder engagement indicated also that flooding intensifies at the site when the Odaw River overflows its banks in rainy season.

Site Preparation Phase

During site preparation where excavation works for the construction of the foundation/platform of handling equipment, and supporting infrastructure will be carried out, the engines of the excavation and clearing equipment (the excavator, the bulldozer) would be damaged by the inundation and erosion will occur on-site. Loose soil, silt and wastes could also be washed into the Odaw channel contaminating it and creating an avenue for increased flooding. The significance of the level of disruption of site preparation/clearing from potential flooding is ranked moderate.

Material Handling and Transportation Phase

Flood water can potentially disrupt the material handling operations at all the handling sites. The engines of the handling equipment (the bulldozer, the Cribus and Wheel loader, etc.) would be damaged by the inundation and the deposited dredged material could be washed back into the lagoon/Odaw channel. Other wastes and storage materials could also be washed into the channel contaminating the lagoon/Odaw water, rendering it more polluted. The significance of the level of disruption of the handling operations from potential flooding is ranked moderate.

7.2.9 Waste Handling and Disposal Impacts

The operations at the handling sites and equipment yard will generate different types of waste at both the site preparation and material handling phases. Major waste types at the site preparation phase could include:

- Debris from the relocation of existing structures at Pasico and Odawna;
- Excavated spoil from drainage construction and platform for machines;
- Construction waste from the construction of perimeter fencing for the handling sites;
- Domestic solid waste – food packaging materials, plastics, papers, leftover food, cans, bottles, etc.; and
- Liquid wastes – faecal matter and urine.

The anticipated waste types at the material handling phase would include:

- Domestic solid waste – food packaging materials, plastics, papers, leftover food, cans, bottles, etc.;
- Liquid wastes – faecal matter, urine and grey water from washrooms;
- Wastewater from tyre washdown bay;
- Spent oils and lubricants from maintenance and repair of machines, equipment and vehicles at Korle-na site (equipment yard); and

- Electronic waste – end-of-life computers and accessories, defective gadgets and devices, spent bulbs, from the offices as well as used machinery and equipment batteries from maintenance/servicing works at Korle-na.

Site Preparation Phase

The site clearing involving the removal of shacks at Pasico and Odawna, and excavation works for the construction of the foundation/platform of handling equipment, servicing area (at the equipment yard) and drainage construction will generate waste including roofing sheets, wood, building blocks, concrete, etc. and excavated spoil.

The construction of hoarding panels along the perimeter of the handling sites and installation of lighting system will involve some cutting and joining works. This would generate pieces of wood, cables and packaging materials. Also, domestic solid waste such as plastics, papers, leftover food, etc. and liquid waste (faecal matter and urine) would be generated by workers.

The different waste types could be disposed of indiscriminately on unoccupied areas on or close to the site leading to littering of the surroundings. Indiscriminately disposed excavated spoil could be washed by runoff thereby silting the Odaw channel. Rusted nails and metal sheets and scrap in the waste could cause injury to workers and waste pickers. Wounds/cuts caused by these objects could be prone to infections.

Construction workers could resort to open defecation and indiscriminate urinating in the lagoon/Odaw and open areas adjoining the project site. This could lead to insanitary surroundings and proliferation of vermin, exposing workers and neighbouring facilities to diseases and ill-health, such as diarrhoea, typhoid, dysentery and cholera. The practice could also affect aesthetics of the area as well as the air quality due to pungent smell from urine accumulation.

With an anticipated minimal waste volumes to be generated due to the relatively small workforce (100 for all the 3 sites) and construction works, and for the 1-month duration, the impact of waste handling and disposal is assessed to be of low significance.

Material Handling Phase

The daily projected domestic waste generation during the material handling phase from all sites is about 31kg for the 66 workers at all sites (per capita generation of 0.47kg/person/day, (Kodwo Miezah, 2015). The improper disposal of domestic solid waste (wrappers, leftover food, etc.) could litter the sites and the environs in an unsightly manner and could also end up in the nearby lagoon/Odaw. They could also be blown by wind unto the Guggisberg Avenue at Pasico and Ring Road West at the Korle-na site, affecting the aesthetics of the area.

At the equipment yard, all solid waste types (domestic, e-waste, oily rags, lubricant containers, used PPEs and nose masks, etc.) could be improperly disposed of as mixed waste, i.e., all-fractions together in single bins with adverse implications for waste dumpsites. Organic portions can readily putrefy, causing odour nuisance.

The e-waste fraction such as end-of-life computers and accessories, defective gadgets and devices, spent bulbs, used batteries and machinery parts would be attractive to informal recyclers who could burn them to recover the valuable metals, such as copper and aluminium, potentially exposing themselves and the public to toxic fumes and heavy metal poisoning, including lung diseases, carcinogenic effects, etc. (Dasai and Nelson, 2017, Morgan, Daniel L, et al, 1997).

Liquid waste generation will consist mainly of sewage (including urine) and grey water from canteen and changing room. The estimated daily liquid waste and wastewater (from cleaning of truck tyres) generated at all sites will be about 2,000L (estimated at 20L/per person/day).

Maintenance and servicing of machinery and equipment at the equipment yard could generate waste oil and lubricant residue which may contain lead and other heavy metals. Accidental release could occur during servicing and foul sections of the site, which could then be washed into the Odaw drain.

With the major waste type during the material handling phase being domestic solid waste and the availability of waste management services in the area, the significance of the impact of waste handling and disposal to cause environmental abuse and diseases is ranked moderate.

7.2.10 Potential Fire Risks

The general rate of fire incidence increases each year with majority of the causes being cigarette smoking and electrical problems resulting from faulty wiring and misuse of electrical gadgets including improper electrical fittings, use of substandard electrical materials and overloading of electrical appliances (Ghana's Surging Fire Incidents, October 2022).

GNFS also expressed concens of the increased rate of vehicular fires in the country. They stated that 22 vehicles were burnt beyond recognition on the highways. This was attributed to the failure to keep fire extinguishers on vehicles, broken fuel pipes, spillage of fuel on exhaust system among others. According to them, majority of the fires are preventable if drivers had serviceable fire extinguishers at the time the fire started (Ghana News Agency, 2022).

Fire risks could occur mainly at the Korle-na site (equipment yard) and the Odawna and Pasico sites during the site preparation, material handling and transportation phases of the project. The sources of potential fire risks at the site preparation phase for all the three sites includes:

- Machinery and equipment deployment; and
- Dropping of cigarette butts.

The sources of potential fire risks during the material handling phase include:

Korle-na Site

- Off-site GOIL Gas Station;

- On-site fuel storage tank;
- Welding sparks;
- Electrical hazards; and
- Fuel and oil spills and leakages.

Korle-na, Odawna and Pasico Sites

- Fuel and oil spills; and
- Dropping of cigarette butts.

The sources of potential fire risks during the transportation of the dredged material includes:

- Fuel leakages; and
- Electrical system failures.

Site Preparation Phase

The use of machinery and equipment during the site preparation phase could pose fire risk when oil or fuel spills from the machinery comes into contact with lit cigarette butts dropped by smoking workers. In the case of fire outbreak, the workers, machines and equipment could be affected. However, the likelihood of occurrence is low, hence the significance of the impact is ranked is moderate.

Material Handling Phase

Korle-na Site (Equipment Yard)

Uncontrolled fire outbreak from the off-site GOIL Gas Station adjacent to the site could spread to the site. Also, fire outbreak from the off-site GOIL Gas Station could be exacerbated if the machinery servicing area which is likely to produce spark is sited close to it.

Fuel spills occurring during discharging or offloading of fuel at the on-site fuel storage tank could pose fire risk in the presence of an ignition source including cigarette butts and sparks from machinery servicing area.

Welding sparks from fabrication works according to the American Welding Society (2012) can travel up to 10.7m, these can serve as an ignition source of fire. Oil spills from machinery and trucks can pose fire risk in the presence of ignition sources such as lit cigarette butts and naked flames from matches dropped by smoking workers. This can potentially spread to the whole site and cause damage to workers, machinery and offices.

Electrical hazards such as exposed wiring, overloaded outlets and circuits, faulty electrical appliances among others could start fire especially at the administrative offices and could spread to the entire site.

Korle-na, Odawna and Pasco Sites

Fuel spills when fuelling equipment and machinery including wheel loaders, compactor, tipper trucks among others and leakages from the unit's fuel system could pose fire risk in the

presence of an ignition source such as lit cigarette butts. Oil leaks from machinery and equipment could also present fire risks in the presence of an ignition source.

In cases of fire outbreak, workers within the site could be trapped, and in panic, others may rush and cause a stampede, sustaining various injuries ranging from scalds to severe burns. Smoke produced as a result of the outbreak could cause asphyxiation and eye irritation. Inhaling toxic fumes from burning of electric and electronic gadgets and consumables could lead to conditions such as chronic obstructive pulmonary disease (COPD), pneumonia, asthma, and cardiovascular disease for those predisposed (Dellinger et al, 2008). Several machinery, offices and computers will as well be destroyed in cases of fire incidence.

The significance of the effects of a fire incident at all three sites during the material handling phases could be high, however, the likehood of occurrance is low, hence the impact is ranked moderate.

Transportation Phase

The transportation of the dredged material to the Pokuase or Anyaa disposal site involving the usage of about 14 trucks could present vehicular fire risks. This could occur when broken fuel pipes resulting in leakage and spillage of fuel on exhaust system comes into contact with a spark from electrical system failure such as faulty car battery. In an event of vehicular fire, the lives of the drivers, passers-by and commercial workers and properties along the access routes could be endangered.

The significance of the effects of vehicular fire incident at the transportation phase is high, however, the likehood of occurrance is low, hence the impact is ranked moderate.

7.2.11 Infringement on Labour Rights

Site Preparation Phase

Workplace environment plays a major role in the performance and productivity of an employee. A safe and fair work environment is paramount to achieving and sustaining productivity in a way that does not infringe on workers' rights. The National Labour Act guarantees the rights and responsibilities of both employers and employees, with provisions on employment protection, conditions of employment, remuneration, and discrimination etc.

Although the Labour Act exists to protect the rights of all categories of workers, employers particularly those in the informal sector, do not usually adhere to its provisions and are rarely sanctioned for any breaches. Workers in Ghana are entitled to statutory benefits such as social security, paid maternity leave, paid sick leave, paid annual leave, work injury compensation, paid overtime and severance pay. Non-statutory benefits may include free medical care, loans, education bursaries, free transport, among others (Owoo et al., 2017).

Trade unions mostly raise awareness on wage and non-wage (sick and maternity leaves) benefits among their members and provide guidance on the effective ways to make use of the benefits. Less than a third of employees in Ghana have union presence at their workplace. The

utilities sector has the greatest union presence while the construction sector has the least. Although about 74% of formal sector workers are unionized, this figure only represents about 7.5% of the total labour force due to the large and predominantly non-unionized informal sector (Owoo et al., 2017).

The 2021 PHC indicates that the proportion of males employed in Ghana (56.1%) are slightly higher than the females employed (44.7%). There are also disparities when it comes to compensation and on average, when an individual is employed to carry out an identical work schedule, women receive 30% less compensation than their male counterparts (DTDA, 2020). There is also evidence that women are underrepresented in official and managerial positions (Naami, 2015).

Also, even though the Persons with the Disability (PWD) Act, 2006 (Act 715) protects the PWD against discrimination when it comes to employment, PWD struggle with finding meaningful employment. An estimated 80-90% of PWD of working age in developing countries are unemployed (Naami et al., 2012). Low societal expectations of their capabilities, architectural barriers at most workplaces and stigma attached to disability are factors that prevent them from being gainfully employed (Naami et al., 2012).

The main sources of infringement of labour rights during site preparation and material handling phases include:

- Non-issuance of employment contracts to workers;
- Unfair compensation payment;
- Inability of workers to organize or join Unions;
- Provision of ill-fitting PPE; and
- Marginalisation of women and PWD.

Non-Issuance of Employment Contracts to Workers

Employment contracts, usually written agreements between an employer and employee, spell out the terms and conditions of employment, including duties of both parties, compensation and benefits (including social protection), hours of work, duration of employment and other relevant matters. Casual labourers employed during the site preparation phase may not be given written employment contracts by the contractor. This gives room for the contractor to do as he pleases concerning the employment terms, leaving the workers with no formal protection regarding their employment rights.

Unfair Compensation for Payment

Compensation is the reward given to employees in return for their services rendered and it is often the cornerstone of a productive workforce. It includes monetary compensation (wages) and other benefits such as pension schemes. Workers could be paid low wages, below the national minimum wage, in an attempt by the contractor to cut costs and maximise profit. Social protection benefits such as pension schemes could be denied the workers, putting them at risk of not being able to cater for themselves in their old age.

Workers could also be made to work overtime without adequate compensation for the extra hours of work. Overworking would deprive workers of enough rest which could lead to stress-related conditions. Stress could increase the risk of cardiovascular disease and exacerbate medical conditions such as hypertension among workers. Greater Accra recording increasing hypertensive cases since 2017, possibly hypertensive cases caused by the overworking of workers, which could increase the cases within the region.

Also, workers being paid compensation that is unfair denies them the opportunity to be adequately remunerated for their time and effort, reduces their motivation to work, makes it difficult for them to sufficiently support themselves and their dependents/families and reduces their ability to access basic social amenities including healthcare and decent housing. Low motivation also affects their work performance, inhibiting productivity and possibly leading to lags in the completion of their daily tasks.

Inability of Workers to Organise or Join Unions

Unions play an important role in helping workers negotiate employment contract terms including wages and other non-wage benefits, undertake industrial action educate workers about their rights and generally ensuring improved working conditions. Although the National Labour Act protects employees' right to form unions, the contractor may deny workers their rights to form a union or belong to any union organisation, thereby limiting them from enjoying the various benefits that unionisation provides.

Provision of Ill Fitting-PPE

The provision of ill-fitting PPE such as gloves and shoes, to workers during the implementation of the project activities will not only creates discomfort but also increases the risk of injuries such as tripping among workers.

Again, most of the PPE have been designed based on the size and characteristics of the male population, making it difficult for women to find suitable and comfortable PPE (Zeo Kleinman, 2020). Women and PWD employed may also not be provided with PPE and where they are given it might not be replaced when they are worn out. The wrong PPE or inadequate provision of PPE for women and PWD can increase the risk of injury among them.

Marginalisation of Women and PWD

Marginalisation and discrimination against women and other vulnerable groups, including PWD, could occur during the site preparation phase. Men could be given preferential employment, especially in the operation of machinery and equipment such as the bulldozer and compactor, which women could equally operate. Even when they are hired, they could be compensated less than their male counterparts for the same role. They may also be excluded from decision-making processes or not given roles that are relevant to decision-making processes.

Persons with Disability could also be denied employment by the contractor due to low expectations of their capabilities and stigma attached to disability. Where any PWD are hired, they could be compensated less than other able-bodied employees on account of their disability. Again, lack of adequate access facilities such as ramps and sanitary provisions could impede their work. They could also not be given the required specialised working tools to carry out their work satisfactorily.

Workers employed during the site preparation phase activities could be denied the right to form union to collectively bargain for their wage and non-wage benefits, which could deny them the opportunity to be fairly compensated for their work done. The likelihood and significance of infringement on labour rights during the implementation of the project activities is ranked low considering the duration of the site preparation activities (i.e one month).

Material Handling Phase

The infringement on labour rights issues enumerated under the site preparation phase also apply to the material handling phase.

Material handling activities would involve intensive use of machinery and equipment. From the 2021 PHC, the proportion of men to women working as plant and machine operators in the Greater Accra Region is (97.35%) and (2.65%) respectively. This could apply to all project sites. Hence, women and PWDs may be discriminated against in any employment opportunities that could be suitable to them on the grounds of male preference in the industry. Therefore, the likelihood and significance of infringement on labour rights during the implementation of the project activities ranked high.

7.2.12 Gender-Based Violence and Sexual Exploitation and Abuse

Gender-based violence (GBV) is a pressing issue worldwide. Although victims include women, men, girls and boys. Women and girls are disproportionally affected, with an estimated one in three women worldwide experiencing some form of sexual or physical violence in their lifetime (WHO, 2021). In Ghana, women, particularly in the Greater Accra Region, face a higher risk of experiencing sexual violence (IDS, 2016). High incidence of GBV and SE in the Greater Accra Region, according to reports, were due to inadequate prevention efforts.

Several policy/legal/legislative instruments/frameworks as well as institutions exist to address GBV, sexual exploitation, abuse and harassment in Ghana. However, the relevant institutions, including the Domestic Violence and Victims Support Unit of the Ghana Police Service, health facilities, the Social Welfare and Community Development Department at the Assemblies, Gender-Based Violence Courts and GBV non-governmental organisations, are often handicapped in providing support to victims due to logistical challenges, inadequate funding, training and prevention activities, lack of coordination and inaccessibility (MWH, 2021).

The potential sources of gender-based violence at the site preparation and material handling phases could include:

- Soliciting for sexual favours from female job seekers and employees;
- Sexual harassment (SH)/abuse of work colleagues; and
- Sexual harassment/abuse of community women and children.

Site Preparation Phase

Research indicates that major civil works increase the risk of gender-based violence (GBV), sexual exploitation (SE), abuse and harassment, in both public (at the workplace) and private spaces (between workers and community members). Over the years, gender disparity and imbalance have been recorded in the construction industry. Many jobs go to men because they have greater physical strength required for the job, and there remain discrimination because of stereotypes within the industry and individual companies, thus there are often very few women working in these environments.

Women who are employed as part of the project's labour force may be at risk of gender-based violence and sexual exploitation from their colleagues/supervisors, especially where the workforce is likely to be male dominated which could be the situation during the implementation of the project activities. Where women are employed, they are usually few and often have to endure or capitulate to sexual abuse by colleague workers and superiors. Sexual favours may be solicited for employment and the rejection of such favours by women usually results in denial of employment opportunities. Hence, women who are in dire need of employment may succumb to such advances.

Close interactions between workers on this project and local communities such as Odawna may result in cases where some workers could commit sexual abuse or have sexual intercourse with women and underage community girls resulting in pregnancies, single parenthood and economic hardship for the women and girls. Also, the change in the living standards of male workers could make them flirt or have multiple relationships with the girls and women in the various communities.

Considering the duration of the site preparation phase, the likelihood of occurrence of gender-based violence would be moderate. The significance of gender-based violence will, however, be high considering the challenges faced by institutions and service providers in adequately addressing cases.

Material Handling Phase

Similar incidences of GBV and SE expounded above could also occur during the material handling phase. Women during the material handling phase could be sexually harassed or abused by their male colleagues and supervisors. These women could end up losing their jobs, get pregnant or contract STIs including HIV.

As most of the plant and machine operators in the Greater Accra Region are men (2021 PHC),

it is likely that all employees will be male. Since women in male-dominated sectors and informal works are more at risk of GBV, any women who may seek employment may be faced with solicitations of sexual favours by the employer before they are hired. Where women are employed, they may have to endure or capitulate to sexual abuse/harassment by colleague workers and superiors.

From the above, the significance of gender-based violence at the material handling phase is high due to the high likelihood of occurrence coupled with the various challenges faced by institutions and service providers in adequately addressing cases.

7.2.13 Potential Risk of Spread of HIV and STIs

The current estimate of adult HIV prevalence in the handling communities is 2.2%, and 2.7% for AMA, and KoKMA, respectively. HIV prevalence for AMA, KoKMA exceeds that of the national prevalence of 1.68% (Ghana HIV Fact Sheet, 2020). The ILO guidelines, in line with the National Workplace HIV/AIDS Policy, have identified the major work conditions and lifestyle factors contributing to the risk of HIV and STIs transmission as:

- High mobility, resulting in long periods spent away from home and family;
- Isolation and working in confined environments with limited contacts;
- Male dominated profession and a predominantly masculine environment, with openness to occasional sexual relations;
- Stress due to working and living conditions; and
- Lack of information about HIV and AIDS.

Others may include:

- Attraction of commercial sex workers to high earning project workers, including migrant and truck drivers;
- Young women lured into sexual relationships by workers due to poverty and unemployment;
- Some women and men turning to prostitution as a new lifestyle; and
- Non-disclosure of HIV status due to stigmatisation and possibly discrimination or victimization, who continue to engage in multiple, unprotected sexual relations.

Site Preparation Phase

The project activities during the site preparation phase would involve interaction of workers and workers, and workers with their community members. These interactions could be intimate, and workers could include HIV carriers exposing other workers and their community members to the potential risk of sexually transmitted infections (STIs) including HIV. Commercial sex workers from the community could, in turn take advantage of the workers since there is a change of their economic status. Luring them to engage in sexual activities in exchange for money. Some young women may also be enticed by the workers to engage in sexual activities (and vice versa), due to poverty and unemployment as five out of ten people from Korle-na and Pasico are unemployed and seeking employment for the first time (PHC,

2010). Also, cases of rape and sexual abuse could pose risk of HIV infection to both victims and perpetrators.

Although the National Workplace HIV/AIDS Policy provides protection from discrimination against people living with HIV and AIDS in the workplace, infected workers could still suffer from stigmatization (ILO, 2021) due to laxity in enforcement by contractors. Stigmatization is also one important factor that fuels the spread of HIV infection. Workers who may be HIV positive may, for fear of stigmatization, hide their status and could engage in unprotected sexual acts, contributing to spread of infection.

The project activities may not directly lead to an increase in HIV/STIs prevalence as there might not be high mobility, resulting in long periods spent away from home and family or being isolated and working in confined environment with limited contacts. Also, with the site preparation phase lasting for a period of one month only with an estimated number of 100 workers, the potential risk of spread of HIV and STIs will be significantly low for both phases.

Material Handling Phase

The sources of the impact assessed at the site preparation phase would also apply to the material handling and transportation phase.

7.2.14 Potential Transmission of COVID-19

COVID-19 is highly transmissible from person to person through respiratory droplets and surface contact. Persons infected with the virus can either be asymptomatic or symptomatic with prominent ones being fever, cough, sore throat and shortness of breath (WHO, 2019).

The COVID-19 Restrictions, enacted under EI 64 was revised due to the low level of infections recorded. In Ghana, as of 10th October, 2022, a total of 20, 152,826 vaccine doses have been administered with about 424 active cases with none in severe or critical conditions. Out of the total active cases, Greater Accra Region has a total of 249 cases and about 19 new cases recorded on the same day. The spread of the virus during the site preparation phase and material handling and transportation could be influenced by these factors:

- Unhygienic personal habits and practices;
- Failure to allocate a budget for COVID-19 prevention measures;
- Misconceptions and persons reluctance to COVID-19 vaccination;
- Non-compliance with COVID-19 protocols;
- Workers concealing infection due to stigmatization; and
- Poor public health attitudes.

Site Preparation Phase

The project activities during site preparation phase will be conducted in an open area under temperatures that are appreciably high, which reduces the rate of transmission. Working in an unconfined area could pose some risk as workers have close physical contact, share construction tools, and use public washrooms. Failure of contractors to ensure that workers

observe social distancing, practice regular handwashing and disinfect tools or equipment could promote the transmission of COVID-19. These working conditions could induce the viral spread.

The highly contagious COVID-19 virus could spread among workers once an infected worker is present. This could lead to a decrease in the number of active workers disrupting construction activities, causing a delay in project completion schedule and in the worst case, result in hospitalization. The respective families of infected workers could be exposed through a chain of transmission.

Also, failure to allocate a budget for the COVID-19 prevention measure, could make it difficult to ensure that workers comply to the COVID-19 protocols. This could lead to the respective families of infected workers being exposed through a chain of transmission. Other commercial settings, along the interventions could be at risk from exposure and this could spread into the community.

However, COVID-19 prevalence may not directly be increased by the project activities as the site preparation phase will last for a period of one month with 100 workers. Also, with the low level of infection records and the greater percentage of persons vaccinated within the country, the significance of the impact will be low.

Material Handling Phase

The enumerations under the site preparation phase applies to the material handling and transportation phase.

Confined workplaces such as the management offices and machinery and equipment holding yard with poor ventilation could increase the rate of spread as particles containing the virus can travel more than 6 feet, especially indoors and in dry conditions of a relative humidity below 50% (Bueckert M et al., 2020).

COVID-19 prevalence may not directly be increased by the project as the material handling and transportation phase as measures will be implemented and monitored to prevent the transmission and spread of the virus. This makes the impact of COVID-19 significantly low.

7.2.15 Physical and Economic Displacement

Development or infrastructure projects typically require land which can result in the physical dislocation of the people living there. Even in situations where people are not required to physically move, the project may still impact on their livelihoods or income generating activities, either temporarily or permanently (IFC, 2002) or cause other adverse impacts. There are some structures and economic activities going on at the Odawna and Pasico handling sites which will be affected by the project.

At the Odawna site, there are two wooden kiosks occupied by some informal settlers. The area is also used as temporary parking area by some truck drivers. There are also some persons

engaging in informal commercial activities such as tabletop trading, vehicle repairs and a drinking spot. The Pasico site is also being used by some waste pickers as an area for aggregation of plastic materials/waste. There are also some pig sties on the site where pigs are being reared. A waste skip is situated on the site for the collection and temporary holding of waste generated within the area.

The structures on these sites will be relocated during the site preparation phase. This will lead to the physical displacement and disruption of economic activities of the owners and occupiers of these facilities. PAPs will include the occupiers of the wooden kiosks, traders and business owners, pig farmers, waste pickers and caretakers of the waste skip at the two sites.

With the number of PAPs and economic activities and structures that will be affected and relocated at both sites during the site preparation phase, the significance of the physical and economic displacement impact is ranked low.

7.3 Summary of Impacts Significance

The evaluation of significance of the various impacts have been summarised in Table 7.4. This covers both the site preparation and material handling and transportation phases.

Table 7. 3 Summary of Impact Significance

Impact	Significance		
	Site Preparation Phase	Material Handling	Transportation Phase
1) Potential traffic impacts and accidents risks	Low	High	High
2) Noise and vibration impacts	Moderate	Neighbouring facilities–Moderate Daytime workers-High Nighttime workers-Moderate	Moderate
3) Dust and other emission impacts	Moderate	Moderate	Moderate
4) Occupational health and safety risks	Moderate	High	N/A
5) Community health and safety risks	N/A	N/A	High
6) Heavy metal exposure risks	High	High	N/A
7) Visual intrusion	Moderate	High	High
8) Potential flood risks	Moderate	Moderate	N/A
9) Waste handling and disposal	Low	Moderate	N/A
10) Potential fire risk	Moderate	Moderate	Moderate
11) Infringement on labour rights	Low	High	N/A
12) Gender-based violence and sexual exploitation	High	High	N/A
13) Potential risk of spread of HIV and STIs	Low	Low	N/A
14) Potential transmission of COVID-19	Low	Low	N/A
15) Physical and economic displacement	Low	N/A	N/A

8.0 MITIGATION MEASURES

The assessment revealed some significant potential impacts for which mitigation measures have been provided to ensure environmental soundness, social and community health and safety and sustainable implementation of the project. The relevant mitigation measures include the following:

1) Traffic improvement and accident prevention measures;
2) Noise and vibration reduction measures;
3) Dust and other emission control measures;
4) Occupational health and safety measures;
5) Public/community health and safety measures;
6) Heavy metals exposure avoidance measures;
7) Visual intrusion minimisation measures;
8) Flood prevention and control measures;
9) Waste segregation and disposal measures;
10) Fire prevention and control measures;
11) Labour rights safeguards measures;
12) Gender-based violence/sexual harassment prevention measures;
13) HIV prevention measures;
14) COVID-19 containment and prevention measures; and
15) Resettlement measures.

8.1 Traffic Improvement and Accident Prevention Measures

Site Preparation Phase

The following measures will be put in place at the various handling sites to prevent accidents during the site preparation phase:

- Deployment of banksmen to control traffic and manage the entry/exit point at the various handling sites;
- A 30km/hr speed limit on-site for all vehicles;
- Wearing of conspicuous reflector jackets by on-site workers at all times; and
- Spot improvement and surface dressing of sections of the access routes to the disposal sites at Anyaa and Pokuase.

Material Handling and Transportation Phase

A haulage management system would be implemented during the material handling and transportation phase incorporating the following:

- Banksmen will be deployed to regulate traffic at the entry/exit point at the various sites;
- Haulage of waste will be done at night-time between 9pm and 5am to avoid traffic congestion and minimize emissions;
- All trucks will be serviced on schedule to prevent breakdowns;

- Trucks not older than 5 years and in good serviceable condition would be deployed for the haulage operations to avoid breakdown in transit;
- Trucks will be loaded ahead of time (at least 30 minutes) and ready to depart as soon as the departure window opens;
- Loaded trucks from the handling sites will move at an interval of about 10 minutes to avoid convoy movements;
- Availability of a co-driver on each trip to aid the driver, such as taking over and continuing the journey/reporting accidents/calling the towing company, etc.;
- All drivers/operators will be trained on defensive driving;
- Speed limit restrictions (not more than 50km/hr) would be observed for the trucks when moving within communities;
- Global Positioning System (GPS) will be installed in each truck to record truck speed, track truck route to minimize unauthorized stops and diversions, record traffic conditions, record travel time to and from the disposal sites, record loading and offloading times, etc. The GPS would also provide the location of the trucks in case of breakdown, accident, or emergency;
- Appropriate phone contacts will be inscribed on the truck for purposes of reporting careless and inconsiderate driving or excessive speeding; and
- A towing system will be instituted for the prompt removal of broken-down trucks.

The Contractor is responsible for ensuring sufficient space at the handling sites for storage, handling and treatment of dredged material. The Contractor will enter into agreements with off-takers to purchase and transport the reusable material. In case of default by an off-taker, the material will be sold to another off-taker, and the money will be refunded to the original purchaser. This will prevent reusable materials from occupying excessive space at the handling sites.

In the event that the sale of reusable material does not go as planned, the Contractor must remove the material to a holding area under the control of the Contractor. In the performance-based contracting arrangement for the dredging works, proceeds from the sale of the reusable material accrue to the Contractor as incentive to dredge and treat more dredged material.

8.2 Noise and Vibration Reduction Measures

Site Preparation Phase

Measures to reduce noise and vibration to protect workers and the public include the following:

- Ensure that machinery used are in good condition and well maintained before use for efficient output and reduction in potential frictional noise from moving parts;
- Operators of machinery and vehicles will be required to switch off idle engines;
- Padded seats will be fitted in mobile equipment and worn-out pads promptly replaced to limit the effect of vibration transmission to drivers;
- Provision of vibration reduction gloves for handheld equipment operators;

- Erection of perimeter closed fence as noise barriers to help attenuate noise; and
- Provision and usage of PPE including earplugs.

Material Handling Phase

Measures to reduce noise and vibration enumerated under the site preparation phase also apply to the material handling phase except for -

- Hand-held noise monitoring meters will be procured for use at all sites by PIU, Contractor, Supervision Consultants' and ESS / SSS of PCU.

Transportation Phase

The following noise reduction measures will also be executed at the transportation phase:

- Transportation of materials to disposal sites will be done at night (9pm-5am);
- Scheduling of truck movements so that persons are not exposed to periods of continuous noise;
- Haulage truck drivers will be encouraged to avoid honking in the communities along the disposal route (especially Anyaa and Pokuase);
- Installation of speed limits to control engine noise of trucks when transiting through the community; and
- Advance notification of Anyaa and Pokuase residents along the disposal routes.

8.3 Dust and other Emissions Control Measures

Site Preparation Phase

Measures to minimize dust and other emissions to protect the public and workers will include the following:

- Construction of perimeter fences around the handling sites at the onset of the site preparation activities to reduce dust escape into the atmosphere;
- Workers will be provided with the appropriate PPE (eye goggles, nose masks, etc.) and usage enforced;
- Ensure that machinery are in good condition and well maintained before use to minimize exhaust emissions;
- Switching off idle engines of vehicles, machinery, and other equipment when not in use;
- Dousing of the site with water at least twice daily, especially during dry periods using a tanker fitted with spray bar;
- Adherence to speed limit of 30km/hr for vehicles within the site; and
- Haulage trucks will be covered with tarpaulin to prevent dust fly off.

Material Handling Phase

Mitigation measures listed for the site preparation phase apply also to the material handling phase, except for the regular servicing of machinery and equipment to maintain efficient performance of waste trucks.

The drain passing through St Mary's SHS has been earmarked for reconstruction by the Hydrological Services Department of the Ministry of Works and Housing. The reconstruction will improve the flow of runoff and wastewater thereby eliminating the odour nuisance from the drain.

Also, portable dust monitoring meters with specialized probes to measure concentrations of different size particulates such as SO_2, etc., will be procured for use at all sites by PIU, Contractor, Supervision Consultants' and ESS / SSS of PCU.

Transportation Phase

Measures to minimize dust and other emissions to protect the public along the access routes to the disposal sites will include the following:

- Regular scheduled maintenance and servicing to be carried out on all trucks for efficient performance to minimize exhaust emissions;
- Haulage trucks will be covered with tarpaulin to prevent dust flyoff and other releases;
- Dousing of the dusty sections of the access roads with water, especially during dry periods, and
- Speed limits signs of 30km/hr will be erected and enforced within the Anyaa and Pokuase communities to reduce dust generation.

8.4 Occupational Health and Safety Measures

The Labour Management Plan (Appendix 11) specifically on occupational health and safety will be implemented to ensure the creation of a conducive work environment and the prioritisation of the safety of workers.

Measures to address traffic impact, dust and other emissions, noise and vibration, heavy metal exposure risks, and potential fire risks have been provided in the respective sections.

Site Preparation Phase

The following accident prevention measures will also be executed at the site preparation phase:

- Trucks will be equipped with reverse alarms to alert workers when trucks are backing up;
- Haulage trucks and other construction machinery, equipment, and vehicles will undergo scheduled maintenance;
- Provision and usage of PPE such as safety boots, helmets, gloves, etc;
- Use of banksmen at the entry/exist to the sites to supervise the movement of trucks and machinery;

- Use of mechanical aids such as trolleys and wheelbarrows to lift heavy materials to prevent manual handling;
- First Aid will be provided to cater for injured workers before they are sent to the nearest hospital depending on the level of injury;
- A select few of the workers will also be trained to act as First Aid Attendants to respond immediately to all work-related injuries; the training would include personal hygiene, waste classification, hazardous waste disposal procedures, possible hazards and emergency procedures;
- Training of workers on health and safety measures;
- Provision of adequate supervision of the workers by experienced supervisors/managers;
- All accidents/injuries/near misses and training will be reported, recorded and documented; and
- The contractor is required to procure Workmen's Compensation Policy (Insurance) to cover all workers in cases of residual accidents, in accordance with the Workmen's Compensation Act, 1987 (PNDCL 187).

Material Handling Phase

The following accident prevention measures will be implemented during the material handling phase:

- Trucks will be equipped with reverse alarms to alert workers when trucks are backing up;
- Haulage trucks and other construction machinery, equipment, and vehicles will undergo scheduled maintenance;
- Provision and usage of PPEs such as safety boots, helmets, gloves, etc
- Use of banksmen on-site to supervise the movements of trucks and machinery;
- First Aid will be provided to cater for injured workers before they are sent to the nearest hospital depending on the level of injury;
- A select few of the workers will also be trained to act as First Aid Attendants to respond immediately to all work-related injuries; the training would include personal hygiene, waste classification, hazardous waste disposal procedures, possible hazards and emergency procedures;
- All accidents/injuries/near misses and training will be reported, recorded and documented; and
- The contractor is required to procure Workmen's Compensation Policy (Insurance) to cover all workers in cases of residual accidents, in accordance with the Workmen's Compensation Act, 1987 (PNDCL 187).

8.5 Public/Community Health Safety Measures

Measures to promote public/community health and safety have been provided under dust and other emissions control measures, noise and vibration reduction measures, heavy metal exposure avoidance measures and visual intrusion minimisation measures.

Transportation Phase

The following public/community health and safety measures will be implemented to prevent frequent knockdowns in the community at the transportation phase:

- Truck drivers will observe the 30km/hr speed limits in the community
- Training of truck drivers on defensive driving to avoid frequent knockdowns;
- Installation of temporary (earthen) speed ramps to prevent speeding; and
- All accidents/injuries/near misses and training will be reported, recorded and documented.

8.6 Heavy Metal Exposure Avoidance Measures

Site Preparation Phase

The avoidance measures to protect workers from exposure to heavy three sites include the following:

- Deployment of machinery for the site preparation activities (with minimal manual involvement) to minimize physical contact with soil surfaces and particles by workers;
- Workers will be supplied with PPE (hand gloves, safety boots, etc.) and the use enforced to protect workers from direct body contact with and inhalation of dust-laden heavy metal contaminated soil;
- Provision of changing room for PPE storage area at the end of the working day and changing of other working gear and clothes to prevent transfer of the heavy metals from the work sites;
- Routine replacement of PPE to avoid use of contaminated materials and regular washing/laundering of working gear;
- First Aid will be provided as immediate response of the short-term effects that could result from exposure to the heavy metals;
- Provision of medical care for workers infected with diseases as a result of exposure to the heavy metals;
- At toolbox meetings, workers will be sensitized on-
  - Dangers of exposure to heavy metals;
  - Thorough handwashing before meals and after work;
  - Practice of personal hygiene;
- Workers will be required to –
  - Keep very short fingernails to prevent contaminated soil getting trapped in nails; and
  - Always wear head covering to prevent windblown contaminated dust stacking in the hair.

To avoid transferring heavy metal contaminated soils (from excavated spoil and ground/site clearing), the waste will not be removed from the sites and transferred to other areas for disposal. Even though the heavy metal presence and distribution was very limited at the sites,

such wastes will be buried at the respective locations by covering with a layer of laterite. The entire handling sites will be covered with a 3-inch compacted laterite to bury the soil-laden heavy metals beneath. This will prevent dispersing and distributing contaminants and exposing workers and other areas to potential heavy metal contamination.

Material Handling Phase

The following measures would be implemented at the material handling phase to protect workers from exposure of heavy metals (Pb, Co and Zn):

- The integrity of the layer of laterite (3inch) will be inspected regularly;
- Workers will be supplied with PPE (hand gloves, safety boots, etc.) and the use enforced to protect workers from direct body contact with and inhalation of dust-laden heavy metal contaminated soil;
- Workers will be required to change clothes and other working gear at close work to prevent transfer of the heavy metals from the work sites;
- Routine replacement of PPE to avoid use of contaminated materials and regular washing/laundering of working gear;
- First Aid will be provided as immediate response of the short-term effects that could result from exposure to the heavy metals;
- Provision of medical care for workers infected with diseases as a result of exposure to the heavy metals;
- At toolbox meetings, workers will be sensitized on-
  - Dangers of exposure to heavy metals;
  - Thorough handwashing before meals and after work;
  - Practice of personal hygiene;
- Workers will be required to –
  - Keep very short fingernails to prevent contaminated soil getting trapped in nails; and
  - Always wear head covering to prevent windblown contaminated dust stacking in the hair.

8.7 Visual Intrusion Minimisation Measures

Site Preparation Phase

Construction of perimeter fence wall will precede site preparatory activities to screen the public and other road users from the preparatory activities.

Material Handling Phase

The following measures will be implemented to reduce visual intrusion during the material handling phase:

- Construction of perimeter fences around the handling sites to obscure operations site preparatory activities;
- Heap of dredged material would not tower over the 2.5m perimeter fences; and

- Ensure frequent evacuation and transportation of the waste and saleable materials to avoid over-heaping.

Transportation Phase

The following measures will be implemented to reduce visual intrusion during the transportation of the waste to the disposal sites:

- Trucks to move at 10-minute intervals to avoid convoy movements;
- Loading of waste and haulage will be conducted at night between 9pm and 5am, so that nearby residents will not be exposed to the line-up of trucks;
- Waste transporting trucks will be covered with tarpaulin to prevent waste spills; and
- Haulage trucks will be labelled with contact numbers for reporting of waste spills.

8.8 Flood Prevention and Control Measures

Site Preparation Phase

The following measures will be implemented to prevent and control flooding during site preparation at all the sites:

- Preparatory works such as raising the frontage of the Odawna and Pasico sites towards the Odaw channel to minimize likelihood of flooding; and
- Construction of earth drains of adequate sizes at the Korle-na, Pasico sites and along the route to the Odawna area.

Material Handling Phase

The following measures will be implemented to prevent and control flooding and inundation at all the sites.

Korle-na Site

There will be reconstruction of the damaged 18.0m section and the 4.0m x 1.8m section from the Ring Road West to allow free flow of runoff to the Odaw River to avoid erosion. There will also be construction of a road shoulder drain of adequate size to trap runoff from the adjoining road and direct to the 4.0m x 1.8m drain to prevent the runoff from entering the site.

The drain passing through St Mary's SHS has been earmarked for reconstruction by the Hydrological Services Department of the Ministry of Works and Housing. The drain will be expanded and the slope enhanced to allow for the free flow of run-off and wastewater through it.

Pasico Site

The flood prevention measures will include:

- Lining the unlined 12.0m length section of the trapezoidal drain with concrete to the Odaw River;
- Construction of a drain of adequate size along the Pasico wall to trap runoff from the Pasico yard; and

- Construction of a circular drain of adequate size from the main Pasico Yard outlet of length 70.0m to Odaw River.

Odawna Site
The main flood prevention measure will be to construct a drain of adequate size along the untarred road from the VIP Bus Terminal to the Odawna handling site near the Odaw main channel.

8.9 Waste Segregation and Disposal Measures

In compliance with the objectives and the specific guidelines for environmental sanitation services of the Environmental Sanitation Policy (2010), measures would be put in place to minimise the impact of waste on the environment. The waste management measures for the site preparation and material handling phase are covered under:

- Excavated spoil and waste from clearing activities;
- Segregated waste;
- Oily waste; and
- Liquid waste and wastewater.

8.9.1 Excavated Spoil and Waste from Clearing Activities

Site Preparation Phase
Excavated spoil from excavation works at all sites will be used in filling low lying sections of the sites before introducing laterite as cover material. Waste from clearing of existing structures at Pasico and Odawna will be collected for disposal by an accredited waste management company as the site clearing activities are ongoing.

8.9.2 Segregated Waste

Site Preparation and Material Handling Phase
The segregated waste will comprise of construction, domestic, containers of oil, lubricants and paints, oily rags and e-waste. Once segregated, the wastes could become potential resource for re-use or recycling after treatment, and thus, no longer pose any of the assessed environmental and health risks.

Four types of waste bins will be used for this purpose. The bins will be clearly labelled, or colour coded for ease of identification and use for waste segregation and placed at vantage points. The wastes will be segregated at source into three general and a special separate, labelled bins as follow:

- General bins: -
  - Blue Bin – plastics, glass, bottles, paper, cardboard and scrap metal;
  - Yellow Bin – lubricant cans, paint and solvent containers and oily rags; and
  - Green Bin – organic (food left over), wood, other miscellaneous waste.
- Special bin: -

- Specialised container (e-waste) – fluorescent bulb/tubes, batteries, old computers and accessories, printers, toners, etc; and
- Specialised container (disposables) – used/damaged PPE and COVID-19 related waste.

The bins to be located are the various sites is presented in Table 8.1.

Table 8. 1 Bins to be Located at the Project Sites

Site	Bins
Korle-na (equipment yard)	○ Blue bin ○ Black bin ○ Green bin ○ Specialised containers (e-waste, oily waste and disposables)
Korle-na (material handling area)	○ Blue bin ○ Specialised container (e-waste and disposables)
Pasico	○ Blue bin ○ Specialised container (e-waste and disposables)
Odawna	○ Blue bin ○ Green bin ○ Specialised container (e-waste and disposables)

The segregated construction waste will be outsourced to waste management contractors for removal and disposal. The special bin will be transferred to a designated and accredited waste treatment company by the outsourced waste collection contractor.

The Green labelled waste consisting of organic and miscellaneous waste, will be destined for outright disposal. The content of the Green Bin will be collected by an accredited waste management company for disposal.

8.9.3 Oily Waste

Material Handling Phase

Waste oils from machinery and equipment servicing and other repair work during the operation of the project at the Korle-na site (equipment yard) will be the responsibility of skilled personnel undertaking the assigned jobs. However, the following mitigation measures will be adopted to handle oily wastes and rags, etc.:

- Development and designation of an impervious platform and bunded with waste oil holding area for maintenance works;
- Activities involving the use of oils and lubricants will be performed at the designated maintenance area;
- Maintenance area fitted with a waste oil tank to hold spent oils and will be returned to the suppliers as and when the tanks are full; and
- Separation of oil rags and other oily waste such as lubricant containers from other solid waste. Oily rags will be collected by an accredited waste management company for appropriate disposal.

8.9.4 Liquid Waste and Wastewater

Site Preparation and Material Handling Phase

Liquid waste will consist of mainly sewage (including urine) and grey water from hand washing and eatery sources. Workers at the Odawna and Pasico sites will be provided with mobile toilets units for use during the site preparation and material handling phases. Workers at the Korle-na site will use the toilet facility onsite at the equipment yard. Severe sanction (including deduction of percentage of salary and dismissal) will be applied to workers who engage in open urination/defecation. Grey water will be channelled into drains fitted with filters to trap to capture food particles for disposal.

Wastewater from the tyre wash at the handling sites will be channelled into onsite drains fitted with silt traps to trap the silt before disposal into nearby drains. Silt traps will be periodically emptied.

8.10 Fire Prevention and Control Measures

Site Preparation Phase

The fire prevention and control measures that will be instituted at all three sites to prevent and control fire outbreaks in line with the Fire Precaution (Premises) Regulations, 2003 (LI 1724) include the following:

- Securing a fire permit/certificate from the GNFS;
- Construction of fire hydrants for all the sites;
- Educating workers on fire prevention and firefighting equipment and measures;
- Provision of fire prevention and firefighting equipment, including fire extinguishers; and
- Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour.

Material Handling Phase

The fire prevention and control measures that will be instituted include the following:

Korle-na Site (Equipment Yard)

- Installation of smoke detectors and fire alarms at the –
  - Fuel storage tank; and
  - Near the separating fence wall from the GOIL LPG Station.
- Area for machinery servicing and welding works situated –
  - At 65m from the fuel storage tank; and
  - At 110m from the GOIL Gas Station.
- Posting of legible fire safety signs, e.g., “No Smoking”, “Switch-off Engines”, “Mobile Phones Off”, etc. conspicuously at the fuel storage area;
- Construction of concrete floor and bunded area around fuel storage tank to contain spills; and
- Prompt cleaning of accidental spills.

Korle-na, Odawna and Pasico Sites

- Validation of fire certificate from the GNFS;
- Provision of fire hydrants at each of the sites;
- Conducting weekly toolbox meeting on fire safety and the use of firefighting equipment;
- Provision of Fire Assembly Points;
- Provision of fire extinguishers;
- Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour; and
- Prompt cleaning of accidental spills.

Transportation Phase

The fire prevention and control measures to be instituted at the transportation phase includes the following:

- Provision of fire extinguishers in trucks;
- Provision of truck spill kit to clean possible spills; and
- Regular scheduled maintenance and servicing to be carried out on all trucks to improve performance.

8.11 Labour Rights Safeguard Measures

A Labour Management Plan (Appendix 11) derived from the Labour Act, 2003 (Act 651) will be implemented by the contractor as part of their contractual obligations. The contractor will, as part of the Labour Management Plan would institute measures (at the site preparation and material handling phases) to prevent infringement on labour rights through the following measures:

- Issuance of employment contracts to workers;
- Give fair compensation to workers;
- Promote the formation of union among workers; and
- Empowerment of women and PWD.

Issuance of Employment Contract to all Workers

The contractor is required to issue employment contract to all category of workers. The Labour Act also, makes provisions for the furnishment of the worker with a copy of the worker's contract of employment without prejudice.

Fair Compensation for Workers

To ensure that the workers are fairly compensated for work done, the contractor will be required to fulfil the following obligations as set out clearly in the employment contract with workers:

- Pay all workers compensation that is equal to or above the national minimum wage; and
- Pay male and female employees on the same work schedule equal compensation.

Promote the Formation of Union Among Workers

Workers would be given the opportunity to form or join any workers' union of their choice and participate in collective bargaining. The Labour Act, Section III also advocates for the right of the worker to join and form trade unions of his/her choice without any restrictive conditions of employment.

Empowerment of Women and PWD

To promote the empowerment of women and PWD, the following measures will be implemented:

- Employment of women and PWDs where feasible;
- Provision of –
  - Adequate access aids for any PWD workers; and
  - Adequate and separate sanitary facilities for women and PWDs.

Additional measures include:

- Provision of adequate and suitable PPE for workers including women and PWD.

8.12 Gender-Based Violence/Sexual Harassment Prevention Measures

Workers will be provided with extensive education on human rights, including Gender Based Violence and Sexual Exploitation and Abuse while ensuring each worker signs a code of conduct developed by the contractor that incorporates human right clauses. A grievance redress mechanism to report GBV/SEA/SH, and other human rights violations will be implemented during the site preparation and material handling phases for the prevention of gender-based violence.

Other measures to be implemented during the site preparation and material handling phases for the prevention of gender-based violence are presented below.

Site Preparation Phase

- Aiding victims to receive support from dedicated GBV service providers in the municipality/metropolis;
- Supporting the Social Welfare and Community Development Department (SWCDD) of Accra Metropolitan Assembly and the Korle Klottey Municipal Assembly to conduct public educational campaigns and sensitisation programmes on GBV/SEA/SH within the project areas (Pasico, Korlena and Odwana), and

During the site preparation, material handling and transportation phases, all GBV/SEA/SH cases received will be processed exclusively by the SSS of the GARID PCU and the SSS of

the MWH HSD. To facilitate easy resolution of these cases, a database of all Response Service Providers for SEA/SH has been created and integrated into the GRM system. This inventory includes providers in the areas of health, judicial, law enforcement, psychosocial, and legal aid, and is available for referrals by the GARID Project GRM.

Material Handling Phase

The contractor will develop and institute a GBV/SEA/SH Workplace Policy in line with the Sexual Exploitation and Abuse and Sexual Harassment Prevention and Response Action Plan. This policy will ensure that:

- The contractor will dismiss all perpetrators and report all incidences of GBV/SEA to the appropriate authorities and reported incidences will be followed up to ensure resolution;
- Victims are aided in receiving support from dedicated GBV service providers in the municipality/metropolis; and
- Supporting the SWCDD of Accra Metropolitan Assembly and the Korle Klottey Municipal Assembly to conduct public educational campaigns and sensitisation programmes on GBV/SEA/SH within the project areas (Pasico, Korlena and Odwana).

8.13 HIV Prevention Measures

The National HIV and AIDS Policy (2019) goal is to create an enabling environment for the development and execution of effective and efficient HIV and AIDS interventions and for the achievement of epidemic control. This policy provides the overarching perspective, position and direction of Ghana as it continues on its journey for an end to the epidemic of AIDS by 2030 which is the SDG 3 specific target 3.3.

An objective is to ensure the availability of adequate funding to execute the policy strategies. Also, the National Workplace HIV and AIDS Policy makes provision for protection of Persons Living with HIV (PLWHIV) such as non-discrimination, right to health, education, privacy and confidentiality, freedom of movement, disclosure of confidential information and prevention of HIV and AIDS spread among workers.

Although the risk of spread of HIV and STIs associated with the project is significantly low, the project still seeks to contribute towards the National HIV and AIDS Policy goal and objectives by contributing towards the control of the epidemic and subsequently to the end of the AIDS epidemic by 2030. The mitigation measures listed under the site preparation phase and material handling and transportation phase will contribute towards achieving this goal.

Site Preparation Phase

- Recruiting of majority of workers from the project localities; and
- Handling information on HIV status of workers with due care and confidentiality.

Workplace HIV Policy will be developed, and prevention clauses incorporated into the employment contract of workers by the Health and Safety Specialist of the Contractor in accordance with ILO Guidelines and the National HIV and AIDS Policy as well as National Workplace HIV/AIDS Policy and implemented during the site preparation phase and material handling and transportation phase, to help maintain a safe and healthy work environment including the following:

- Awareness creation among workers on HIV and AIDS risks and dangers through preventive programs including –
  - Facilitation of voluntary testing;
  - Safe sex practices, condom use, abstinence, etc.;
  - Peer counselling;
- Provision of condoms at accessible and convenient locations for workers and truck drivers; and
- Incorporation of the HIV Workplace Policy into working conditions to prevent discrimination or stigmatisation of workers based on their perceived or real HIV/AIDS status.

Community support and prevention measures will include financial support to:

- The District Health Directorate of the project area (Pasico, Odawna and Korle-na) to organize education campaign on HIV/AIDS in the community and the municipality; and
- To print and distribute awareness leaflets.

Material Handling Phase

Mitigation measures listed above for the Site Preparation phase apply also to the Material Handling phase.

8.14 COVID-19 Containment and Prevention Measures

The COVID-19 Restrictions enacted under Imposition of Restrictions (Covid-19 Pandemic) Instrument E.I. 64, was revised to make the wearing of nose masks optional while encouraging the public to continue the practice of handwashing and social distancing. In-person activities such as those that take place in mosque, churches, private parties and events have been resumed in full capacity requiring all persons present to be fully vaccinated.

The project activities both at the site preparation and the material handling and transportation phases would comply appropriately with the Government directives on COVID-19 to contain and avert transmission of the virus. In addressing this, the ESMP makes provisions for a budgetary allocation for implementing the protocols. The following requirements listed below would be put in place.

Site Preparation Phase

- Requiring workers to –

  - Avoid coughing or sneezing in public;
  - Stay at home if sick (and report accordingly);
  - Avoid crowds and contact with others, if sick;
- Sanctioning culpable workers by a caution in the first instance, and dismissal if repeated; and
- Provision of welfare relief package for infected workers who disclose COVID 19 status.

The budgetary allocation for implementing the protocols will specifically make the following provisions:

- Vaccination of workers;
- Routine disinfection of workplace;
- Entry logbook for workers and visitors;
- Water storage tank for constant supply of water;
- Standard COVID 19 response/containment requirements;
- Poster/signage on COVID-19 protocols;
- Disposal of used tissues and hand washed water; and
- Dust bins and wastewater containers.

Material Handling Phase

Mitigation measures listed above for the Site Preparation phase apply also to the Material Handling phase.

8.15 Resettlement Measures

Due to the displacement associated with the GARID Project, the application of the World Bank Operational Policy (OP 4.12) – Involuntary Resettlement is triggered. The policy requires the preparation of a Resettlement Action Plan (RAP) to address and mitigate the potential impacts of physical/economic displacement. In accordance with OP 4.12 and the national requirements on land acquisition and compensation i.e., the Land Act, 2020, etc. and the GARID Resettlement Policy Framework, a RAP, covering various interventions/locations including the handling and disposal sites, has been prepared and is being implemented.

The RAP outlines restitution measures and ensure that the affected persons are assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms to pre-displacement levels or to levels prevailing prior to the beginning of the project implementation, whichever is higher. The key components of the RAP include:

- Socio-economic baseline on project affected persons;
- Assessment of physical/economic displacement, and potential economic and social impacts;
- Eligibility criteria for and entitlements;
- Valuation and compensation for losses;
- Resettlement measures;

- Grievance redress mechanism;
- Resettlement implementation plan –
  - Implementation responsibilities;
  - Implementation schedule;
  - Costs and budget; and
- Monitoring and evaluation.

All compensation and relocation will be done in accordance with the RAP, prior to the site preparation phase of all the handling sites.

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 Introduction

A general Environmental and Social Management Plan (ESMP) has been developed for the project in accordance with the Environmental Assessment Regulations of 1999, LI 1652 and OP 4.0 to assist the handling and transportation of the dredged material to be carried out in an environmentally safe and sustainable manner. This ESMP (in an addition to the ESMP prepared in the ESIA for the Deferred Routine Maintenance Dredging of the Odaw Drainage Basin) will deliver mechanism for environmental and social mitigation and enhancement measures in the implementation of the project.

The Contractor for the material handling and transportation (waste disposal) will derive the substantive Contractor ESMP (C-ESMP) from this ESMP. The proposed method and process for the implementation of the handling and transportation activities will be based on this ESMP to ensure an efficient, safe and sustainable project implementation.

The ESMP is essential for guiding the successful implementation of the project's social and environmental measures throughout the life of the project. Having this framework in place ensures a systematic approach to bringing environmental and social considerations into decision making and day-to-day operations. It establishes a framework for tracking, evaluating and communicating environmental and social performance and helps ensure that environmental and social risks and liabilities are identified, minimised and managed. The ESMP will be a living document and will continue to be developed during the site preparation and material handling and transportation to enable continuous improvement and may require updating and submission to the EPA per the requirements of the environmental permit.

The objectives of the ESMP are to:

- Promote environmental and social management and communicate the aims and goals of the ESMP;
- Ensure that all workers, subcontractors and others involved in the project meet legal and other requirements with regard to environmental and social management;
- Incorporate environmental and social management into site preparation and material handling and waste transportation procedures;
- Provide a framework for implementing project environmental and social commitments; and
- Outline management commitment for the sustainable implementation of the proposed project.

9.2 Roles and Responsibilities

9.2.1 Ministry of Works and Housing

MWH is the responsible Government Ministry with oversight of the project. The MWH will assume responsibility and account for the permit obligations and conditions, as required under

LI 1652. The GARID Project Implementation Unit (PIU) at MWH, with technical support from the GARID PCU (specifically from the Environmental and Social Safeguard Specialists) will oversee the implementation of the E&S management measures of the project during the site preparation and material handling phases. The Environmental Focal Person (EFP) and Social Focal Person (SFP) of the PIU will monitor the Contractor throughout the project life and will submit regular reports on the ESMP implementation and other E&S safeguards performance to MWH and the GARID PCU. MWH will in turn submit the required environmental monitoring reports to EPA as would be specified in the conditions to the Environmental Permit, as well as to the World Bank (through the PCU) on quarterly or half-yearly basis.

9.2.2 Hydrological Services Department

The Hydrological Services Department (HSD) under the MWH, is responsible for the programming and co-ordination of construction and maintenance of storm drains within the country. The HSD, playing the role of the Supervision Consultant will supervise the dredging works on the Odaw River, the handling and treatment of dredged material at the handling sites and disposal of unusable material at the final disposal sites, as well as monitor the environmental and social performance of the Contractor. The HSD will work with the Contractor to ensure proper implementation of the environmental and social mitigation measures during its entire life span including the maintenance dredging phase.

The following key personnel in HSD will play roles in ESMP implementation:

- Resident Engineer;
- Environmental Safeguards Specialist (ESS); and
- Social Safeguards Specialist (SSS).

The HSD will report on the Contractor's E&S safeguards performance to the MWH. The MWH will in turn report on the Contractors' E&S safeguards performance, through the GARID PCU, to the World Bank and EPA on quarterly/half-yearly basis.

9.2.3 GARID PCU

The PCU will support HSD in the implementation and supervision respectively of the E&S components of the project including:

- Assistance in the tendering process;
- Supervision of Contractors by ESS & SSS of the PCU in collaboration with HSD; and
- Monitoring of handling, transportation and disposal of dredged material.

9.2.2 Contractor

The Contractor selected to undertake the dredging, handling and disposal of the dredged material will be responsible for the implementation of the proposed mitigation measures in this ESMP. The Contractor will be committed to provide the resources (appropriate human resources and specialised skills) essential for implementation and control of the ESMP and

will prepare and implement a detailed Contractor's environmental and social management plan (C-ESMP).

The Contractor will have dedicated competent personnel (ESS, SSS, Human Resource Manager and Health and Safety Specialist (HSS) on the basis of appropriate education, training, and experience that will manage and oversee the environmental, social and health and safety aspects of the complete scope of work. The main Contractor has the responsibility to monitor itself as well as any sub-contractors and main suppliers on environmental and social performance.

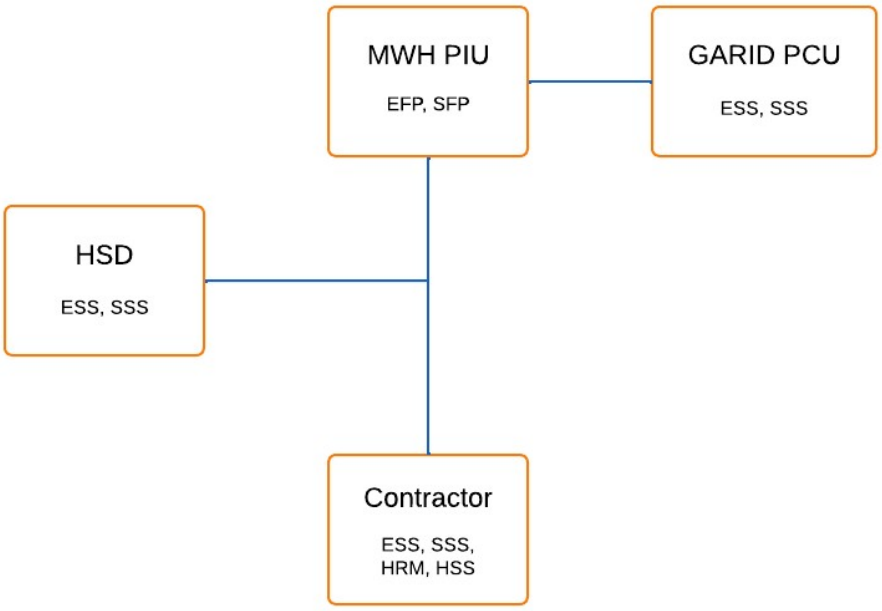


Figure 9. 1 Project Implementation Management Structure

9.3 Action Plans

The tables below give an overview of the ESMP for the site preparation and material handling and transportation phases respectively and constitute the action plans that define the approaches that will be used to ensure that the desired outcomes are achieved for project sustainability. The specific objectives of the Action Plans are to:

- Prevent vehicular accident, knockdowns at the handling site and its environs and public safety in communities along haulage route;
- Minimize GHG emissions from project activities;
- Safeguard the quality of ambient air in the project area by minimizing the generation of dust and other air emissions;
- Ensure the safety of workers and the public from odour nuisance and other health and safety concerns;
- Minimise the visual impact from the project;

- To ensure that workers are not exposed to heavy metals detected in high quantities and to avoid the dire health impact associated with the ingestion or inhalation of these heavy metals;
- To minimise the exposure of the public and workers to noise and vibration;
- Ameliorate project-induced social changes and manage community apprehension;
- To safeguard the rights of all workers and ensure fair treatment, non-discrimination and equal opportunity for all workers;
- To prevent any form of gender-based violence and sexual harassment against workers and members of the community;
- To minimise the potential risk of spread of HIV/AIDS among workers and in the project community; and
- To prevent and contain COVID-19 infections and transmission.

The specific environmental, social and related safeguards Action Plans cover the following:

1) Traffic improvement and accident prevention plan;
2) Noise and vibration minimization plan;
3) Dust and other emission control plan;
4) Occupational health and safety plan;
5) Public/community health and safety plan;
6) Heavy metal exposure avoidance plan;
7) Visual intrusion minimization plan;
8) Flood prevention and control plan;
9) Waste segregation and disposal plan;
10) Fire prevention and control plan;
11) Labour rights safeguard plan;
12) Gender-based violence/sexual harassment prevention plan;
13) HIV prevention plan;
14) COVID-19 containment and prevention plan; and
15) Resettlement implementation plan.

9.3.1 Traffic Improvement and Accident Prevention Plan

The objective of this plan is to improve future traffic performance and to enhance road safety. This will minimize the potential for road accidents, knockdowns, traffic congestion, deterioration of existing roads and conflict at the entry/exit points. The plan is presented in Table 9.1.

Table 9. 1 Traffic Improvement and Accident Prevention Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Site entry and exit conflict on the major access roads causing accidents	• Deployment of banksmen to control traffic at entry and exit points at the various handling sites.	ESS of Contractor	HSD & PCU

Poor state and narrow sections of access routes in Anyaa and Pokuase with health and safety concerns for road users and roadside households	• Spot improvement and surface dressing of sections of the access routes to the disposal sites at Anyaa and Pokuase.		
Material Handling and Transportation Phase			
Site entry and exit conflict on the major access roads leading to accidents	• Use of banksmen to regulate the entry and exit of trucks to/from the sites	ESS of Contractor	HSD & PCU
Additional traffic generation and related congestion with elevated GHG emissions	• Adoption of night-time waste haulage to avoid traffic congestion and minimize emissions. • Scheduled maintenance of trucks • Loading of trucks ahead of departure window • Transportation of waste at intervals of 10 minutes to avoid convoy movement of waste trucks • Use of trucks not older than 5 years and documented servicing regime maintained to avoid breakdown in transit		
Accident involving waste trucks affecting truck drivers and/or pedestrian	• Availability of a Co-driver on each trip to aid the driver • Adherence to 50km/hr speed limit for haulage trucks. • Installation of GPS • Inscription of appropriate phone contacts on trucks for reporting careless/inconsiderate driving		
Truck break-down in transit causing accidents at nightfall	• Towing system with a third party contracted to remove breakdown trucks with 30min of reporting		
Limited storage space at handling sites.	• Prearrangement with off-takers for sale and pick-up of reusable materials (aggregates and sand)	Contractor	HSD & PCU

9.3.2 Noise and Vibration Minimisation Plan

The objective of this plan is to minimise the exposure of the public and workers to noise and vibration. The plan is presented in Table 9.2.

Table 9. 2 Noise and Vibration Minimisation Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Noise and vibration from machinery operation	• Erection of perimeter fence as noise barriers to help attenuate noise • Inspection of machinery and confirmation of good state and condition before use • Switch off all idle engines • Padded seats fitted in mobile equipment and worn-out pads promptly replaced • Provision of vibration reduction gloves for handheld equipment operators.	ESS of Contractor	HSD & PCU

	• Provision and usage of PPE including earplugs		
Material Handling and Transportation Phase			
Machinery/equipment deployed at the handling sites	Mitigation measures listed above for the Site Preparation Phase also applies to the Material Handling Phase except for the procurement and use of handheld noise monitoring meters at all sites	ESS of Contractor	HSD & PCU
Transportation Phase			
Cumulative noise from fleet of waste trucks in transit (on busy roads) to disposal sites	• Night-time haulage of waste to disposal sites during low traffic period to reduce noise • Follow scheduled maintenance for the waste trucks • Installation of speed ramps on access roads to disposal sites • Installation of and adherence to speed limit on disposal routes • Honking prohibited in communities along the disposal route (in Anyaa and Pokuase) • Advance notification of the schedule of waste transfer to residents along the disposal routes in Anyaa and Pokuase	ESS of Contractor	HSD & PCU

9.3.3 Dust and other Emissions Control Plan

The objective of this plan is to minimise and control the exposure of dust and other emissions to the public and workers. The plan is presented in Table 9.3.

Table 9. 3 Dust and Other Emissions Control Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Dust and other emissions from machinery and haulage trucks	• Erection of perimeter fencing for enclosure of the sites to reduce dust escape into the environment • Provision and use of PPEs (including nose masks) to workers • Inspection of machinery and confirmation of good state and condition before use • Switching off idle machinery • Dousing of the sites twice daily (minimum) • Adherence to speed limit of 30km/hr on-site • Covering of trucks carrying laterite with tarpaulin	ESS of Contractor	HSD & PCU
Material Handling Phase			
Dust and emissions from machinery and haulage trucks	Mitigation measures listed above for the Site Preparation phase apply also to the Material Handling phase except for the regular maintenance of machinery Portable dust monitoring meters with specialized probes to measure concentrations of different size particulates such as SO2, etc., will be procured for use at all sites by PIU, Contractor, Supervision Consultants' and ESS / SSS of PCU.	ESS of Contractor	HSD & PCU
Transportation Phase			

Dust and emissions from haulage trucks	• Maintaining efficient performance of waste trucks by following maintenance schedules • Covering of the waste trucks with tarpaulin to prevent dust flyoff and other releases • Installation of and adherence to speed limit of 30km/hr on disposal routes (in Anyaa and Pokuase)	ESS of Contractor	HSD & PCU

9.3.4 Occupational Health and Safety Plan

The objective of this plan (Table 9.4) is to avoid potential accidents and offer first aid services for accidents and emergencies.

Table 9. 4 Occupational Health and Safety Plan

Causes	Mitigation	Responsibility	Supervision
Site Preparation Phase			
Workplace accidents including knockdowns trips, slips and fall and chemical exposure	• Implementation of labour management plan • Provision and usage of PPE • Use of banksmen at the entry/exit to the sites • Installation of reverse alarms • Training of workers on health and safety • Provision of First Aid Box and training of First Aid Attendants • Training of workers on First Aid • Use of wheelbarrows /mechanical lifting aids • Observance of good housekeeping practices • Adequate supervision • Procurement of Workmen's Compensation Policy (Insurance)	HSS of Contractor	HSD & PCU
Material Handling Phase			
Workplace accidents including knockdowns trips, slips and fall and chemical exposure	• Implementation of labour management plan • Provision and use of PPE • Use of banksmen on-site • Installation of reverse alarms • Training of workers on health and safety • Provision of First Aid Box and training of First Aid Attendants • Observance of good housekeeping practices • Training of workers on First Aid • Adequate supervision • Procurement of Workmen's Compensation Policy (Insurance)	HSS of Contractor	HSD & PCU

9.3.5 Public/Community Health and Safety Plan

The objective of this plan (Table 9.5) is to protect the public/community along the disposal route against knockdowns.

Table 9.5 Public/Community Health and Safety Plan

Causes	Mitigation	Responsibility	Supervision

Transportation Phase			
Knockdowns by haulage trucks	• Adherence to the 30km/hr speed limits in the communities • Training of drivers on defensive driving • Installation of temporary (earthen)speed ramps • All accidents/injuries/near misses will be reported, recorded and documented	HSS of Contractor	HSD & PCU

9.3.6 Heavy Metal Exposure Avoidance Plan

The objective of this plan is to ensure that workers are not exposed to heavy metals detected in high quantities (Zn, Co and Pb) at the various sites, i.e., Korle-na, Pasico and Odawna to avoid the dire health impact associated with the ingestion or inhalation of these heavy metals. This will be consistent with WBG General Environmental Health and Safety Guidelines which recognise that workers are to operate in safe and healthy working conditions. The plan is presented in Table 9.6.

Table 9.6 Heavy Metal Exposure Avoidance Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Excavated and other earth works	• Deployment of machinery for the site preparatory activities (with minimal manual involvement) to avoid human contact • Provision and usage of appropriate PPE • Provision of changing room for PPE storage area at the end of working day • Regular cleaning/laundry of working gear • Provision of First Aid Box • Sensitization of workers on dangers of exposure to heavy metals • Provision of medical care for workers infected with diseases as a result of exposure to the heavy metals	ESS of Contractor	HSD & PCU
General movement (vehicular and workers) on project site picking/releasing contaminated soil particles	• Sensitization of workers on – o Dangers of exposure to heavy metals o Thorough handwashing before meals and after work o Practice of personal hygiene		
Contamination associated with transfer of excavated spoil for disposal	• Bury excavated spoil at the respective handling sites and cover with a layer of laterite (3-inch)		
Material Handling Phase			
Potential washing of heavy metal by run off into channel/lagoon	• Inspection of integrity of laterite layer (3-inch)	ESS of Contractor	HSD & PCU
Non-adherence to basic hygiene practices such as regular handwashing	• Change of working gear at close of work to avoid transferring heavy metal contaminants home • Provision and usage of appropriate PPE (gloves, safety boots, etc.)		

	• Provision of First Aid Box • Provision of medical care for workers infected with diseases as a result of exposure to the heavy metals • Regular cleaning/laundry of working gear • Sensitization of workers on – o Dangers of exposure to heavy metals o Thorough handwashing before meals and after work o Practice of personal hygiene		

9.3.7 Visual Intrusion Minimisation Plan

The objective of the plan is to prevent as far as possible visual impacts on the travelling public (on the Ring Road West, Guggisberg Avenue, and Graphic Road Overpass) and other people nearby, including the access roads at Anyaa and Pokuase from the site preparation, handling of the dredged material as well as waste transportation to the disposal sites. Table 9.7 outlines the sources of the visual impacts, the mitigation measures and the corresponding responsibilities for those measures as well as the supervisory roles for effective implementation actions required.

Table 9. 7 Visual Intrusion Minimisation Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Deployment of machinery for site clearing and levelling	• Construction of perimeter fence around the handling sites to obscure operations inside	ESS of Contractor	HSD & PCU
Material Handling Phase			
Dredged material stockpiling operation Heaped dredged material	• Rehabilitation of perimeter fence erected at the site preparation phase • Heap of dredged material would not tower over the 2.5m fence wall • Ensure frequent evacuation and transportation of the waste and saleable materials to avoid over-heaping	ESS of Contractor	HSD & PCU
Transportation Phase			
Convoy movement of waste trucks potentially causing visual nuisance Waste spills from haulage trucks	• Trucks to move at 10-minute intervals to avoid convoys • Loading and haulage of waste conducted at night • Haulage trucks will be covered with tarpaulin to prevent waste spills • Haulage trucks will be labelled with contact numbers for reporting of waste spills		

9.3.8 Flood Prevention and Control Plan

The objective of the plan is to prevent as far as possible the flooding of the handling sites. Table 9.8 outlines the sources, mitigation measures and the corresponding responsibilities for the measures necessary to facilitate effective implementation and supervision.

Table 9. 8 Flood Prevention and Control Plan

Causes/Sources	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			

Overflow of the Odaw Channel	• Preparatory works such as raising the frontage of the Odawna and Pasico sites towards the Odaw channel to minimize likelihood of flooding	ESS of contractor	HSD & PCU
Inadequate/absence of drains at Pasico and Korle-na areas which could cause flooding of the sites	• Construction of earth drains of adequate sizes at the Korle-na, Pasico sites and along the route to the Odawna area		
Material Handling Phase			
Korle-na Site			
Damaged drains at the Korle-na handling sites	• Reconstruction of the damaged sections of drains • Construction of road shoulder drain along the Ring Road West Road of adequate size to trap runoff	ESS of contractor	HSD & PCU
Pasico Site			
Inadequate drain at the Pasico handling site	• Lining the unlined section (12m) of the trapezoidal drain with concrete • Construction of a drain of adequate size along the Pasico wall to trap runoff from the Pasico yard • Construction of a circular drain of adequate size from the main Pasico Yard outlet of length 70.0m to Odaw River	ESS of contractor	HSD & PCU
Odawna Site			
Inadequate drain along the route to the Odawna handling site	• Construction of a drain of adequate size along the untarred road from the VIP Bus Terminal to the Odawna handling site near the Odaw main channel	ESS of contractor	HSD & PCU

9.3.9 Waste Segregation and Disposal Plan

The objective of this plan is to minimize the impacts of waste on the environment, reduce the likelihood of and odour nuisance and insanitary surroundings at both the site preparation phase and material handling phase. The plan is presented in Table 9.9.

Table 9. 9 Waste Segregation and Disposal Plan

Waste Type	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Excavated spoil and waste from clearing activities	• Excavated spoil will be used as filling material before site covering with laterite • Waste from clearing works at sites will be collected by an accredited waste management company for disposal	ESS of Contractor	HSD & PCU
Segregated waste	• Segregate waste into colour coded bins for the following and outsourced to waste contractors: o Domestic waste; o Construction waste; and o Recyclable materials.		

Liquid waste	• Mobile toilet units to be provided for workers at Pasico and Odawna • Workers at Korle-na to use the toilet facility onsite • Waste from mobile toilet to be dislodged by an accredited waste management company		
Material Handling Phase			
Segregated waste	• Domestic waste will be segregated into appropriate colour coded waste bins • Recyclable materials will be collected by accredited recycling companies • Special containers will be transferred to a designated and accredited waste handling companies • Green bin will be collected by an accredited waste management company for disposal.	ESS of Contractor	HSD & PCU
Oily waste	• Designate and prepare an impervious platform as maintenance area for machinery and equipment servicing at the equipment yard • Activities involving use of oil and lubricants will be performed at the equipment yard • Maintenance area will be fitted with waste oil tank to hold waste oil temporarily • Servicing will be undertaken by a skill personnel • Waste oil will be returned to supplier when tanks are full • Oil rags will be separated from other solid waste and collected by an accredited waste company		
Liquid waste and wastewater	• Mobile toilet units to be provided for workers at Pasico and Odawna • Workers at Korle-na to use the toilet facility onsite • Sanction will be applied to workers who engage in open defecation or urination practices • Grey water will be channelled into drains fitted with filters • Wastewater from tyre wash to be channelled into onsite drains fitted with silt traps before ending up in nearby drains		

9.3.10 Fire Prevention and Control Plan

The objective of this plan is to ensure fire prevention and effective fire safety at the sites and during the transportation of the dredged material. The plan is presented in Table 9.10.

Table 9. 10 Fire Prevention and Control Plan

Causes/Sources	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
• Machinery and equipment deployment at the handling sites	• Securing of fire permit/certificate from the GNFS • Construction of fire hydrants for all the sites	ESS of Contractor	HSD & PCU

• Dropping of cigarette butts by smoking workers	• Education of workers on fire prevention and fire fighting equipment and measures • Provision of fire prevention and fire fighting equipment, including fire extinguishers • Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour		
Material Handling Phase			
Korle-na Site			
• Location of Fuel Storage Station within the Korle-na Site • An offsite GOIL Gas (LPG) Station adjacent to the Korle-na Site • Electrical hazard (overloaded outlets and circuits, etc.) • Welding sparks • Fuel and oil spills	• Installation of smoke detectors and fire alarms at the – o Fuel storage tank o Near the separating fence wall from the GOIL LPG Station • Area for machinery servicing and welding works situated – o At 65m from the fuel storage tank o At 110m from the GOIL Gas Station • Posting of legible fire safety signs, e.g., "No Smoking", "Switch-off Engines", etc. at the fuel storage area • Construct concrete floor and bunded area around fuel storage tank to contain spills • Prompt cleaning of accidental spills	ESS of Contractor	HSD & PCU
Korle-na, Odawna and Pasico Sites			
• Dropping of cigarette butts by smoking workers • Fuel and oil spills	• Validation of fire certificate from the GNFS • Provision of fire hydrant at each of the site • Conducting weekly toolbox meeting on fire safety and use of firefighting equipment such as fire extinguisher and fire hydrants • Provision of Fire Assembly Points • Provision of fire extinguishers • Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour • Prompt cleaning of accidental spills	ESS of Contractor	HSD & PCU
Transportation Phase			
• Fuel leakages • Electrical system failures	• Provision of fire extinguishers in trucks • Provision of truck spill kits • Regular scheduled maintenance and servicing to be carried out on all trucks to improve performance	ESS of Contractor	HSD & PCU

9.3.11 Labour Rights Safeguards Plan

The objective of this plan is to safeguard labour rights of all workers. The plan is presented in Table 9.11.

Table 9. 11 Labour Rights Safeguard Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision

Site Preparation Phase			
• Non-issuance of employment contracts to workers • Unfair compensation for workers • Inability of workers to organise	• Issuance of employment contracts to all categories of workers to indicate o Worker compensation equal to or above national minimum wage o Equal compensation for both male and female workers o Clauses to promote formation of workers' union and collective bargaining	Human Resource Manager of contractor	HSD & PCU
Provision of ill-fitting PPE	• Provision of adequate and suitable PPE to workers, particularly women and PWD	HSS of Contractor	
Marginalisation of women and PWD	• Employment of women and PWDs where feasible • Provision of adequate access aids for workers with disability • Provision of adequate separate sanitary facilities for women and workers with disability	Human Resource Manager of contractor SSS of Contractor	
Material Handling Phase			
• Non-issuance of employment contracts to workers • Unfair compensation for workers • Inability of workers to organise	• Issuance of employment contracts to all categories of workers to indicate o Worker compensation equal to or above national minimum wage o Equal compensation for both male and female workers o Clauses to promote formation of workers' union and collective bargaining	Human Resource Manager of Contractor	HSD & PCU
Provision of ill-fitting PPE	• Provision of adequate and suitable PPE to workers, particularly women and PWD	HSS of Contractor	
Marginalisation of women and PWD	• Employment of women and PWDs where feasible	Human Resource Manager of Contractor	

9.3.12 Gender-Based Violence/Sexual Harassment Prevention Plan

The objective of this plan is to prevent any form of workplace violence and sexual harassment and to ensure that the human rights of workers are protected. The plan is presented in Table 9.12.

Table 9. 12 Gender-Based Violence and Sexual Harassment Prevention Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
• Soliciting for sexual favours from female job seekers and employees • Sexual harassment/abuse of work colleagues	• Cases of GBV/SEA/SH will be reported through all outlets of the GRM and will be processed/handled solely by the SSS of the GARID PCU and SSS of MWH HSD • Victims will be aided to receive to receive support from the dedicated GBV service providers in the municipality/metropolis	SSS of Contractor	SSS of PCU & HSD

Sexual harassment/abuse of community women and girls	• Workers will be educated on human rights protection • Workers to sign a code of conduct • Support the SWCDD on GBV/SEA/SH educational campaigns	SSS of Contractor	SSS of HSD & PCU
Material Handling Phase			
• Employers soliciting for sexual favours from female job seekers • Supervisors/workers sexually harassing/abusing female colleagues	• Cases of GBV/SEA/SH will be reported and handled through the GRM • GBV/SEA/SH Workplace Policy will be developed and implemented • Victims will be aided to receive support from dedicated GBV service providers in the municipality/metropolis	SSS of Contractor	SSS of HSD
Sexual harassment/abuse of community women and girls	• Workers will be educated on human rights protection • Workers to sign a code of conduct • Support the SWCDD on GBV/SEA/SH educational campaigns		SSS of HSD & PCU

9.3.13 HIV Prevention Plan

The objective of the plan in Table 9.13 outlines measures to minimize the potential risk of spread of HIV/STIs and also contribute to attaining the National HIV and AIDS policy target of ending the epidemic of AIDS by 2030. The containment plan will also be consistent with the National Workplace HIV/AIDS Policy to put measures in place to provide protection from discrimination against people living with HIV and AIDS.

Table 9. 13 HIV and STIs Containment Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Workers with high disposable income	• Recruiting majority of workers from the project area • Handling information on HIV status of workers with due care and confidentiality	SSS of Contractor	HSD & PCU
Presence of commercial sex workers	Implementation of HIV/AIDs Workplace Policy, and incorporation of prevention clauses in employment contract including the following – • Awareness creation among workers through preventive programs including – o Facilitation of voluntary testing o Safe sex practices, condom use, abstinence, etc. o Peer counselling • Provision of condoms at accessible and convenient locations • Incorporation of the HIV Workplace Policy into working conditions to prevent discrimination or stigmatisation of workers		
Stigmatization	• HIV/STIs awareness creation among workers • Support to the Municipal Health Directorate of the project area (Odawna, Pasico and Korle-na) to		

	print and distribute awareness leaflets and organise education campaign on HIV/AIDS in the community and the municipality.		
Material Handling Phase			
Workers with high disposable income	• Recruiting majority of workers from the project area • Handling information on HIV status of workers with due care and confidentiality	SSS of Contractor	HSD & PCU
Presence of commercial sex workers	Implementation of HIV/AIDs Workplace Policy, and incorporation of prevention clauses in employment contract including the following – • Awareness creation among workers through preventive programs including – o Facilitation of voluntary testing o Safe sex practices, condom use, abstinence, etc. o Peer counselling • Provision of condoms at accessible and convenient locations		
Stigmatization	• HIV/STIs awareness creation among workers • Support to the Municipal Health Directorate of the project area (Odawna, Pasico and Korle-na) to print and distribute awareness leaflets and organise education campaign on HIV/AIDS in the community and the municipality		

9.3.14 COVID-19 Containment and Prevention Plan

The objective of the plan is to ensure availability of resources, adherence to the protocols, prompt reporting and prevention of stigmatization during the site preparation and material handling and transportation phases. These are outlined in table 9.14.

Table 9. 14 COVID-19 Containment and Prevention Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
Poor public health attitude and unhygienic habits	• Implementation of COVID-19 protocols	HSS of Contractor	HSD & PCU
Failure to allocate a budget for COVID-19 prevention measures	• Requisite investments/budget for provision of standard COVID-19 protocol response requirements		
Misconceptions and persons reluctance to COVID-19 vaccination	• Requiring workers to be fully vaccinated		
Non-compliance with COVID-19 protocols	• Sanctioning culpable workers by a caution in the first instance, and dismissal if repeated		
Workers concealing infection	• Welfare relief package for infected workers who discloses COVID 19 status		
Material Handling Phase			

Poor public health attitude and unhygienic personal habits	• Implementation of COVID-19 protocols	HSS of Contractor	HSD & PCU
Failure to allocate a budget for COVID-19 prevention measures	• Requisite investments/budget for provision of standard COVID-19 protocol response requirements		
Misconceptions and persons reluctance to COVID-19 vaccination	• Requiring workers to be fully vaccinated		
Non-compliance with COVID-19 protocols	• Sanctioning culpable workers by a caution in the first instance, and dismissal if repeated		
Workers concealing infection	• Welfare relief package for infected workers who discloses COVID 19 status		

9.3.15 Resettlement Implementation Plan

The objective of this plan is to prevent and minimise loss of property and livelihood due to project activities during the site preparation phase. The ongoing RAP will include a preparation and implementation schedule, comprehensive grievance redress mechanism (GRM), monitoring and evaluation measures and the various teams/committees made up of key stakeholders who will be responsible for the implementation of the RAP. Table 9.15 outlines the required mitigation measures and responsibility as well as supervisory roles.

Table 9. 15 Resettlement Implementation Plan

Cause/ Source	Mitigation Measures	Responsibility	Supervision
Site Preparation Phase			
• Relocation of existing structures on the sites (at Odawna and Pasico) affecting PAPs • Disruption of economic activities at the sites affecting livelihoods	• Preparation and implementation of a Resettlement Action Plan (RAP) which is ongoing for the Odawna and Pasico sites. • The RAP will outline restitution measures for the social and property impacts, and to ensure that the affected persons are assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms to pre-displacement levels or to levels prevailing prior to the beginning of the project implementation, whichever is higher.	SSS of MWH PIU	SSS of PCU

9.4 ESMP Implementation Capacity

The availability of qualified personnel with the requisite capacity is not only an essential component of the ESMP, but also a requirement to effectively drive implementation of the ESMP. The various action plans and the required supervisory and related stewardship responsibilities could only successfully deliver results contingent on adequate E&S capacity of the specified actors and stakeholders.

The personnel of the HSD, MWH PIU and PCU need the requisite capacity as the lead drivers of E&S compliance. The capacity building and training needs assessment for the Contractor

have been provided for in the ESIA. This section focuses largely on the need assessment for the ESS and the SSS (Appendix 12).

From the assessment, there is the need to organize a refresher programme for all personnel involved in the implementation of the ESMP with particular emphasis on waste handling and disposal as well as the action plans that cover public and occupational health and safety. A budget has not been allocated since this has been incorporated into the capacity building budget of the substantive ESIA project.

9.5 Environmental and Social Management Implementation Budget

The budget for the implementation of this ESMP as outlined in the specific action plans is for a period of 18 months. This budget excludes the activities/actions already costed for under the ESMP for the dredging project EIA. This budget (Table 9.16) should however be seen as only indicative for guidance purposes. The estimated budget for undertaking these activities is USD 314,400.

Table 9. 16 Environmental and Social Management Implementation Budget

Cost Areas	Activity	Budget ($)
1) Traffic improvement and accident prevention plan	• Instituting a haulage management plan (banksmen, co-driver, towing system, etc.) • Surface dressing and spot improvement for access routes (Anyaa and Pokuase)	150,000
2) Noise and vibration minimisation plan	• Installation of noise barriers (fencing of project site) • Scheduled maintenance of machinery and equipment • Purchase of PPE including earplugs • Procurement of noise monitoring meters • Installation of speed limit and ramps • Organisation of sensitisation programmes	51,400
3) Dust and other emissions control plan	• Dousing of project sites • Purchase of tarpaulin sheets • Procurement of dust monitoring meters	30,000
4) Heavy metal exposure avoidance plan	• Weekly washing of working gear	9,000
5) Visual intrusion minimisation plan	• Installation of perimeter fences for each handling site (covered under noise and vibration minimisation plan) • Installation of labelled stickers on trucks	2,000
6) Flood prevention and control plan	• Construction of drains • Desilting of drains	30,000
7) Occupational health and safety plan	• Purchasing of PPE • Training of workers on First Aid • Training of workers on health and safety	10,000
8) Public/community health and safety plan	• Training of drivers on defensive driving • Installation of temporary (earthen)speed ramps	5,000
9) Waste segregation and disposal plan	• Purchasing of bins for segregation for all sites • Waste transfer services	6,000

10) Fire prevention and control plan	• Provision of firefighting equipment • Installation of smoke detector and heat alarm	5,000
11) HIV containment plan	• HIV/AIDS awareness creation among workers • Provision of condoms at accessible locations • Supporting the Health Directorate on HIV awareness campaign in the Municipality • Support to print and distribute leaflets	10,000
12) COVID-19 containment and prevention plan	• Purchase of nose masks, handwash soaps, hand sanitizers and dust bins • Vaccination of workers.	6,000
Total Cost		314,400

10.0 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

10.1 Introduction

Monitoring would be a key component of the ESMP during project implementation. Monitoring would be undertaken at both the site preparation and material handling and transportation phases to verify the effectiveness of impact management, including the extent to which mitigation measures are successfully implemented. Monitoring would primarily involve the following:

- Compliance monitoring; and
- Impact monitoring.

The aim of monitoring would be to:

- Improve environmental and social management practices;
- Check the efficiency and quality of the management processes;
- Monitor the effectiveness of the mitigation and enhancement measures;
- Establish the reliability and credibility of the mitigation measures;
- Determine long-term and residual effects;
- Provide the opportunity to report the results on safeguards and impacts and propose mitigation measures to improve E&S performance; and
- Identify project-specific cumulative environmental and social effects, if applicable.

10.1.1 Compliance Monitoring

Monitoring of impacts and mitigation measures would be carried out by the relevant staff of the Contractor. This is to verify that the required mitigation measures are being implemented. Compliance monitoring would include inspections during site preparation to verify the extent to which mitigation measures and EPA permit conditions are being adhered to. The material handling and transportation activities will also be monitored by Environmental and Social Safeguards Specialists of the HSD, MWH PIU and PCU.

10.1.2 Impacts Monitoring

The E&S Safeguards Specialists of the HSD, MWH PIU and PCU would be involved in periodic impacts and mitigation monitoring. The HSD through its safeguards specialists would ensure Contractors submit reports on work progress and any challenges in observing the E&S safeguards. The monitoring results would form a major part of the reports to be submitted to the EPA.

10.2 Monitoring Plans

These plans identify the monitoring parameters, distinguish the project phases, frequency and monitoring responsibility for implementation of the appropriate measures developed to reduce the impacts and risks associated with the project. Monitoring information will be compiled in annual reports/EMP (depending on the permit condition) and submitted to EPA. Monitoring activities will be based on the following specific plans:

1) Traffic improvement and accident prevention monitoring plan;
2) Noise and vibration monitoring plan;
3) Dust and other emission monitoring plan;
4) Occupational health and safety monitoring plan;
5) Public/community health and safety monitoring plan;
6) Heavy metal exposure monitoring plan;
7) Visual intrusion minimisation monitoring plan;
8) Flood prevention and control monitoring plan;
9) Waste segregation and disposal monitoring plan;
10) Fire prevention and control monitoring plan;
11) Labour rights safeguards monitoring plan;
12) Gender based violence/sexual harassment prevention monitoring plan;
13) HIV and STIs prevention monitoring plan;
14) COVID-19 containment and prevention monitoring plan; and
15) Resettlement monitoring plan.

10.2.1 Traffic Improvement and Accident Prevention Monitoring Plan

The plan for monitoring traffic congestions, road accidents and knock downs is presented in Table 10.1.

Table 10. 1 Traffic Improvement and Accident Prevention Monitoring Plan

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility
Site Preparation Phase				
Deployment of banksmen to control traffic and manage the entry and exit points at the various handling sites	Review of accident records and near misses at the site entry/exit	Number of accident/near misses	Daily	Contractor/ HSD
Spot improvement and surface dressing of sections of the access routes to the disposal sites at Anyaa and Pokuase.	• Review of complaints by community folk through the grievance redress mechanism • Inspect road condition of the access routes to the Anyaa and Pokuase sites	• Records of complaints by community folk through the grievance redress mechanism • Road condition of the access routes	Bi-weekly	
Material Handling and Transportation Phase				
Use of banksmen to regulate the entry and exit of trucks to/from the sites	Review of accident records and near misses at the site entry/exit	Number of accident/near misses	Daily	Contractor/ HSD
Adoption of night-time waste haulage to avoid traffic congestion and minimize emissions	Review of haulage records	Records of time of departure of haulage trucks	Weekly	
Servicing of trucks on schedule	Review of maintenance schedule	Number of times serviced	Weekly/ Monthly	

• Loading of trucks ahead of departure window				
Trucks to move at 10-minute intervals to avoid convoy movements	Review records of haulage intervals	Records of time of departure of haulage trucks		
Use of trucks not older than 5 years	Check year of purchase	Year of purchase	Before the start of the project	
Adherence to 50km/hr speed for haulage trucks	Check compliance of speed limit	GRM records, engagement with community	Bi-weekly	
Installation of GPS	Check truck speed Track truck route Record traffic conditions Record travel time to and from disposal sites Record loading and offloading times	GPS records on speed, time and position	Daily	
Inscribing appropriate phone contacts on the trucks	Check presence of phone number	Visibility from a distance	Impromptu	
Implementing a towing system with a third party	Confirm the contract agreement with towing company	Signed contract	Before the start of the project	
Prearrangement with off-takers for sale and pick-up of aggregates and sand	Confirm agreement with off-takers Review off-taker pick-up schedule	Signed contract Quantities and times scheduled for pick-up	Before the start of the project Weekly	HSD

10.2.2 Noise and Vibration Monitoring Plan

The plan for monitoring noise and vibration is presented in Table 10.2.

Table 10. 2 Noise and Vibration Monitoring Plan

Mitigation	**Monitoring Measures**	**Parameters**	**Frequency**	**Responsibility**
Site Preparation Phase				
Inspection of machinery and confirmation of good state and condition before use	Review of records of the state of machinery before use	Servicing records	Quarterly	Contractor/ HSD
Switch off all idle engines	Check for any idle engine running	Idle engines running	Daily	
Padded seat fitted in mobile equipment and worn-out pads replaced	Check on fitted pads in seats of mobile equipment	Padded seats in mobile equipment	Weekly	
Provision of vibration reduction gloves for handheld equipment operators.	Records of provision and use of vibration reduction gloves	Number of workers using vibration reduction gloves		

Erection of perimeter fence as noise barriers to help attenuate noise	Inspect integrity of perimeter fencing at each site	Integrity of perimeter fences		
Provision and usage of PPEs including earplugs for workers	Records of provision of PPE Check on the usage of PPE	Number of workers using PPE	Impromptu	
Material Handling Phase				
Inspection of machinery and confirmation of good state and condition before use	Review of records of the state of machinery before use	Servicing records	Quarterly	Contractor/ HSD
Switch off all idle engines	Check for any idle engine running	Idle engines running	Daily	
Padded seat fitted in mobile equipment and worn-out pads replaced	Check on fitted pads in seats of mobile equipment	Padded seats in mobile equipment	Monthly	
Provision of vibration reduction gloves for handheld equipment operators.	Records of provision and use of vibration reduction gloves	Number of workers using vibration reduction gloves		
Erection of perimeter fence as noise barriers to help attenuate noise	Inspect integrity of perimeter fencing at each site	Integrity of perimeter fences		
Provision of PPE including earplugs for workers	Records of provision and use of PPE	Number of workers using PPE		
Enforce the usage of PPE	Check the usage of PPE		Impromptu	
Procurement and use of handheld noise monitoring meters at all sites	Inspect availability and use of handheld noise monitoring meters	Availability and use of handheld noise monitoring meters	Weekly	
Transportation Phase				
Night-time haulage of waste to disposal sites during low traffic period to reduce noise	Review of truck movement and haulage logbooks	• Time of haulage • Number of trucks per trips	Daily	Contractor/ HSD
Follow scheduled maintenance for the waste trucks	Review records of servicing	Records of servicing	Quarterly	
Installation of and adherence to speed limit on disposal routes	Review of records of engagement with residents on - ○ Honking and noise making by trucks; ○ Speeding; ○ Advance notification; and ○ Response to complaints and resolution etc	Complaints from residents	Monthly	
Honking prohibited in communities along the disposal route (in Anyaa and Pokuase)				
Advance notification of the schedule of waste transfer to residents along the disposal routes in Anyaa and Pokuase				

10.2.3 Dust and Other Emissions Monitoring Plan

The plan for monitoring dust and other emissions is presented in Table 10.3.

Table 10. 3 Dust and Other Emissions Monitoring Plan

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility
Site Preparation Phase				
Erection of perimeter fencing	Inspect integrity of the fence	Integrity of the fence	Weekly	Contractor/ HSD
Provision of PPE to workers	Inspection of supply stock and use of PPE	Records of provision and use of PPE by workers	Weekly	
Check that machinery is in good condition before use	Review state of machinery records before use	Machinery servicing record	One-time	
Switching off idle machinery	Check that idle engines are off	Idle engines switched off	Daily	
Dousing of the sites twice daily (minimum)	Check that effective dousing has been done	Record/evidence of dousing done on-site		
Adherence to speed limit of 30km/hr on-site	Impromptu checks on speed limit on-site	Complaints of over speeding		
Covering of trucks carrying laterite with tarpaulin	Check that haulage trucks are covered with tarpaulin	Haulage trucks are covered with tarpaulin		
Material Handling Phase				
Measures to minimise dust and other emissions Site Preparation phase also applies to the Material Handling phase except for: • Maintaining efficient performance of waste trucks by following maintenance schedules • Portable dust monitoring meters with specialized probes to measure concentrations of different size particulates such as SO2, etc.	Review records of servicing Inspect availability and usage of portable dust monitoring meters	Records of servicing Availability of dust and other emissions monitoring meters and records of monitoring	Quarterly Weekly	Contractor/ HSD
Transportation Phase				
Scheduled maintenance of machinery	Review records of servicing	Records of servicing	Quarterly	Contractor/ HSD
Covering of haulage trucks with tarpaulin	Check that haulage trucks are covered with tarpaulin	Haulage trucks are covered with tarpaulin	Daily	
Adherence to speed limit of 30km/hr on disposal routes (in Anyaa and Pokuase)	Impromptu check on speed limit of trucks in Anyaa and Pokuase communities	Complaints of over speeding	Weekly	

10.2.4 Occupational Health and Safety Monitoring Plan

The monitoring plan for prevention of occupational health and safety risks is presented in Table 10.4.

Table 10. 4 Occupational Health and Safety Monitoring Plan

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility

Site Preparation Phase				
Implementation of labour management plan	Review records of implementation of occupational health and safety measure.	Records of implementation of occupational health and safety measures	Bi-weekly	Contractor/ HSD
Provision and usage of PPE	Checks on the supply and use of PPE	Records of supply and use of PPE	Daily impromptu	
Use of banksmen on-site	Checks on the use of banksmen	Availability of banksmen		
Installation of reverse alarms	Check availability and effective use of installed reverse alarm	Availability and use of reverse alarms		
Provision of First Aid Box	Check availability of first aid box	Availability of First Aid Box		
Use of wheelbarrows /mechanical lifting aids	Check availability and use of lifting aids	Availability and use of lifting aids		
Observance of good housekeeping practices	Housekeeping checks/audit	Review records of housekeeping activities		
Training of workers on First Aid	Review records of training	Records of Training	Bi-weekly	
Procurement of Workmen's Compensation Policy (Insurance)	Inspect availability of insurance policy/certificate	Availability of insurance certificate	One-time	
Material Handling Phase				
Implementation of labour management plan	Review records of implementation of occupational health and safety measure.	Records of implementation of occupational health and safety measure	Monthly	Contractor/ HSD
Provision and usage of PPE	Impromptu checks on the supply and use of PPE	Records of supply and use of PPE	Daily impromptu	
Use of banksmen on-site	Impromptu checks on the use of banksmen	Availability of banksmen		
Installation of reverse alarms	Check availability and effective use of installed reverse alarm	Availability and use of reverse alarms		
Observance of good housekeeping practices	Housekeeping checks/audit	Review records of housekeeping activities		
Provision of First Aid Box	Availability of first aid box	Check the content of the first aid box		
Training of workers on First Aid	Review records of training	Records of Training	Monthly	
Procurement of Workmen's Compensation Policy (Insurance)	Inspect availability of insurance policy/certificate	Availability of insurance policy/certificate	One-time	

10.2.5 Public/Community Health and Safety Monitoring Plan

The monitoring plan for prevention of public/community health and safety risks is presented in Table 10.5.

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility
Transportation Phase				
Adherence to the 30km/hr speed limits in the communities	Check on the adherence to the 30km/hr speed limit	Records of sanctions applied to offenders	Bi-weekly	Contractor/ HSD
Training of drivers on defensive driving	Review of training records	Records of training sessions	Quarterly	
Installation of temporary (earthen) speed ramps	Inspect the availability of temporary (earthen)speed ramps	Availability of temporary (earthen)speed ramps	Monthly	
All accidents/injuries/near misses and trainings will be reported, recorded and documented	Review records of accidents/injuries/near misses and trainings organized	Records of accidents/injuries/near misses and trainings organized		

10.2.6 Heavy Metal Exposure Monitoring Plan

The plan for monitoring the avoidance of heavy metal exposure risks to workers is presented in Table 10.6.

Table 10. 6 Heavy Metal Exposure Monitoring Plan

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility
Site Preparation				
Provision and usage of appropriate PPE (gloves, safety boots, etc.)	Check the availability and usage of PPE by workers	Records of provision and use of PPE	Daily	Contractor/ HSD
• Sensitization of workers on – o Dangers of exposure to heavy metals o Thorough handwashing before meals and after work o Practice of personal hygiene	• Review of records of sensitization programme • Spot checks and corrections on personal hygiene of workers	• Records of sensitization programme • Behaviour of workers towards personal hygiene	Weekly Impromptu	
Provision of medical care for workers	Review records of medical care provision for workers	Records of medical care provided	Daily/ Weekly	
Provision First Aid Box	Check on the availability of First Aid Box	Availability of First Aid Box		
Excavated spoil will be buried at the respective handling sites and covered with layer laterite (3-inch)	• Check on excavated spoil buried at each site and covered with laterite • Review of records of quantities of excavated spoil generated	• Presence of layer of laterite at each site where spoil is buried	Daily Weekly	

		• Quantities of excavated spoil generated		
Provision of changing room for PPE at the end of a working day	Check on the state and patronage of changing room	Evidence of working gear in changing room after work	Weekly	
Regular cleaning of working gear	Review of records of cleaning/laundry of working gear	Records of cleaning/laundry of working gear		
Deployment of machinery for the site preparatory activities (with minimal manual involvement) to avoid human contact	• Check on records of use of various machinery on-site • Check for manual/human involvement in excavation and earthworks	• Records of machines on-site and their state • Manual/human involvement in excavation and earthworks	Weekly Daily	
Material Handling Phase				
Provision and usage of appropriate PPE (gloves, safety boots)	Check the availability and use of PPE by workers	Records of provision and usage of PPE	Weekly	Contractor/ HSD
Regular cleaning of working gear	Review of records of cleaning/laundry of working gear	Records of cleaning/laundry of working gear		
Change of working gear at close of work to avoid transferring heavy metal contaminants home	Checks on working gear and changed clothes before leaving the work premises	Record of working gear in changing room after work	Daily	
Provision of medical care for workers	Review records of medical care provision for workers	Records of medical care provided	Quarterly	
Provision First Aid Box	Check on the availability of First Aid Box	Availability of First Aid Box	Monthly	
• Sensitization of workers on – o Dangers of exposure to heavy metals o Thorough handwashing before meals and after work o Practice of personal hygiene	Review of records of sensitization programme	Records of sensitization programme	Monthly/ Quarterly	

10.2.7 Visual Intrusion Minimisation Monitoring Plan

The plan for monitoring visual intrusion minimisation measures is presented in Table 10.7.

Table 10. 7 Visual Intrusion Minimisation Monitoring Plan

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility
Site Preparation Phase				
Construction of perimeter fence around the handling sites to obscure site preparatory activities	• Inspect the availability of perimeter fence at each handling site • Inspect integrity of perimeter fences	• Availability of perimeter fences	Once	Contractor/ HSD

		• Integrity of perimeter fences		
Material Handling				
Rehabilitation of perimeter fences erected at the Site Preparation Phase	Inspect integrity of perimeter fences at each site	Integrity of perimeter fences	Monthly	Contractor/ HSD
Heap of dredged material would not tower over the 2.5m fence wall	Inspect records of the quantum of waste heaped at each site	The height of the stockpiled dredged material	Weekly	
Ensure frequent evacuation and transportation of the waste and saleable materials to avoid over-heaping	Inspect quantities of waste evacuated for disposal and sand sold	Quantities of waste onsite		
Transportation Phase				
Trucks to move at 10-minute intervals to avoid convoy movements	Review records of haulage intervals and operations	Records of haulage times	Weekly	
Loading and haulage of waste conducted at night	Review of haulage records	Records of haulage times		
Waste transporting trucks covered with tarpaulin	Inspect tailgates of haulage trucks	Records/complaints of waste spills	Impromptu	

10.2.8 Flood Prevention and Control Monitoring Plan

The plan for monitoring the control and prevention of flooding at the various handling sites is presented in Table 10.8.

Table 10. 8 Flood Prevention and Control Monitoring Plan

Mitigation	**Monitoring Measures**	**Parameters**	**Frequency**	**Responsibility**
Site Preparation Phase				
Preparatory works such as raising the frontage of the Odawna and Pasico sites towards the Odaw channel to minimize likelihood of flooding	Check to ensure the Contractor's contract specifies raising the frontage of the sites to avoid flooding	Works incorporated in Contractor's contract particularly raising the frontage of the sites	Once	Contractor/ HSD & PCU
Construction of drains of adequate sizes at the Korle-na, Pasico sites and along the route to the Odawna area	• Capacity and adequacy of the constructed drain • Inspect records of flood events and effects on the sites (in the rainy season)	• Functionality of constructed drain • Occurrence of flood events onsite	Weekly	
Material Handling Phase				
Korle-na Site				
Reconstruction of the damaged section of drain	Functionality of the re-constructed drain	Integrity of drains constructed	Monthly/ Quarterly	Contractor/ HSD & PCU
Construction of road shoulder drain drain along the Ring Road West Road of adequate size to trap runoff	Review records of performance of constructed drain	Performance of constructed drain	Monthly	
Pasico Site				

Lining the unlined section (12m) of the trapezoidal drain with concrete	Check effectiveness of the lined material	Functionality of the lined drained	Quarterly	Contractor/ HSD &PCU
Constructing a drain of adequate size along the Pasico wall to trap runoff from the Pasico yard	Review records of performance of the constructed drains	Functionality of the constructed drain	Monthly	
Constructing a circular drain of adequate size from the main Pasico Yard outlet of length 70.0m to Odaw River.				
Odawna Site				
Construction of a drain of adequate size along the untarred road from the VIP Bus Terminal to the Odawna handling site near the Odaw main channel	Review records of the drain performance, especially in the rainy season	Functionality of the constructed drain	Monthly	Contractor/ HSD &PCU

10.2.9 Waste Segregation and Disposal Monitoring Plan

The plan for monitoring waste segregation and disposal for the effective management of the various waste types at the site preparation and material handling phase is presented in Table 10.9.

Table 10. 9 Waste Segregation and Disposal Monitoring Plan

Mitigation	**Monitoring Measures**	**Parameters**	**Frequency**	**Responsibility**
Site Preparation Phase				
Excavated spoil will be used in filling low lying sections	Inspect records of quantities and disposal	Quantities of excavated spoil	Daily	Contractor/ HSD
Waste from clearing activities will be collected by accredited waste management company	• Inspect adherence to appropriate disposal • Inspect waste disposal site used by waste management company	Quantities of waste disposed of	Daily	
Segregate waste into colour coded bins and outsourced to waste contractors	• Check on the use of colour coded bins • Weekly check if waste is properly segregated • Review records of general waste disposed	Availability and use of bins	Weekly	
• Workers at Korle-na to use toilet facility onsite • Mobile toilet units to be provided at Pasico and Odawna • Waste from the mobile toilet to be dislodged by an an accredited waste management company	• Review adequacy of toilet facility • Review records of dislodging	• Availability and state of toilets • Records of waste dislodged	Weekly Monthly	
Material Handling Phase				
Segregated Waste				

Domestic waste segregated into appropriate colour coded waste bins	Impromptu checks on the use of colour coded bins	Availability and use of bins	Impromptu	Contractor/ HSD &PCU
Construction waste outsourced to a waste management contractor for removal and disposal Recyclable materials collected by accredited recycling companies	Inspect if waste is properly segregated	Quantities of construction waste and recyclable waste	Weekly	
Special containers transferred to a designated and accredited waste handling companies Green bin collected by an accredited waste management company for disposal	Review records of general waste disposed of	Quantities of waste disposed of	Weekly	Contractor/ HSD &PCU
Oily Waste (Korle-na Site)				
Development and designation of an impervious platform as maintenance area for machinery and equipment servicing	Inspect availability of maintenance area	Availability of maintenance area	Once	Contractor/ HSD &PCU
Servicing will be undertaken by a skill personnel	Availability of skilled personnel	Personnel available	Monthly	
Waste oil will be returned to supplier when tanks are full.	• Review quantities of waste oil collected and returned to suppliers • Checks on the integrity of oil tanks	• Records of waste oil returned to supplier • Integrity of tanks	Monthly Weekly	
Oil rags will be separated from other solid waste and collected by an accredited waste company	Inspect adherence to separation Review of records of waste collection	Separated waste rags Records of waste collected	Impromptu	
Liquid Waste				
• Workers at Korle-na to use toilet facility onsite • Mobile toilet units to be provided at Pasico and Odawna	Review adequacy of toilet facility	Availability and state of toilet	Monthly	Contractor/ HSD &PCU
Sanction will be applied to workers who engage in open defecation or urination practices	Review records of offenders and sanctions applied	Offenders and sanctions applied	Quarterly	
Grey water will be channelled into drains fitted with filters	Inspect effectiveness of filter	Residue collected	Quarterly	
Wastewater from tyre wash to be channelled into onsite drains fitted with silt traps before ending up in nearby drains.	Inspect effectiveness of silt trap	Quantity of silt collected	Quarterly	

10.2.10 Fire Prevention and Control Monitoring Plan

The plan for monitoring fire prevention and control measures is presented in Table 10.10.

Table 10. 10 Fire Prevention and Control Monitoring Plan

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility
Site Preparation Phase				
Securing of fire permit/certificate from the GNFS	Inspect the availability of fire certificate	Availability of fire certificate	Once	Contractor/ HSD &PCU
Construction of fire hydrants for all the sites	Inspect the availability of fire hydrants	Availability of fire hydrants	Once	
Education of workers on fire prevention and fire fighting measures	Records of training programs on fire prevention and fighting	Number of workers educated	Quarterly	
Provision of fire extinguishers	Inspect availability and accessibility of fire extinguishers	Availability of fire extinguishers	Quarterly	
Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour	Inspect usage of designated smoking area and metal bins and compliance	Records of offenders	Monthly	
Material Handling Phase				
Korle-na Site				
Installation of smoke detectors and fire alarms at the – o Fuel storage tank o Near the separating fence wall from the GOIL LPG Station	Test functionality fire alarm and smoke detectors	Functionality of smoke detectors and fire alarms	Quarterly	Contractor/ HSD &PCU
Area for machinery servicing and welding works situated – o At 65m from the fuel storage tank o At 110m from the GOIL Gas Station	Inspection of location of machinery servicing/ welding area to the fuel storage tank and GOIL Gas Station	Location of machinery servicing/ welding area	Once	
Posting of legible fire safety signs, e.g., "No Smoking", "Switch-off Engines", etc. at the fuel storage area	Inspection of legibility and adequacy of caution signages	Legibility and adequacy of caution signages	Monthly	
Construct concrete floor and bunded area around fuel storage tank to contain spills	Inspection of concrete floor and bunded area	State of concrete floor and bunded area	Once	
Prompt cleaning of accidental spills	Inspect availability of spill kit	Contents of spill kit	Monthly	
Korle-na, Odawna and Pasico Sites				
Validation of fire certificate from the GNFS	Inspect validity of fire certificate	Validity of fire certificate	Annual	Contractor/ HSD &PCU
Provision of fire hydrant at each of the site	Check on water availability in hydrant	Water availability	Quarterly	

Conducting weekly toolbox meetings on fire safety and use of firefighting equipment	Review participation of workers in toolbox meetings	Records of attendees	Weekly	
Provision of Fire Assembly Points	Check availability of Fire Assembly Point	Availability of Fire Assembly Point	Once	
Provision of fire extinguishers	Inspect availability and accessibility of firefighting equipment	Number/Functionality of fire extinguishers	Quarterly	
Designating smoking areas away from fuel and oil storage area with metal bins to drop the cigarette butt and spot checking of behaviour	Inspect usage of designated smoking area, metal bins and compliance	Records of offenders	Monthly	
Prompt cleaning of accidental spills	Inspect Availability of spill kit	Contents of spill kit	Monthly	
Transportation Phase				
Provision of fire extinguishers in trucks	Availability of fire extinguisher	Expiration dates of fire extinguisher	Quarterly	Contractor/ HSD &PCU
Provision of truck spill kit	Inspect availability of spill kit	Contents of spill kit	Monthly	
Scheduled maintenance and servicing	Review record of servicing	Record of servicing	Monthly	

10.2.11 Labour Rights Safeguard Monitoring Plan

The plan for monitoring the labour rights safeguard measures is presented in Table 10.11.

Table 10. 11 Labour Rights Safeguard Monitoring Plan

Mitigation	Monitoring Measures	Parameters	Frequency	Responsibility
Site Preparation Phase				
• Issuance of employment contracts to all categories of workers to indicate ○ Worker compensation equal to or above national minimum wage ○ Equal compensation for gender of same schedule and qualifications ○ Clauses to promote formation of workers' union and collective bargaining	• Review of records of employment contracts including compensation • Check for availability/opportunity for workers' union	• Number of employees with contracts with details of compensation amount • Availability/opportunity for workers' union	One-time	Contractor/ HSD &PCU
Employment of women and PWDs where feasible	Review records of women and PWDs employed	Number of women and PWDs employed	Monthly	
Provision of adequate and suitable PPE for workers	• Review records of supply of PPE	• Records of supply of PPE	Weekly/ Monthly	

	• Check on usage and suitability of PPE			
Provision of adequate access aids for workers disability	Check provision of access facilities for PWD	Access facilities provided for workers with disability	One time	Contractor/ HSD &PCU
Provision of adequate separate sanitary facilities for women and workers with disability	Check provision of separate sanitary facilities for women and PWD	Adequate separate sanitary facilities provided for female workers and workers with disability		
Material Handling Phase				
• Issuance of employment contracts to all categories of workers to indicate o Worker compensation equal to or above national minimum wage o Equal compensation for both male and female workers Clauses to promote formation of workers' union and collective bargaining	• Review of records of employment contracts including compensation • Check for availability/opportunity for workers' union	• Number of employees with contracts with details of compensation amount • Availability/opportunity for workers' union	One-time / Yearly	Contractor/ HSD &PCU
Employment of women and PWDs where feasible	Review records of women and PWDs employed	Number of women and PWDs employed	Yearly	
Provision of adequate and suitable PPE for workers	• Review records of supply of PPE • Check on usage and suitability of PPE	• Records of supply of PPE • Usage and suitability of PPE	Monthly Daily	

10.2.12 Gender-Based Violence/Sexual Harassment Prevention Monitoring Plan

The plan for monitoring gender-based violence prevention measures is presented in Table 10.12.

Table 10. 12 Gender-Based Violence/Sexual Harassment Prevention Monitoring Plan

Mitigation	**Monitoring Measures**	**Parameters**	**Frequency**	**Responsibility**
Site Preparation Phase				
Cases of GBV/SEA/SH will be reported through all outlets of the GRM and will be processed/handled solely by the SSS of the GARID PCU and SSS of MWH HSD	Review records of reported GBV/SEA/SH cases	Records of reported cases of GBV/SEA/SH	Daily/Weekly	Contractor/ HSD &PCU

Victims will be aided to receive support from the dedicated GBV service providers in the municipality/ metropolis	Review records of victims aided in accessing support	Records of victims aided in accessing support		
Workers will be educated on human rights protection	Review records of educational campaigns on human rights protection	Records of educational campaigns on human rights protection		
Support the SWCDD on GBV/SEA/SH educational campaigns	Review records of educational campaigns on GBV/SEA/SH	Records of educational campaigns on GBV/SEA/SH	Quarterly	
Workers to sign a code of conduct	Review records of code of conduct signed	Records of code of conduct signed	One-time	
Material Handling Phase				
GBV/SEA/SH Workplace Policy will be developed and implemented	Review implementation of GBV/SEA/SH policy	GBV/SEA/SH policy	One-time	Contractor/ HSD &PCU
Cases of GBV/SEA/SH will be reported and handled through the GRM	Review records of reported GBV/SEA/SH cases	Records of reported cases of GBV/SEA/SH	Monthly/ Quarterly	
Victims will be aided to receive support from dedicated GBV service providers in the municipality/metropolis	Review records of victims aided in accessing support	Records of victims aided in accessing support		
Workers will be educated on human rights protection	Review records of education programmes conducted	Records of educational campaigns on human rights protection		
Support the SWCDD to conduct educational campaigns on GBV/SEA/SH	Review records of educational campaigns on GBV/SEA/SH	Records of educational campaigns on GBV/SEA/SH		
Workers to sign a code of conduct	Review records of code of conduct signed	Records of code of conduct signed	One-time	

10.2.13 HIV and STIs Containment Monitoring Plan

The plan for monitoring HIV/STIs and prevention measures covers the areas presented in Table 10.13.

Table 10. 13 HIV and STIs Containment Monitoring Plan

Mitigation	**Monitoring Measures**	**Parameters**	**Frequency**	**Responsibility**
Site Preparation Phase				
Recruiting majority of workers from the community	Review records of the number of workers employed from the community	Number of employees from the community	One time	Contractor/ HSD

Handling information on HIV status of workers with due care and confidentiality	Review records of grievances	Records of grievances	Weekly/ Monthly	
Implementation of HIV/AIDs Workplace Policy, and incorporation of prevention clauses in employment contract including the following – • Awareness creation among workers through preventive programs including – o Facilitation of voluntary testing o Safe sex practices, condom use, abstinence, etc. o Peer counselling • Provision of condoms at accessible and convenient locations • Incorporation of the HIV Workplace Policy into working conditions to prevent discrimination or stigmatisation of workers	Review HIV Workplace Policy and records of implementation including – • Review records of awareness programmes o Review records of voluntary testing of workers o Check for records of reported cases o Review records of peer counselling organised • Checks for availability of condoms • Review records of reported cases of discrimination and stigmatisation	Records of HIV Workplace policy and records of implementation • Records of awareness programmes organised o Records of number of voluntary testing of workers o Records of reported cases o Records of peer counselling organised • Availability of condoms • Records of discrimination and stigmatisation		
Organization of education campaign on HIV/AIDS in the District	Review records of education campaign	Records of education campaign	Quarterly/ Yearly	
To print and distribute awareness leaflets	Review records of printed and distributed awareness leaflets	Records of printed and distributed awareness leaflets		
Material Handling Phase				
Recruiting majority of workers from the community	Review records of the number of workers employed from the community	Number of employees from the community	One time	Contractor/ HSD &PCU
Handling information on HIV status of workers with due care and confidentiality	Review records of grievances	Records of grievances	Monthly	
Implementation of HIV/AIDs Workplace Policy, and incorporation of prevention clauses in employment contract including the following – • Awareness creation among workers through preventive programs including – o Facilitation of voluntary testing	Review HIV Workplace Policy and records of implementation including – • Review records of awareness programmes	Records of HIV Workplace policy and records of implementation • Records of awareness programmes organised		

○ Safe sex practices, condom use, abstinence, etc. ○ Peer counselling • Provision of condoms at accessible and convenient locations • Incorporation of the HIV Workplace Policy into working conditions to prevent discrimination or stigmatisation of workers	○ Review records of voluntary testing of workers ○ Check for records of reported cases ○ Review records of peer counselling organised • Checks for availability of condoms • Review records of reported cases of discrimination and stigmatisation	○ Records of number of voluntary testing of workers ○ Records of reported cases ○ Records of peer counselling organised • Availability of condoms • Records of discrimination and stigmatisation		
Organization of education campaign on HIV/AIDS in the communities	Review records of education campaign	Records of education campaign	Yearly	
To print and distribute awareness leaflets	Review records of printed and distributed awareness leaflets	Records of printed and distributed awareness leaflets		

10.2.14 COVID-19 Containment and Prevention Monitoring Plan

The plan for monitoring COVID-19 containment and prevention is presented in Table 10.14.

Table 10. 14 COVID-19 Containment and Prevention Monitoring Plan

Mitigation	**Monitoring Measures**	**Parameters**	**Frequency**	**Responsibility**
Site Preparation				
Implementation of COVID-19 protocols	Review records of infected workers	Number of workers infected	Daily/ Weekly	Contractor/ HSD &PCU
Requisite investments/budget for provision of standard COVID-19 protocol response requirements	Review records of investment made, COVID-19 response equipment and logistics procured	Records of investment made, COVID-19 response equipment and logistics procured	Weekly/ Monthly	
Requiring workers to be fully vaccinated	Review records of fully vaccinated workers	Number of workers vaccinated		
Sanctioning culpable workers	Review records of sanctioned workers	Number of sanctioned workers		
Welfare relief package for infected workers who discloses COVID 19 status	Review records of beneficiaries	Number of beneficiaries	Weekly/ Monthly	
Material Handling and Transportation Phases				
Implementation of COVID-19 protocols	Review records of infected workers	Number of workers infected	Monthly	SSS of HSD

Requisite investments/budget for provision of standard COVID-19 protocol response requirements	Review records of investment made, COVID-19 response equipment and logistics procured	Records of investment made, COVID-19 response equipment and logistics procured	Quarterly	
Requiring workers to be fully vaccinated	Review records of fully vaccinated workers	Number of fully vaccinated workers	Weekly/ Monthly	
Sanctioning culpable workers	Review records of sanctioned workers	Number of sanctioned workers	Quarterly	
Welfare relief package for infected workers who discloses COVID 19 status	Review records of beneficiaries	Number of beneficiaries	Quarterly	

10.2.14 Resettlement Monitoring Plan

Monitoring and evaluation measures will be outlined in the RAP to ensure PAPs are satisfactorily treated in accordance with the terms enshrined in the RAP.

10.3 Environmental and Social Monitoring Implementation Budget

The budget for the implementation of this Environmental and Social Monitoring Plan as outlined in the specific action plans is for a period of 18 months. This budget (Table 10.14) should however be seen as only indicative for guidance purposes. The estimated budget for undertaking these activities is USD 60,600.

Table 10. 5 Environmental and Social Management Implementation Budget

Cost Areas	**Budget ($)**
1) Traffic improvement and accident prevention monitoring plan	5,000
2) Noise and vibration monitoring plan	9, 400
3) Dust and other emissions monitoring plan	9,200
4) Occupational health and safety monitoring plan	3,000
5) Public/community health and safety monitoring plan	3,000
6) Heavy metal exposure monitoring plan;	9,000
7) Visual intrusion minimisation monitoring plan	2,000
8) Flood prevention and control monitoring plan	2,000
9) Waste segregation and disposal monitoring plan	4,000
10) Fire prevention and control monitoring plan	4,000
11) Labour rights safeguard monitoring plan	3,000
12) Gender based violence/sexual harassment prevention monitoring plan	3,000
13) HIV and STIs containment monitoring plan	2,000
14) COVID-19 containment and prevention monitoring plan	2,000
Total	**60,600**

11.0 GRIEVANCE REDRESS MECHANISM

The GRM is to provide all persons (both the public and employees) and groups affected during the site preparation and material handling and transportation activities, avenues through which they can express their concerns and receive the needed corrective action in an appropriate and timely manner. The mechanism will provide an effective, transparent and timely system that will give employees or aggrieved persons redress and avoid litigation, minimize bad publicity, avoid/minimize delays in execution of infrastructural works, and ensure public health, safety, and sustainability during project implementation.

At public engagements targeted at the project, attendants would be informed of the grievance redress mechanism and encouraged to use it. To ensure that all understand what is being communicated, these engagements would be conducted in languages common to the project footprint (i.e., Ga, Twi and English). The GRM is intended to:

- Provide affected persons with avenues for making a complaint/grievance or resolving any dispute that may arise during the project implementation and determination of entitlements of compensation;
- Ensure that appropriate and mutually acceptable redress actions are identified and implemented to the satisfaction of complainants;
- Provide avenue for vulnerable groups and victims of GBV/SEA/SH to have equal access to grievance redress process and support;
- Avoid project-community conflict and improve community support for project activities; and
- Provide a way for community members to consistently engage with the project, enhance relationships, reduce social risk, and enable more responsive and responsible management.

The GRM provides for both the project workers and community members.

11.1 Grievance Redress Process for Project Workers

The Grievance Mechanism for all project workers is as follows:

- Contractors and or representatives will be the point of contact for all Grievances. The Contractor will designate a staff member who will be responsible to receive grievances;
- Upon receipt of Grievances, the Contractor staff/representative will notify the SSS of HSD to register the complaint(s) on to the GRM system. Grievances will be registered in a registry of complaint and all information related to the handling of the grievances will be recorded in the registry;
- The Contractor will attempt to address grievance within established time frame of 15 business days upon receipt. In cases of timely or urgent matters, a minimum period of 24 hours and a maximum of 15 business days will be allotted for resolving the grievance. Grievances can be made in person, via telephone call or writing;

- If the grievance cannot be resolved by the Contractor, the Contractor will inform the SSS of the HSD;
- The SSS will meet with the project contractor and workers and attempt resolution; and
- If unresolved, either party may seek redress in the courts of the country.

11.2 Grievance Redress Process for the Communities

This mechanism is based largely on the GARID Project GRM framework. The mechanism consists of a four-tier bottom-up system (Figure 11.1) which includes the following:

- Local/community (Project Site) level – complaints and questions that can be responded to immediately;
- Metropolitan and Municipal-level grievance resolution (MMLGR) - complaints, for example, disputes between project community or neighbouring community and the Contractor/project, etc;
- Project-level grievance resolution (PLGR) – unresolved complaints at the metropolitan and municipal level; and
- National judicial system – dissatisfied complainant/or issues unable to be resolved at the project level.

A Grievance Redress Committee (GRC) will be setup for each tier to handle grievances received. Grievances that are unresolved will move to the next tier, up to the highest and final tier (i.e., national judicial system) for resolution. The mechanism ensures that complaints received are promptly reviewed to address project-related concerns. The steps of the grievance process include:

- Step 1: Receipt and registration of complaints and grievances;
- Step 2: Assessment of risks, potential grievances and complaint; and
- Step 3: Resolution or referral of grievance to the next tier.

The others include:

- Grievance log assessment;
- Acknowledgment and response;
- Appeals provision (for resolution); and
- Follow-up.

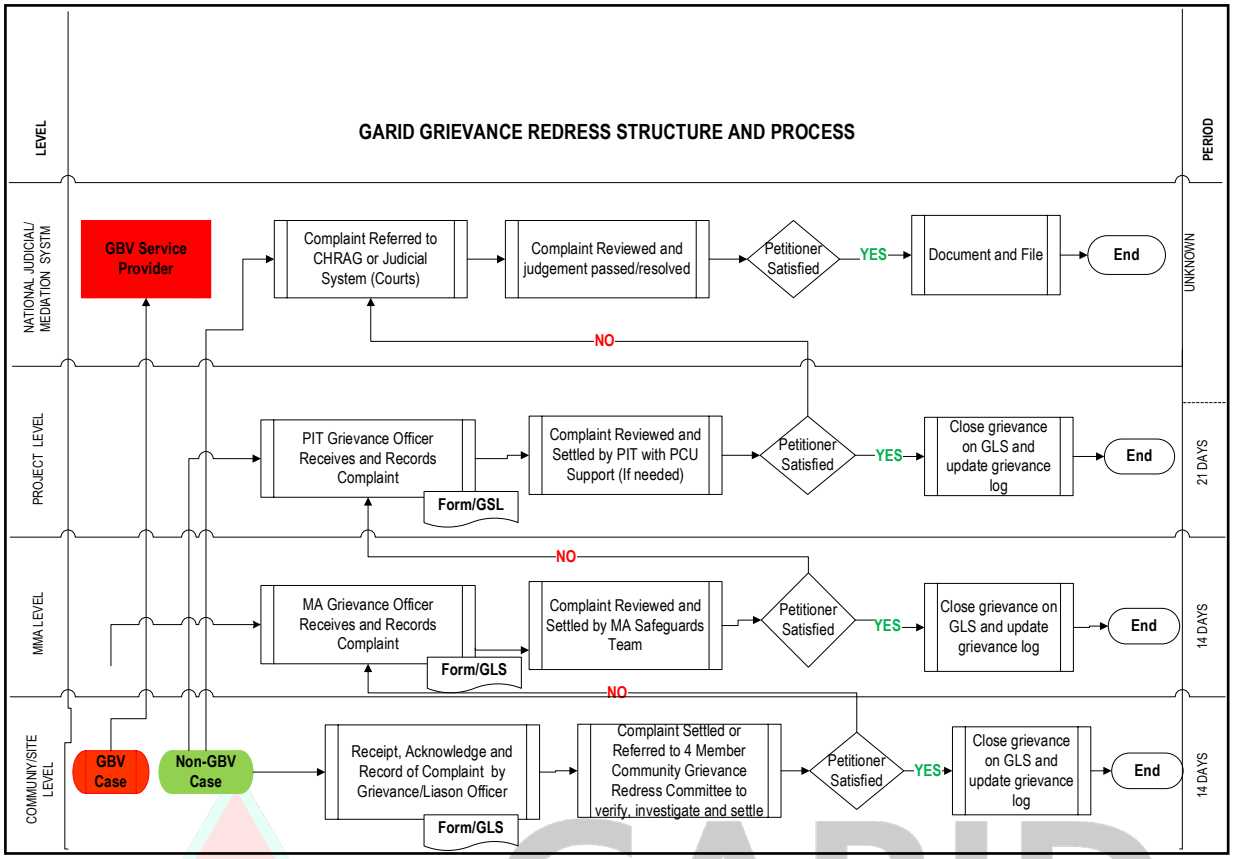


Figure 11. 1 GARID Grievance Redress Structure and Process

The GARID Project has developed a simple computer-based web platform (https://garid-accra.com/grievance-redress-mechanism/) for more effective management of complaints. During the site preparation phase, cases arising from the project activities would be resolved through this system. Aside taking cases directly on the online grievance logging system (GLS), cases will also be recorded manually on grievance forms (Appendix 13.1) at various case in-take points. Other avenues for the uptake of complaints will include walk-ins, phone calls (dedicated toll-free line – 0800800900/0800500600) and WhatsApp (0241340130). A dedicated desk will be set up at all the sites (Korle-na, Odawna and Pasico) to receive walk-in complaints.

During the material handling and transportation phases, the Contractor will provide avenues for receiving of complaints and grievances. This will include a phone and WhatsApp number as well as having a desk for receiving grievances. Waste trucks would also be labelled with the email and contact for all grievances.

11.2.1 Community Level Grievance Redress Committee

The Community Level Grievance Redress Committee (CLGRC) will be the first point to relay grievances. The CLGRC will consist of:

- SSS of the Contractor;
- The assembly member of the electoral area;

- Representative of the traditional leaders;
- Representative of male PAPs, and
- Representative of female PAPs.

The SSS of the Contractor will be the Chairperson of the CLGRC. The committee would immediately notify the complainant(s) of receipt of the complaint whilst it investigates the complaint. The committee would determine the redress action and relay the proposed measures to the complainant. All grievances would be resolved within fourteen business days of receipt (Appendix 13.2). If the committee fails to resolve the issue, it is escalated to the second tier.

11.2.2 Metropolitan and Municipal Level Grievance Resolution

Escalated grievances from the first tier or an unsatisfied complainant will report his/her grievance to the MMLGR. The MMLGR would investigate and address the grievance within fourteen business days. The MMLGR will consist of:

- Development Planning Officer;
- Works Engineer;
- Physical Planning Officer;
- Social Welfare and Community Development Officer; and
- Presiding Member of the local Assembly.

11.2.3 Project Level Grievance Resolution

The Project Level Grievance Resolution (PLGR) will consist of the MWH HSD and the GARID PCU. The MWH HSD with the support of GARID PCU will monitor the activities of the MMLGR to ensure complaints and grievances lodged are resolved amicably. However, if a complainant is not satisfied with the decision of the MMLGR, he/she can bring it to the attention of the PLGR. The PLGR will resolve the issue within twenty-one business days from the date of receipt.

11.2.4 National Judicial System

If the complainant remains dissatisfied with the mediation effort of the MWH HSD, the complainant has the option to pursue the appropriate recourse via judicial process in Ghana. The Constitution allows any aggrieved person the right of access to the Court of Law. However, the project will do all that it can to make use of the alternative dispute arrangements provided under this GRM to reach amicable settlement with a complainant. Table 11.1 shows the timelines for addressing grievances at every tiers.

Table 11. 1 Timelines for Responding to Grievances

Process	Timelines
1. Community Level Grievance Redress Committee	Within fourteen business days
2. Metropolitan and Municipal Level Grievance Resolution	Within fourteen business days
3. Project Level Grievance Resolution	Within twenty-one business days
4. National Judicial System	Unknown

11.3 Gender-Based Violence, Sexual Exploitation and Abuse and Sexual Harassment

The GARID Project has a SEA/SH Prevention and Response Action Plan to mitigate gender-based violence (GBV), sexual exploitation and abuse (SEA) and sexual harassment (SH) cases and has been linked to the online GRM system. To support confidential uptake and resolution of GBV/SEA/SH complaints, cases received from all outlets, would be processed solely by the SSS of the GARID PCU and SSS of MWH HSD during the site preparation phase, and material handling and transportation phases respectively, and referred to the appropriate GBV service providers (including the Police) in the municipality/metropolis for appropriate redress. Follow-ups would be made until the case is resolved and closed.

11.4 Training of Grievance Committees and Sensitisation of Communities

Prior to the implementation of the project, all grievance committees including the community grievance committees shall be trained and taken through the GRM process. Information about the existence and functioning of the GRM will be made readily available to all stakeholders, particularly the community members through public engagement strategies (including public announcements and posters).

12.0 DECOMMISSIONING AND CLOSURE PLAN

The decommissioning and closure section outlines the anticipated actions needed to guide the project in the formal closure and preparation to hand over of the handling sites to the Accra Metropolitan Assembly and the Ngleshi Stool of James Town, in accordance with the general provisions of the Memorandum of Understanding among the parties. The parties comprise of the Ministry of Works and Housing on the one hand, and the Accra Metropolitan Assembly and the Ngleshi Stool of James Town, Accra on the other.

The following stages of actions will be required to effectively decommission the three operational (handling) sites and to hand over to the original owners:

- **Pre-closure activities -**
  - Notice to relevant authorities and stakeholders;
  - Stakeholder engagements; and
  - Pre-closure report preparation to EPA.
- **Closure/shutdown of activities -**
  - Abate deposition of dredging materials and all haulage operations;
  - Evacuate all materials, equipment and facilities movable; and
  - Conduct site inventory and E&S Audit.
- **Decommissioning activities -**
  - Remove all structures and clear the sites of wastes;
  - Conduct backfilling or filling of the sites as necessary;
  - Conduct ripping to prepare the appropriate sections for revegetation; and
  - Undertake revegetation of the sites.
- **Post-closure activities –**
  - Conduct site monitoring for necessary remedial action (e.g. revegetation effectiveness and erosion control/avoidance);
  - Media monitoring (mainly detection of heavy metals and runoff water quality);
  - Facility and equipment legacy left onsite for the owners;
  - Post-closure report preparation; and
  - Handing over of sites.

12.1 Pre-Closure Activities

12.1.1 Closure notification - Notice to Relevant Authorities and Stakeholders

In line with LI 1652, the project will be required to formally notify all relevant authorities and key stakeholders of the intention to close the project. The notification will be given at least 6 months in advance. The Contractor will serve the closure notice through the MWH to the EPA, AMA, the Ngleshi Stool of James Town and opinion leaders, as well as other relevant stakeholders, especially in the neighbourhood.

The closure notice will also be posted at the sites, providing information on the expected closure date and decommissioning duration as well as the post-closure period. This will include proposed measures to render the sites safe, prior to return of the sites to the owners.

The notification to EPA will be a formal submission of a pre-closure report, which will elicit EPA's approval of the approach and methodology, and any other guidance to inform the decommissioning and closure processes.

12.1.2 Stakeholder Engagement

As part of the pre-closure activities, the project (contractor) will undertake extensive consultations at this stage with EPA, the Assembly, the Stool elders/opinion leaders and other stakeholders. This will help to arrive at the most reasonable state in which the sites may be rendered prior to handing over to the Assembly and the Stool - to safeguard public health and safety. This will be necessary since the MOU signed among the parties did not give a clear indication of the state in which the sites should be handed over.

12.2 Closure/Shutdown Activities

12.2.1 Closure Activities

The first stage of closure (in the decommissioning process) will be to abate all haulage operations and to put the handling sites under safe shutdown by maintaining a thin staff onsite mainly for security and maintenance purposes. The closure activities will last for a period of 3 months. The key closure activities which will be based on the review feedback from EPA on the pre-closure report would include to:

- Shutdown operations onsite, except for security presence;
- Abate deposition of dredging materials;
- Abate all haulage operations;
- Evacuate all materials and equipment movable; and
- Conduct site inventory and E&S Audit (post-operational risk assessment and heavy metal analysis and mapping).

During this period a detailed post-operational risk assessment will be conducted at the handling sites to identify any hazards that need to be taken into consideration in the decommissioning process. Site walkdowns and other characterization activities such as equipment and facility inventories will be undertaken. In view of the high levels of heavy metal presence mapped at the sites in the baseline studies, a detailed heavy metal survey will be required at the closure stage to determine the potential extent of residual pollutants at the respective sites. This will then require implementation of necessary measures, such as placement of laterite layer to bury such contaminated areas and render the sites safe.

12.2.2. Outcome of Pre-Closure Report

The pre-closure report, which will inform the actual workplans, the duration and extent of the decommissioning submitted to the EPA will be approval to guide the decommissioning operations. The pre-closure report would contain the potential impacts at closure and decommissioning as well as the mitigation measures to address the significant impacts.

The potential impacts identified would include the following;

- Erosion;

- Mobilization of heavy metal contaminants;
- Dumping of waste; and
- Encroachment by squatters, turning the area into other uses such as waste recycling, mechanic workshops, tabletop businesses, etc.

The mitigation measures to be implemented at the various stages of closure/decommissioning would include:

- Closure notices posted (6 months in advance);
- Notification of AMA and the Stool to jointly oversee the closure phase activities with the ontractor;
- Prohibition of access by barricading the sites;
- Deployment of security to ward off encroachers and squatters and potential deposition of wastes;
- Erosion control through improved provision of runoff channels;
- Safeguarding public health and safety (including burying any heavy metal contaminated soil/sites with laterite covering); and
- Decision on which legacy facilities and equipment onsite would be of use or benefit to the owners and therefore could be maintained and also handed over to the Assembly and the Stool.

12.3 Decommissioning Activities

The decommissioning will be performed to protect the health and safety of the public (including owners of the sites), and the environment and prevent the spread of contaminants from the decommissioning activities. Activities during this stage would last for a period of 5 months, and would include:

- Removal of structures and waste management;
- Backfilling;
- Ripping; and
- Revegetation of the sites.

12.3.1 Removal of Structures and Waste Management

During this stage, all structures and equipment installed on the site will be dismantled. Equipment that have resale value will be auctioned in accordance with public sector rules, and those without resale value will be managed according to the waste management practices proposed by this Addendum. Following the removal of all structures and equipment, the site will be cleared of any waste and debris and evacuated by a designated/approved waste contractor.

12.3.2 Backfilling

Backfilling will be done wherever needed. For instance, any excavated location or depression onsite will be filled to achieve even elevation with the adjoining land, but with gentle gradient towards the Odaw or lagoon. The main purpose will be to avoid ponding of rainwater at the sites and the potential exposure of underneath contaminated soil. The areas for filling would

include any location detected to be heavy metal contaminated. The material for filling would be mainly laterite sourced from approved commercial suppliers.

12.3.3 Ripping

Ripping of compacted areas with a small bulldozer will be done to encourage infiltration, reduce erosion, compaction and increase the volume of soil readily accessible to plants. In order to further mitigate the problems of compaction, tillage of the soil will be undertaken to prepare appropriate sections of the land for revegetation.

12.3.4 Revegetation

Revegetation is the process of replacing the original site cover with grass following land disturbance, and where necessary followed by the planting of trees (Lima and Wathem, 1999), as agreed with the landowners. This will be done to improve the appearance of the site and for the purposes of erosion control. The project will ensure that the vegetation cover is well established at all the sites as agreed with the owners.

12.4 Post-Closure Activities

The post-closure activities aim at ensuring the long-term safety, security, and environmental sustainability of the areas used as handling sites. The post-closure activities will last for a period of 12 months, and will cover the following:

- Site monitoring for any necessary remedial action;
- Media monitoring;
- Facility and equipment legacy left onsite for the owners;
- Post-closure report preparation; and
- Handing over of sites.

12.4.1 Monitoring of the Restored Sites

The 3 handling sites will be monitored to ensure the effectiveness of measures put in place for recovery and restoration of the sites to an environmentally sustainable state. Measures to be monitored would include:

- Backfilling of excavated areas;
- Stabilisation of the edges of the land towards the Odaw/Lagoon at the Korle-na and Pasico handling sites; and
- Vegetation growth/cover of the handling sites.

12.4.2 Media Monitoring

Monitoring of the media (land and rainwater/runoff) at the 3 sites would be carried out to:

- Detect presence and distribution of heavy metal contaminants; and
- Runoff water quality in drains and on the sites.

12.4.3 Facilities and Equipment Legacy

Any existing equipment and facility onsite that will be identified to be of benefit to the site owners will be further improved and left in a good state in order not to become a source of public safety risk. These could include onsite paved access and slabs, drains directing runoff, facilities at the equipment yard (e.g. office space, paved compound, toilets, and meeting room), and the perimeter fence. Such facilities would be monitored, and the state/condition will be further enhanced to improve their utility value prior to handover.

12.4.4 Post-Closure Report

A post-closure report will be prepared and submitted to the EPA for approval. The report will spell out the post-closure monitoring conducted and the results as well as any remedial actions undertaken to render the sites safe for return to the owners. EPA's approval would signal an acceptable decommissioning and post-closure activities and the safety of the sites for handing over.

12.4.5 Handing Over of the Sites

The handing over of the handling sites to the AMA and the Ngleshi Stool of James Town according to the MOU signed among the parties would mark a critical transition point in the management of these sites. When the handling activities of dredging materials are completed, the management of the handling sites would become the responsibility of the AMA and the Ngleshi Stool of James Town.

12.5 Decommissioning and Closure Action Plan

The decommissioning and closure action plan for implementation is presented in Table 12.1 with an estimated budget. The actions to be carried out at the various stages and the estimated budget for undertaking these actions is USD 65,000.00.

Table 12. 1 Decommissioning and Closure Action Plan with Budget

Stages	Actions	Responsibility	Budget($)
Pre-closure Activities			
Notice to relevant authorities and stakeholders	• Notification on the expected closure date, measures to be undertaken, timeframe and potential impacts to: o AMA o Ngleshi Stool elders and opinion leaders o EPA o Other neighbouring stakeholders • Preparation of pre-closure report • Posting of closure notices at the sites, including information on closure date, decommissioning duration and post-closure period	HSD	10,000.00
Stakeholder engagement	Extensive consultation to inform the state in which the sites should be handed over, including the following stakeholders: o AMA o Ngleshi Stool elders / opinion leaders o EPA o Other neighbouring stakeholders		1,000.00
Closure/shutdown			

Closure activities at the 3 handling sites	• Shutdown the handling sites; • Provide security onsite; • Abate deposition of dredged materials at the respective sites • Abate all haulage operations • Evacuate all materials and movable equipment • Conduct site inventory and E&S Audit (post-operational risk assessment and site heavy metal analysis and mapping)	HSD	10,000.00
Decommissioning Activities			
Removal of structures and waste management	• Demolition and evacuation of site structures (not desirable) • Removal of all machinery and installed equipment • Auction of equipment and facilities • Management of equipment without resale value as waste through an acredited waste contractor.	HSD	5,000.00
Backfilling	• Filling in excavated and eroded areas • Stabilisation of the edges of the land towards the Korle Lagoon / Odaw at the Korle-na and Pasico handling sites		5,000.00
Ripping	Breaking of compacted areas at all the sites		6,000.00
Revegetation	Replacement of the original ground cover with grass at the 3 handling sites.		5,000.00
Post-closure Activities			
Monitoring of recovered/restored sites	Monitoring of the effectiveness of - • Backfilling of excavated areas • Stabilisation of the edge of the land towards the Korle-na and Pasico handling sites • Vegetation cover	HSD	8,000.00
Media monitoring	Media monitoring to - • Detect presence of heavy metals • Runoff water quality of the sites		5,000.00
Facilities and equipment legacy for site owners	Monitor and improve on the existing equipment or facilities considered beneficial to the site owners prior to handover, in order that they do not become a source of public safety risk: • Onsite paved access • Drains directing runoff • Facilities at the equipment yard (office space, toilet, meeting room, etc.) • Perimeter fences		3,000.00
Post-closure report	Preparation of post-closure report for EPA's approval		5,000.00
Handing over of sites	Handing over of the sites to AMA and Ngleshie Stool at a ceremony		2,000.00
Total			**65,000.00**

13.0 CONCLUSION AND RECOMMENDATIONS

13.1 Need to Improve the 1.5km Access Route to Pokuase Disposal Site

The route to the final disposal site in Pokuase will ply roads within the community. Sections of the roads, about 1.5km, are in a bad shape apart from being un-engineered routes. The use of the road will create inconveniences and noise nuisance for residents, especially households along the access roads. The residents, however, seem accustomed to some level of noise due to previous quarrying operations on the sites which are being converted into the disposal sites. The residents will nonetheless be sensitized on the night-time disturbances that will be occasioned by the haulage activities.

13.2 Need to Improve the 700m Access Route at Anyaa Disposal Site

As in the case of Pokuase, the route to the final disposal site in Anyaa passes through the community. The 700m access from the Ajos Junction to the disposal site has uneven surfaces and is not engineered and in a bad shape. The use of the road will create inconvenience and noise nuisance for residents, especially households along the access road. Engagement with residents indicated that if the access road could be improved, in addition to other standard safeguards measures such as speed limits and speed ramps, the nuisances from the movement of the waste trucks could be tolerated.

13.3 Preferred Night-time Transportation of Waste

Trucks involved in the transportation of the waste material must as much as possible avoid being obstructed or being involved in accidents. Such an occurrence could result in abandonment of waste on the road, which due to its nature, may give off unpleasant smell or leak its content onto the road. It could also exacerbate the already challenging traffic situation on the roads during peak time and court poor public review for the project.

Generally, the haulage route analysis showed that daytime travel could also result in a threefold increase in travel time, generate excessive greenhouse gas emissions and result in undue delays and inefficiencies. It is therefore recommended for the dredged material haulage to be executed only during the proposed night hours to minimize any drudgery and enhance the benefits of the project.

13.4 Good Planning and Consistency Required to Deliver Project Benefits

Haulage of 110,000m^3 of deferred material will require about 200 days, which is approximately one year at a rate of 28 trips a day. This operation will be intensive and logistically demanding. It will therefore require good planning to ensure consistency in the haulage activities. Equipment must always be in good working order and all other logistical requirements must be well arranged. A similar well-organized approach will have to be employed for the haulage of the estimated 20,000m^3 of yearly maintenance dredged material. Without consistently meeting the daily haulage demands, it would be difficult for the project to meet the target and impossible for the expected benefits of the project to be realised.

13.5 Keeping Communities Informed and Maintaining Open Communication

In order to strengthen the community cooperation, build trust and ensure smooth operations, it would be necessary to formally inform the communities when the haulage operations commence and to maintain open or ongoing communication with them. This may be done through their representatives such as the traditional authorities, Assemblymen/women and community associations. This approach would enable the project to receive timely feedback and make adjustments whenever needed. It would also enable the project to avoid any misunderstandings which could strain relations and cause undue delay in project implementation.

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APPENDICES

Appendix 1.0

Environmental Permit for Deferred and Routine Maintenance Dredging of the Odaw Drainage Basin Project

Permit No: CI00454500102

ENVIRONMENTAL PROTECTION AGENCY

Environmental Permit

ENVIRONMENTAL ASSESSMENT REGULATIONS, 1999 (LI 1652)

This is to authorize

MINISTRY OF WORKS AND HOUSING

To commence the proposed Greater Accra Resilient and Integrated Development (GARID) Project as per the attached schedule.

Located within Accra Metropolis and other Municipalities of the Greater Accra Region of Ghana.

Ebenezer Appah-Sampong
Deputy Executive Director/Technical Services
For: Executive Director

Date Issued: October 27, 2021
Validity Period: April 26, 2023

NB: This Permit is only valid with the attached Schedule and the Seal of the Environmental Protection Agency and conditioned upon obtaining other permits from relevant institutions among others

Tel: (0302) 664697 / 664698 / 662465
667524 / 0289673960 / 1 / 2
Fax: 233 (0302) 662690
E-mail: info@epa.gov.gh
Ghana Post (GPS): GA-107-1998

Environmental Protection Agency
P. O. Box MB 326
Ministries Post Office
Accra, Ghana
Website: http://www.epa.gov.gh

SCHEDULE TO THE ENVIRONMENTAL PERMIT

1.0	CONTACT	:	KWADWO OHENE SARFOH (PROJECT COORDINATOR)
2.0	COMPANY	:	MINISTRY OF WORKS AND HOUSING ACCRA-GHANA, GAR
3.0	CONTACT	:	+233302983322
4.0	REGISTRATION NO.	:	CI: 4545/01
5.0	PERMIT NO.	:	CI0045450102

6.0 **ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROPOSED GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT (GARID) PROJECT LOCATED IN THE ACCRA METROPOLIS AND OTHER MUNICIPALITIES OF GREATER ACCRA REGION OF GHANA.**

In pursuance of the Environmental Protection Agency Act 1994 Act, 490 {Sections 2 (i) and 12 (1)} and the Environmental Assessment Regulations, 1999 (LI 1652) and on the basis of the information provided in the Environmental Impact Assessment (EIS), (September 2021), this Environmental Permit is issued authorizing **Ministry of Works and Housing** to commence the **Deferred and Routine Maintenance Dredging of Odaw Drainage Basin project** located in the Accra Metropolis and other Municipalities of Greater Accra Region of Ghana upon obtaining the necessary building and development permits from the relevant Assemblies.

7.0 CONDITIONS OF PERMIT

7.1 Project Specifications

a. Comply with all project specifications, mitigations, monitoring and other environmental management provisions indicated in the project EIS as well as Ghana Standard for Environmental Protection-Requirements for Effluent Discharge (GS 1212,2019), Ghana Standard for Environment and Health Protection-Requirements for Ambient Air Quality and Point Source/Stack Emissions (GS 1236, 2019), Ghana Standard for Health Protection-Requirements for Ambient Noise Control (GS 1222, 2018). The project involves the **Deferred and Routine Maintenance Dredging of Odaw Drainage Basin** in the Accra Metropolis and other Municipalities with the following activities.

Project Scope

a) Excavation/dredging /removal of waste and sediments from the Odaw River, its tributaries drains and Korle Lagoon
b) Emptying of sand traps
c) Construction of the handling sites and handling of the dredged materials
d) Transport of dredged materials from dredging locations to the handling sites
e) Transport of non-reusable materials from handling sites to disposal site of Anyaa
f) Temporary removal of flap gates of the interception weir and prevention of floating waste entering the Lagoon.

Equipment /Methodology of dredging

a) Cutter suction dredger (CSD)
b) Watermaster in hydraulic configuration
c) Watermaster in mechanical configuration
d) Excavator +pontoon (wet mechanical dredging)
e) Excavator (dry mechanical dredging)

7.2 Location

a) The proposed project is located within the Accra Metropolis and other Municipalities of Greater Accra Region. The dredging project will be carried out in the following locations.

I. Odaw line, 33,123m^3
II. Odaw unlined 9,138m^3
III. Agbogbloshie
IV. South Kaneshie, 14,334m^3
V. Korle Lagoon, 29,949m^3

b) The following locations with their coordinates will serve as temporary handling sites for the dredged materials before its finally disposed off

I. Korle-na, (5.532186, -0.221591)
II. Odaw-na, (5.558610, -0.219359)
III. Pasico, (5.538386, -0.219025)
IV. Lavender hill, (5.529935, -0.223344)

7.3 Displacement of properties

a) Ensure payment of adequate compensation for buildings, lands and kiosks in accordance with the provision of the law at the appropriate values in line with the Land Valuation procedures
b) Affected people shall be compensated and a resettlement action plan to be prepared and livelihood restoration plan for vulnerable prepared for implementation
c) Collaborate with Lands Commission to facilitate the compensation procedures to ensure that all affected parties are promptly compensated.
d) Submit a report on compensation payment as part of the Annual Environmental Report of the project.
e) Optimise the footprint of the works, including access to the dredging areas, cleaning of drains, collection areas, dewatering areas in order to avoiding assets of people
f) Place makers in the field with the deferred dredging campaign to show footprint of the works so that people do not established any assets within the footprint

Appendix 2.0

Memorandum of Understanding Between MWH and AMA and Ngleshi Stool of James Town

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE MINISTRY OF WORKS AND HOUSING

AND

ACCRA METROPOLITAN ASSEMBLY

AND

NGLESHI STOOL OF JAMES TOWN, ACCRA

FOR

THE USE OF 3 DESIGNATED SITES ALONG THE ODAW BASIN AND KORLE LAGOON TO SUPPORT THE TEMPORARY HANDLING OF NEWLY DREDGED MATERIALS

The Ministry of Works and Housing, represented by the Chief Director, hereinafter referred to as "the Government" on the one hand

And

The Accra Metropolitan Assembly, represented by the Metropolitan Coordinating Director, on the other hand, hereinafter referred to as "the Assembly";

And

The Ngleshi Stool of James Town, Accra, represented by the Stool Head, on the other hand; hereinafter referred to as "the Stool",

All collectively referred to as the "**Parties**".

BACKGROUND

The Government of Ghana has secured funding from the World Bank to finance the Greater Accra Resilient and Integrated Development (GARID) Project. The project aims to improve flood risk management and solid waste management in the Odaw River Basin of the Greater Accra Region, and improve access to basic infrastructure and services in targeted communities within the Basin. The project will invest in flood mitigation measures within the Odaw River Basin for five years (2020–2025).

The GARID project comprises five interrelated components (1) Climate Resilient Drainage and Flood Mitigation Measures, (2) Solid Waste Management Capacity Improvements, (3) Participatory Upgrading of Targeted Flood Prone Low-income Communities, and Local Government Support (4) Project Management; and (5) Contingent Emergency Response (CERC). These are further described below:

The Component 1 of the Project is being implemented by the Ministry of Works and Housing (MWH), and includes structural improvements of drainage systems, and flood

water management through upstream water conservation, development of flood retention areas, as well as improving early flood warning and response capacity in Greater Accra Region.

A major intervention under this component is the dredging of the Odaw Channel and tributary drains. The capacity of the Odaw Channel and drains has decreased, due to siltation, improper disposal of solid waste which finds its way into the drains, and lack of routine maintenance. The volumes of sediment in the Channel have to be removed. The Odaw Channel (and associated drains) from Caprice to the Sea needs to be dredged to restore the design flow capacity (deferred dredging) and subsequently dredged annually (maintenance dredging) to maintain the design flow capacity. The total volume for the deferred dredging is estimated to be around 655,000 m^3. Annual maintenance dredging volumes have been estimated at between 45,000 - 85,000m^3.

The newly dredged material must be handled and ultimately carted away from the dredging zone to designated final disposal sites in order to create an obstruction-free work environment and to prevent washing back of the material into the Channel. Analysis of sediment from the Odaw Channel indicates that it is a mixture of gravel and sand (75%), and, silt and clay (25%). Overall, there appears to be enough sand or gravel content to make sand and gravel sales for beneficial use, particularly in the construction industry. Despite best efforts to reuse as much of the dredged material as possible, a certain amount will have to be disposed of at a final disposal site(s). The volumes of material to be disposed of every year are estimated at around 110,000 m^3 and 20,000 m^3 from the deferred dredging and maintenance dredging respectively.

WHEREAS:

A. The Parties have considered the designation of sites to support the temporary handling of newly dredged materials under the Performance-based contracting approach to the deferred and routine dredging of the Odaw Basin (from mid-stream to downstream) and the Korle Lagoon;

B. The Parties have committed to working together and collaborating on matters relating to the dredging of the mid-stream from Caprice through the down-stream section of the Odaw basin and the Korle Lagoon into the sea.

C. The Parties accept that this activity demands the availability of land and the temporary handling of the newly dredged materials including de-watering the sediments, and filtering the plastic and other residual waste to be transported to designated final disposal sites on the and separating the re-usable sediments (referred to as **"the Project Sites"**);

D. The Parties have determined the best suited locations for the temporary handling activity which are as follows;
   i. The parcel of land situate on the banks of the lower lagoon of the Korle of which an aerial view is annexed hereto as Annex A with accompanying site plan annexed hereto as Annex B;
   ii. The parcel of land situate on the banks of the left arm of the Odaw Basin and adjacent to the boundary fence wall of Pasico Company Limited on the Guggisberg Avenue, Korle Gorno of which an aerial view is annexed hereto as Annex A with accompanying site plan annexed hereto as Annex C;
   iii. The parcel of land situate on the banks of the Odaw basin and adjacent to the railway crossing at Odawna of which an aerial view is annexed hereto as Annex A with accompanying site plan annexed heretofore as Annex D;

E. The Parties have agreed that the materials to be handled shall be exclusively dredged materials and no other waste shall be accepted at the designated project sites;

F. The Parties have considered and acknowledge the critical importance of sustaining the development and maintenance of the Project to facilitate improvements in flood mitigation in the Greater Accra Metropolitan Area (GAMA) in addition to training, learning, research and innovations; and

G. The Parties are agreed that subsequent to the completion of the dredging contract and related usage of the designated land for temporary handling, the Project Sites shall revert to the Assembly and the Stool.

NOW THEREFORE the Parties have agreed as follows:

ARTICLE 1 – OBJECT OF THE AGREEMENT

The object, of this Memorandum of Understanding (hereinafter referred to as the "Agreement) is to define the respective roles and responsibilities of the Parties relating to the development and maintenance of the Project and related matters.

ARTICLE 2 – DESCRIPTION OF THE PROJECT

The scope of the Project to be maintained under this Agreement shall comprise the following:

i. Lands of respective sizes as annexed hereto in Annexes B, C, and D;
ii. Preparation of the Sites to receive newly dredged materials from the Odaw Basin and the Korle Lagoon, including measures outlined in the Environmental and Social Impact Assessment reports;
iii. Executing security and other protective measures to ensure health and safety of operatives undertaking temporary handling of dredged materials and transportation of both re-usable sediments and the residual waste materials after the filtering;
iv. Other ancillary works to ensure access, parking, drainage, fire prevention, maintenance of the Site, among others

ARTICLE 3 – COVERAGE OF SERVICE AND LINKAGE

The Project is expected to provide the Site to support the handling activities linked to the dredging to be implemented by the Contractor executing the performance-based dredging.

ARTICLE 4 – OBLIGATIONS OF THE PARTIES

Article 4.1 – The Government

i. **The Government** shall

a. secure the funding for the construction of the Project with the support of the World Bank under the Greater Accra Resilient and Integrated Development (GARID) project, and from any other sources, as may become necessary.

b. conduct an Environmental and Social Impact Assessment in accordance with the World Bank environmental and social safeguard policies and the guidelines of the Environmental Protection Agency (EPA). Based on the

ESIA, the government shall ensure the preparation of the Environmental and Social Management Plan (ESMP).

c. lead in the procurement of Contractors to undertake the design for the dredging operation and the implementation of deferred and routine dredging in accordance with the terms outlined in the Feasibility Studies

d. provide a project management support unit to oversee the design and construction of the Project including the Defects Liability Period during the operation for the period of the construction

e. hand over the Site to the Contractor to be utilised for the purposes set out in this Memorandum for the period indicated in this Memorandum without any encumbrances at the time of handing over

f. ensure that, during the period where possession of the Site rests with the Contractor, all cultural, social and religious norms of the Stool as elaborated in this memorandum shall be respected by the Contractor.

Article 4.2 – The Stool

i. **The Stool** shall

a. avail the Site, represented by the parcels of land delineated in Appendixes A, B and C annexed heretofore, to the Client and subsequently acquiesce to its onward transfer to the Contractor for use as defined in this memorandum

b. mediate and ensure that its subjects do not obstruct the Contractor in the implementation of the dredging, handling and disposal activities

c. undertake the requisite customary rights as agreed between parties

d. lead the community in all public engagements between the Community and the Contractor and or the Client

e. provide complimentary information in the preparation of education, information and communication materials

f. support the Project in the communication of essential information to the Community

Article 4.3 – The Assembly

i. **The Assembly** shall;

a. support the Client to oversee the activities of the Contractor in compliance with the terms in this agreement

b. police the peripheries of the Site to maintain the sanctity of the approaches to the Site of the Project and forestall deliberate dumping or damage of the neighbouring environs.

c. prepare and circulate appropriate education, information and communication materials to further the sensitization of residents and other persons involved in activities that contribute to the dredging activities.

Article 4.4 – The Parties

i. **The Parties** shall

a. promptly inform each other in the event of the occurrence of any incidents with prospects of having adverse impacts on the continuation and sustainable delivery of the Project.

b. seek to harness additional value for the operations of the project through partnerships with other actors in the utilization of re-usable parts of the dredged materials.

ARTICLE 5 – AMENDMENTS TO THE AGREEMENT

The Agreement may only be modified or amended by mutual consent of the Parties and shall be in writing.

ARTICLE 6 – ENTRY INTO FORCE/CONDITIONS PRECEDENT TO EFECTIVENESS

The Agreement shall enter into force upon the signing by the Parties.

ARTICLE 7 – TERM/VALIDITY PERIOD OF THE AGREEMENT

This Agreement shall commence on the effective date and shall be perpetual subject to the provisions of this Agreement.

ARTICLE 8 – TERMINATION OF AGREEMENT

i. In the event of non-performance by any of the Parties of its obligation under the Agreement, the Agreement shall automatically terminate.

ii. Notwithstanding Article 8 (1) any of the Parties may terminate the Agreement within three (3) months' notice in writing to the other Parties which notice shall be formally acknowledged.

ARTICLE 9 - FORCE MAJEURE

i. The provisions of this Agreement shall not apply during the time and to the extent that the performance of the obligations of the Parties is prevented, wholly or in part, by reason of a Force Majeure.

ii. If any Party is by reason of a Force Majeure is unable to perform any obligation pursuant to this Agreement, it shall notify the other Parties as soon as possible, specifying the cause and extent of such non-performance, the date of commencement thereof and the means proposed to be adopted to remedy or abate the Force Majeure.

iii. If Force Majeure occurs, each party shall:

a. use all reasonable means to remedy or abate the Force Majeure as soon as possible;

b. resume performance as soon as possible after termination of the Force Majeure or abatement of the Force Majeure to an extent which permits resumption of such performance; and

c. notify the other Parties when resumption of performance shall occur.

iv. If a Force Majeure continues for a period exceeding eighty-four (84) days, any Party may terminate this Agreement forthwith upon notice to the other Parties.

v. "Force Majeure Event" means an exceptional event or circumstance which:

a. is beyond a Party's control,

b. such Party could not reasonably have provided against before entering into this Agreement,

c. having arisen, such Party could not reasonably have avoided or overcome, and

d. is not substantially attributable to the other Party;

vi. Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

a. war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
b. rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war,
c. riot, commotion, disorder, strike or lockout by persons other than the Contractor's personnel and other employees of the Contractor and its subcontractors,
d. munitions of war, explosive materials, ionizing radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such ammunitions, explosives, radiation or radio-activity, and
e. natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

vii. Notwithstanding the above provisions, if any event arises outside the control of the Parties including but not limited to Force Majeure which makes it impossible or unlawful for either Party to fulfil its obligations under this Agreement, either Party shall be released from further performance under the Agreement upon notification to the other Party.

ARTICLE 10 – NOTICES AND ADDRESSES

Each Party shall utilize the addresses, as provided hereunder for all communication notices, requests and other correspondence, and these shall be deemed to have been duly given or made when delivered by hand, mail, courier, fax or e-mail, unless otherwise amended by any of the parties, which changes must be submitted and acknowledged one month prior to the use of such revised addresses.

ARTICLE 11 – DISPUTE RESOLUTION

i. Any dispute that may arise in the interpretation and application of this Agreement and any subsidiary agreements and amendments shall be resolved by and between the Parties amicably in the spirit of friendship and co-operation.

ii. Any dispute between the Parties in connection with, pursuant to, relating to or arising out of this Agreement that remains unresolved for a period of more than ninety (90) days from the time such dispute is declared shall be referred for settlement in accordance with the alternative dispute settlement procedure in Ghana stipulated in _____ and its subsequent amendments.

ARTICLE 12 – APPLICABLE LAW

This Agreement shall be governed by and construed in accordance with the law in force in Ghana.

Signed this day, ...of ....., ... at .....

.....

For the Ministry of Works and Housing	For the Accra Metropolitan Assembly	For the Ngleshi Stool of James Town, Accra
CHIEF DIRECTOR Ministry Of Works And Housing Accra	CO-ORDINATING DIRECTOR ACCRA METRO. ASSEMBLY	P. O. BOX GP 22107 ACCRA
Chief Director	**The Coordinating Director**	**The Stool Head** Nii Armah Koti Akuab

Witnessed herein by

Name

Kwadwo Ohene Sarfoh | Graham Sarkodie | Nii Agyeteq Armah

Appendix 3.0

Soil Sample Results of Heavy Metal Concentration at the Four Handling Sites

3.1 In-Situ Soil Sample Results

3.1.1 Korle-na

Way Point	Ti	Fe	Cu	Zn	Pb	Sr	Rb	Zr	Mn	Co	Ba	As	Ag	Hg	Ni
1	1780	12416	30	129	33	126	19	179							
2	1995	12505	32	123	26	107	16	212	130						
3	3227	14251	33	118	47	134	25	186	186						
4	2560	16810	45	189	54	145	28	222			505				
5	3012	19782	38	179	68	101	38	274	169	276	634		59		
6	2604	14623	50	96	25	334	18	142						20	
7	1540	12632		81	24	301	25	153	154						
8	801	556		85	12	265	6	65							
9	306	1165		95	12	289	13	180				10			
10		8560	23	888	12	289	13		72	53				13	
11	801	44556		185	6	443								13	35
12		4482		185		275	6								
13		143030		185		289	17	55			314				
14	301	1566		189		289	13	155							

3.1.2 Pasico

Way point	Ti	Mn	Fe	Co	Cu	Zn	Pb	Rb	Sr	Ba	Zr	Sb
31	1327	112	10074	167	39	360	85	13				
32	3841	323	14491		85	248	99	27	113			
33	3986	130	8451		602	1283	255	29	188			
34	4216		1251	206	55	161	289	105		646		
36	1869	148	8679		45	250	32	11	153			
37	2075	128	7048		707	10183	620	17	243			
38	2812	215	18541	327	174	343	82	31				
39	1655	162	12383		94	202	83	22	85			
40			8478		26	30		11	28		86	223
41	3039	138	16400		55	203	57	28	79			

3.1.3 Odawna

Way point numbe	Ti	Mn	Fe	Co	Cu	Zn	Hg	Pb	Sr	Rb	Zr
42a	2186	113	11744	190	63	258	19	45			
42b	1759	113	10261		31	154		39	60	18	
43a	1612	120	7501		31	96		27	67	15	
43b	1062		5759		28	121		17	95	5	207
44a	1816	150	13451	212	74	192		50	68	33	364
44b	1720	112	13321		58	164		32	65	32	304
47a			4308			230		842	73	33	217
47b			4946			1177		90	58	14	272
48	1324		5407	124		72		14	60	13	181
49	2209		6559	125		118		37	91	17	458
50			5697			458		15	57	16	163
51			4499			26			42	16	206
52	1377	130	10635			474		46	90	28	307
53	1198		5695			99		25	62	22	153
54		272	5770			97		16	82	17	100
55	1700		14408	271		198		29	167	32	315
56	2373		12956			191		39	94	33	278

** *Results in ppm*

3.2 Laboratory Results for Soil Analysis

Analysis Results

Water Research Institute, Environmental Chemistry Division
CSIR Premises, Airport Res. Area
P. O. Box M. 32
Accra, Ghana
Phone: (+233-302) 775351/52 Fax: (+233-302) 777170 E-mail: info@csir-water.com

Location: Accra **Company: Name: Centre for Env. And Health Research & Training**

Contact First Name: Yaw **Contact Last Name: Amoyaw-Osei**

Analysis start date: **Analysis end date:**

Parameter	Lavender Hill Handling site (LH)	Korle-na Handling site (KN)	Pasico Handling site (PS)	Odawna Handling site (OD)
Iron (mg/kg)	776	7,689	1,181	2,453
Manganese (mg/kg)	96.0	79.0	30.0	20.0
Copper (mg/kg)	23.0	79.7	50.0	123
Zinc (mg/kg)	131	299	232	178
Cobalt (mg/kg)	1.60	3.80	3.55	1.35
Lead (mg/kg)	4.00	20.0	157	248
Arsenic (mg/kg)	2.66	0.700	0.300	0.437
Mercury (mg/kg)	2.34	0.566	0.234	0.534

Approved by:

Dr. K. A. Asante (Head, ECSED)

HEAD-ECSED
04 JUL 2022

Appendix 4.0

Ambient Air Quality and Noise Level Monitoring Report

Methodology

Monitoring protocols used during the exercise are outlined in this section. The protocols are consistent with the approved Ghana standard methods and are accepted internationally.

Sampling was carried at various locations within the proposed project sites from 20th to 23rd May, 2022. The period coincided with the main rainy season. The weather condition was predominantly cloudy with some rain showers during the sampling period.

Noise Level Monitoring and Analysis

Calibration of Sound Level Meter

The microphone capsule (MK:224) together with the preamplifier was mounted on a tripod stand and fitted to the sound level meter (CR:171B) via the CK:675 outdoor measurement kit. The sound level meter was then switched on and allowed for about 2 minutes to load. An acoustic calibrator (CR:515) was also switched on, and fitted on top of the microphone capsule. The "CALIBRATION" button on the sound level meter was then pressed for the commencement of calibration. After about 5 seconds, the sound level meter (screen) showed "OK" to signify end of calibration. The "OK" button was pressed to end the calibration process. The acoustic calibrator was removed and switched off.

Noise Measurement

Ambient noise survey was carried out to monitor existing ambient noise levels at the proposed project sites (Contractor equipment and holding sites). A 24-hour continuous measurement was undertaken at each sampling location to account for daily variations in noise levels of the area.

Sound level recordings were made using Type 1 Cirrus CR:171B Optimus Plus Sound Level Meter with built-in 1/3 octave band and fully conforms to specifications of IEC 61672-1:2013. **At each of the selected location, t**he sound level meter was mounted on a tripod stand with the microphone elevated at a height of 1.5 meters above ground level and inclined at an angle of 45°. The meter was set to fast respond time for all measurements. The equivalent (Leq), maximum (Lmax) and minimum (Lmin) as well as statistical values for LA_{10}, LA_{50}, and LA_{90} noise levels were computed and recorded over the same period (day and night) at each sampling location.

Photos of equipment setup during noise monitoring at each sampling location are provided below.

Noise Level survey at NSL3 - St. Mary Girls School

Noise Level survey at NSL4 - AMA Block

Noise Level survey at NSL5 - Pasico

Noise Level survey at NSL6 - Odawna - West

Noise Level survey at NSL7 - Odawna - East

Ambient Air Quality Monitoring

Particulate (TSP, PM_{10} & $PM_{2.5}$) Sampling and Analysis

MiniVol Tactical Air Samplers (TAS®) were used for the measurement of particulate matter (TSP, PM_{10} and $PM_{2.5}$). The programmable sampling units were set over a 24-hour period at each sampling location to sample ambient air at a flow rate of 5 L/min. Regular checks of the flow rate were conducted throughout the sampling period to ensure that constant flow rate was maintained. The sampling units were mounted at a height of about 2.0 meters above ground level and away from any obstacle to ensure unrestricted air flow to the units. At each receptor location, TSP, PM_{10} and $PM_{2.5}$ were sampled at the same time for the same period.

Ambient air was collected over pre-conditioned (pre-weighed) non-fibre whatman filter paper (Ø47 mm) placed within a filter holder. A PM_{10} and $PM_{2.5}$ impactors were fixed on top of the filter holders which ensured that only particles of size less than 10 and 2.5 microns reach the filter paper. In the case of TSP, no impactor was placed in the filter holder and this allowed total particulates in the air to reach the filter paper.

At the end of the sampling period, the filters were removed and kept in sealed filter holders to prevent moisture from reaching the filters. The filters were sent to the laboratory, dried in a desiccator for 24-hours before re-weighing. The net weights were calculated and dust concentrations were computed using the gravimetric method of determination of respirable and total inhalable particulate concentrations. The formula used to compute dust concentration is provided below.

$$\mu g/m^3 = \frac{\text{Net dust weight (mg) x 1000 x 1000 } (L/m^3)}{\text{Flow Rate } (L/\text{min}) \text{ x Sample time (min)}}$$

Photos of equipment setup at each of the selected locations sampled for Air Quality are provided below.

Air Quality Survey at AQL3 - St. Mary Girls School

Air Quality Survey at AQL4 - AMA Block

Air Quality Survey at AQL5 - Pasico

Air Quality Survey at AQL6 - Odawna - West

Air Quality Survey at AQL6 - Odawna - East

Gaseous Emission Sampling and Analysis

Gases (SO_2 and $NO_{2)}$ were recorded for 24 hours at the various selected sampling locations within the proposed project site. Aeroqual Series 500 single gas detectors were mounted to detect the presence and concentrations of Nitrogen dioxide (NO_2) and Sulphur dioxide (SO_2).

The units were oriented against the direction of the wind. As the wind blows, air is absorbed onto a sensor and the gas is then detected and logged by the unit. The sulphur dioxide unit has a detection range of 0 – 10 ppm with a resolution of 0.01 ppm whereas the nitrogen dioxide unit has a detection range of 0 – 20 ppm with a resolution of 0.001 ppm. Gas recordings were downloaded from the Aeroqual Series 500 units by means of USB cable and computed for the levels of Nitrogen dioxides (NO_2) and Sulphur dioxide (SO_2).

Quality Control

Field quality control involved regular calibration checks and documentation of the operational flow-rate to track the sampler's calibration stability.

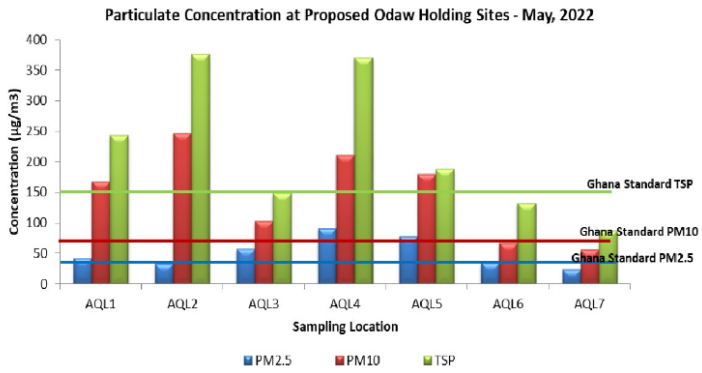
Ambient Air Quality

Particulate Monitoring (TSP, PM10 & PM2.5)

Concentrations of TSP, PM10 and PM2.5 in ambient air were monitored over a 24-hour period at the four (4) selected locations and the results compared with the respective Ghana standards and IFC guidelines.

Particulate concentrations recorded at all the seven (7) selected locations ranged from 86.8 µg/m3 to 376.8 µg/m3, 56.1 µg/m3 to 247.1 µg/m3, and 24.3 µg/m3 to 91.2 µg/m3 for TSP, PM10 and PM2.5 respectively. Concentrations recorded for TSP, PM10 and PM2.5 for the two (2) sampling locations at Holding Site 3 (Odawna) compare favorably with the respective Ghana Standards. On the contrary, concentrations recorded at the five (5) sampling locations for the remaining sites (Contractor Equipment Site, Holding Site 1 & 2) exceeded the respective Ghana standards except for PM2.5 concentration at Contractor Equipment Site (AQL2).

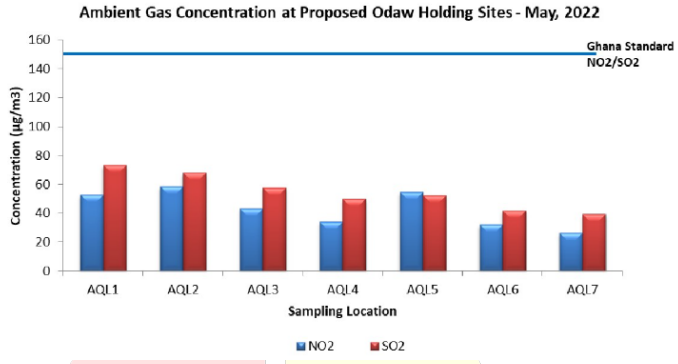
Major sources of particulates emissions observed during the monitoring period include frequent movement of vehicles on the main roads, burning of plastics and used tyres, and wind-blown dust particles from exposed surfaces.



Concentrations of the proposed holding site in comparison with Ghana Standards

Gaseous Emission (NO_2 & SO_2)

Gaseous emissions monitoring was also carried out for nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) for 24-hour period. Concentrations recorded for NO_2 at SO_2 at all the four locations are lower when compared with the respective Ghana standard of 150 µg/m^3 and 50 µg/m^3 for residential areas. Based on the results, it can be concluded that the existing activities (domestic and intermittent vehicular movement) has moderate impact in terms of gaseous emissions (NO_2 and SO_2). Figure 3.2 shows the concentrations of NO_2 and SO_2. Gaseous emission sources observed include emissions from frequent movement of tipper trucks, emissions from the Chinese Company and domestic activities.



Concentrations of Ambient Gases (NO2 & SO2) in comparison with Ghana Standard.

Ghana Ambient Noise Standards

For the purposes of comparison, the requirements for ambient noise control levels based on categorized zones for Ghana standards are provided in table below.

Requirement for Ambient Noise Control Level Based on Categorized Zones

Zone	PERMISSIBLE NOISE LEVEL IN dB(A)	
	DAY (6:00am – 10:00pm)	NIGHT (10:00pm – 6:00am)
A (Residential areas)	55	48
B (Education and health facilities, office and law courts)	55	50
C (Mixed used)	60	55
D (Areas with some light industry)	**65**	**60**
E (Commercial areas)	75	65
F (Light industrial areas)	70	60
G (Heavy industrial areas)	70	70

Source: GS 1222:2018

Based on the categorized zones by the Ghana standard, all the seven (7) locations can be classified under Zone D (Areas with some light industry).

Results

Results obtained for the baseline ambient air quality and noise level monitoring are provided in tables respectively. The results are representative of the environmental conditions of the proposed project area at the time of the monitoring.

The applicable Ghana standards and IFC guidelines are also provided to allow for comparison.

Table 3.1: Summary of Air Quality Results over 24-Hour Period

Location ID	Date		Particulate Concentration			Gaseous Concentration	
	Started	Stopped	$PM_{2.5}$ (µg/m³)	PM_{10} (µg/m³)	TSP (µg/m³)	NO_2 (µg/m³)	SO_2 (µg/m³)
Contractor Equipment Site (AQL1)	20-May-22	21-May-22	42.0	168.1	242.9	52.7	73.3
Contractor Equipment Site (AQL2)	20-May-22	21-May-22	33.3	247.1	376.8	58.3	68.1
Holding Site 1 (Korle Naa - AQL3)	21-May-22	22-May-22	57.9	102.8	148.8	43.3	57.6
Holding Site 1 (Korle Naa – AQL4)	21-May-22	22-May-22	91.2	210.8	370.4	33.9	49.7
Holding Site 2 (Pasico – AQL5)	21-May-22	22-May-22	78.3	179.7	187.8	54.6	52.4
Holding Site 3 (Odawna – AQL6)	22-May-22	23-May-22	35.0	66.7	131.9	32.0	41.9
Holding Site 3 (Odawna – AQL7)	22-May-22	23-May-22	24.3	56.1	86.8	26.3	39.2
Ghana Standard (Commercial Area)			**35**	**70**	**150**	**150**	**150**
IFC Guidelines			**25**	**50**	**-**	**200**	**20**

Table 3.2: Summary of Environmental Noise Levels Recorded over 24-Hour Period

Location ID	Time	Noise Level in dB(A) Recorded						
		LA_{eq}	LA_{max}	LA_{min}	LA_{10}	LA_{50}	LA_{90}	LA_{95}
Contractor Equipment Site (NSL1)	Day (7h00 – 22h00)	**60.9**	91.7	46.7	62.5	58.1	54.8	53.9
	Night (22h00 – 7h00)	**61.7**	103.9	45.2	62.1	58.1	53.9	52.5
Contractor Equipment Site (NSL2)	Day (7h00 – 22h00)	**60.5**	88.6	48.9	62.3	58.3	55.0	53.9
	Night (22h00 – 7h00)	**61.7**	83.5	52.5	63.5	60.6	57.9	57.1
Holding Site 1 (Korle Naa - NSL3)	Day (7h00 – 22h00)	**61.6**	91.1	35.9	65.9	55.2	46.7	45.0
	Night (22h00 – 7h00)	**68.1**	95.1	40.1	70.9	59.0	47.3	45.3
Holding Site 1 (Korle Naa – NSL4)	Day (7h00 – 22h00)	**63.4**	88.5	45.1	66.5	60.6	53.0	51.0
	Night (22h00 – 7h00)	**73.1**	96.3	46.8	74.6	61.9	52.8	51.3
Holding Site 2 (Pasico – NSL5)	Day (7h00 – 22h00)	**66.0**	86.4	51.0	67.9	64.5	61.2	60.1
	Night (22h00 – 7h00)	**67.2**	90.1	56.4	68.5	65.3	62.6	61.7
Holding Site 3 (Odawna – NSL6)	Day (7h00 – 22h00)	**60.3**	90.2	44.3	63.5	55.2	50.4	49.3
	Night (22h00 – 7h00)	**58.6**	83.4	44.4	61.7	52.4	48.0	47.3
Holding Site 3 (Odawna – NSL7)	Day (7h00 – 22h00)	**60.0**	107.5	48.5	60.3	54.0	51.4	51.0
	Night (22h00 – 7h00)	**62.1**	86.1	45.8	63.9	54.2	49.9	49.1
Ghana Standard (Zone D)	Day (7h00 – 22h00)	**65**	-	-	-	-	-	-
	Night (22h00 – 7h00)	**60**						

Conclusion

The baseline report has been compiled as part of the EIA process to ensure compliance with the Ghanaian EIA laws, Environmental Protection Agency Act, 1994 (Act 490), and the Environmental Assessment Regulations, 1999 (L.I.1652).

Sampling was conducted within the proposed project site from 20th to 23rd May, 2022. Seven (7) sites were selected for both ambient air quality and noise monitoring.

The baseline results indicate lower particulate concentrations at the Odawna site (holding site 3) while higher particulates were recorded at the remaining three (3) sites. Based on the results when compared with the respective Ghana Standards.

Appendix 5.0

Evaporation Data

Evaporation Rate (mm/day)												
Year	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2015	4.34	4.96	4.86	4.98	4.49	3.59	4.09	4.00	4.46	4.42	4.54	4.16
2016	4.34	4.77	4.98	5.29	4.68	3.75	3.92	3.74	4.40	4.56	4.85	4.24
2017	4.40	4.53	5.17	4.98	4.48	3.58	3.46	3.45	3.73	4.71	4.43	4.02
2018	4.10	4.65	5.35	5.07	4.44	3.89	3.72	4.19	3.93	4.55	4.58	4.34
2019	4.54	4.97	5.24	5.03	4.13	3.86	3.61	3.98	4.03	4.11	4.64	4.80
2020	4.05	3.93	5.02	4.94	4.81	3.60						

Appendix 6.0

Traffic Assessment Data

6.1 Modelled Traffic Performance

Traffic Flow Characteristics	Base Scenario		After Development		10 Years Forecast	
	Highest Peak Values	Lowest 12hr Values	Highest Peak Values	Lowest 12hr Values	Highest Peak Values	Lowest 12hr values
Ring Road West/Guggisberg Avenue Intersection						
Average Delay (s)	113.3	43.9	113.9	44.0	140.4	48.0
Intersection Utilisation (100%)	98.8	71.1	98.9	71.2	107.1	76.6
ICU Level of Service	F	C	F	C	G	D
HCM LOS	F	D	F	D	F	D
Max V/C ratio	1.50	0.83	1.50	0.84	1.65	0.92
Otublohum Road/Obibini Street Intersection						
Average Delay (s)	1764.0	6.1	1781.3	6.2	1787.0	7.8
Intersection Utilisation (100%)	109.7	53.8	110.2	54.3	120.2	58.7
ICU Level of Service	H	A	H	A	H	B
HCM LOS	F	A	F	A	F	A
Max V/C ratio	3.37	0.52	3.45	0.53	5.07	0.63
Fan Milk Junction on The Anyaa-Awoshie Road						
Average Delay (s)	142.4	36.9	142.2	37.0	181.2	38.1
Intersection Utilisation (100%)	83.3	49.1	83.3	49.2	83.3	50.8
ICU Level of Service	E	A	E	A	E	A
HCM LOS	F	D	F	D	F	D
Max V/C ratio	2.95	0.60	2.95	0.60	3.64	0.66
Anyaa Community Road 1 Intersection						
Average Delay (s)	0.3	0.2	0.4	0.3	0.4	0.3
Intersection Utilisation (100%)	31.5	16.8	31.7	16.9	33.8	17.6
ICU Level of Service	A	A	A	A	A	A
HCM LOS	A	A	A	A	A	A
Max V/C ratio	0.33	0.10	0.33	0.10	0.36	0.11
Anyaa Community Road 2 Intersection						
Average Delay (s)	2.5	0.8	2.5	0.9	2.9	0.9
Intersection Utilisation (100%)	42.2	17.6	42.6	17.7	46.2	18.5
ICU Level of Service	A	A	A	A	A	A
HCM LOS	A	A	A	A	A	A
Max V/C ratio	0.35	0.10	0.36	0.10	0.42	0.11
Old Nsawam Road/Pokuase Zonal Council Road Intersection						
Average Delay (s)	15.6	6.8	17.1	6.9	34.2	7.7
Intersection Utilisation (100%)	75.4	43.0	75.6	43.4	82.4	46.8
ICU Level of Service	D	A	D	A	E	A
HCM LOS	C	A	C	A	D	A
Max V/C ratio	0.90	0.41	0.93	0.42	1.22	0.49

6.2 Base Flows

Baseflows Adopted for Korelebu Traffic Signal

Highest Peak Values

Lowest 12hr Peak Values

Baseflows Adopted for Otublohum Road/Obibini Street Intersection

Highest Peak Values

Lowest 12hr Peak Values

Baseflows Adopted for Anyaa Community Roads 1

Highest Peak Values

Lowest 12hr Peak Values

Baseflows Adopted for Anyaa Community Roads 2

Highest Peak Values	*Lowest 12hr Peak Values*
Baseflows Adopted for Old Nsawam/Pokuase Zonal Council Road	
	
Highest Peak Values	*Lowest 12hr Peak Values*

Appendix 7.0

Letter of Introduction

In case of reply, the number and date of this letter should be quoted.

My Ref. No. GARID/PCU/ADM/102/22

Your Ref. No.:.....

GARID
GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT

Ministry of Works & Housing
P. O. Box M. 43
Ministries – Accra

Date 30th May, 2022

GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT PROJECT (GARID)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) OF PROPOSED HANDLING AND TRANSPORTATION OF DREDGED MATERIAL FROM LAVENDER HILL, ODAWNA, KORLENA AND PASICO SITES TO FINAL DISPOSAL SITES IN THE GREATER ACCRA REGION –

INTRODUCTION OF CONSULTANT, CENTER FOR ENVIRONMENT & HEALTH RESEARCH TRAINING (CERHT), TEMA LITOCLEAN GRUPO, AND HOLIX CONSULT LTD. JV

The Ministry of Works and Housing under the Greater Accra Resilient and Integrated Development Project (GARID), has recruited a joint venture consultancy firm, Messrs **CENTER FOR ENVIRONMENT & HEALTH RESEARCH TRAINING (CERHT), TEMA LITOCLEAN GRUPO, AND HOLIX CONSULT LTD. JV** to prepare an **ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN OF THE PROPOSED HANDLING AND TRANSPORTATION OF DREDGED MATERIAL FROM LAVENDAR HILL, ODAWNA, KORLENA, AND PASICO SITES TO FINAL DISPOSAL SITES IN THE GREATER ACCRA REGION**.

This ESMP will assess the environmental and social risks and impacts of handling and transportation of dredged materials based on available information at hand. The main focus of the ESMP will be on assessing significant environmental and social impacts and outlining measures for mitigating or enhancing anticipated project impacts. Various handling and transportation options for the dredged materials will be studied and analyzed in this ESMP.

It is a mandatory requirement of the assignment for the Consultant to undertake consultations with a range of key stakeholders and your participation in this regard would enable the Consultant conclude their obligations in a timely manner.

The Ministry of Works and Housing appreciates your cooperation.

Yours faithfully,

SOLOMON A. ASOALLA
CHIEF DIRECTOR
For: MINISTER

Tel: +233 302 983 322
Email:info@garid-accra.com

Off Valco Drive
PWD Head Office
Ministries-Accra
GPS: GA-144-2550

Appendix 8.0

Previous Engagement Outcomes (Odawna RAP)

Discussions

1. Knowledge of the Dredging activities, Resettlement process and Concerns

- Generally, the PAPs appreciated the need for the dredging activity and were willing to move their activities outside the buffer area to make way for the project activities.
- PAPs included residents and commercial activities such, as traders, vehicle repairs, drivers ploughing their activities along the dredge etc.

2. Concerns with the Resettlement of Project Affected Persons

Major concerns discussed were:

• When will the dredging activities take place?	PAPs would be informed immediately; the project is about to commence.
• Who will be affected and who is qualified to be enumerated?	Persons in the right of way of the project activities
• Will persons affected be allowed to come back to the site after works?	After compensation, PAPs are not expected to come back to the site.
• Any support package for PAPs whose structures will be affected a) If there is a support package, when will it be given?	There will be support packages given to PAPs to enable successful relocation and prevent any associated challenges with the resettlements.
• What is the entitlement criteria for the Project?	Basically, structures in the RoW such as shops, houses, table top vendors etc.
• Who gets the payment of compensation? Example - where someone rents a space, builds a facility and then rents it out to another user, who is entitled to the compensation	Both the rented space and the facility (container or wooden shop) would be compensated. The owner of the space would be compensated and the shop owner would also be compensated.

These issues were well discussed and PAPs appreciated the process.

3. Measures to Enable the Process to be Successful

- A grievance redress committee consisting of five individuals will be set up after further consultation. Membership will later be submitted to the Consulted.
- The Assemblyman will work with enumerators to get the PAPs inventory taken.
- A disclosure meeting was requested by the community after the completion of the RAP inventory.

4. Alternative Livelihood

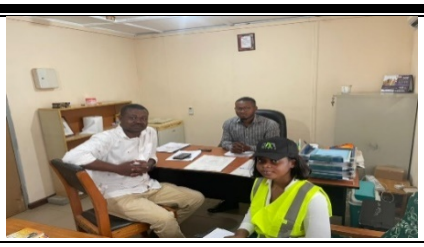
- Discussion on the livelihood restoration issues revealed that most of the PAPs would like to continue their existing livelihood activities.
- However, there are a few individuals within the footprint who could opt for alternative livelihood activities but were not present in the meeting.

Appendix 9.0

Consultation Outcomes

9.1 Korle-na

9.1.1 Ablekuma South Sub-Metro Office

Date:26/05/2022	**Time:** 12:21pm	
Participant: Ototu Philip Attah-Sub-Metro Director-0593024544-ototuphilip@gmail.com	**Interviewers:** Augustine Ampomah – 0204954285 Louisa Ofori-Nyarko-0553734573	

Discussion

1. Current Situation

- The sub-metro office functions under the Accra Metropolitan Assembly.
- The previous dredging activities produced some level of vibrations that was bearable.
- No complaints about the dredging activities was made by the schools around to the sub-metro office.

2. Suggested Safety Measure

- Community awareness campaigns on health and safety should be intensified with respect to the proposed project.

9.1.2 St. Mary's Senior High School

Date:26/05/2022	**Time:** 1:16pm	
Participants: Philomena Owusu-Ansah-Headmistress-0244806118 Sally A.D Attopee-Asst. Head Domestic Dept-0244278426 Juliet Seffah Kissa-Admin. Ass.Head-0208160652 Ernest Asiedu-Somuah-Asst.Academic-0277777613	**Interviewers:** Augustine Ampomah – 0204954285 Louisa Ofori-Nyarko-0553734573	

Discussion

1. Population and Number of Dormitories

- The secondary school has a total of 1,610 students out of which 299 are day students and 1,311 are boarders.
- There is a total of 37 dormitories in the school.

2. Concerns for the Project

- Although the project is a good initiative, the boarding school close to the site is likely to be affected by the noise generated by trucks at night.
- Also, vibrations caused by the machinery could collapse the weak walls of the school.

3. Suggestion

- The open drain which passes through the St. Mary's Senior High School and crosses the road into the Korle lagoon emanates foul smell.
- The drain should be covered.

9.1.3 Trust Sports Emporium Ltd

Date:26/05/2022	**Time:** 12:40pm
Participant: Jonathan Opoku Acheampong-Manager-0240274160	**Interviewers:** Augustine Ampomah – 0204954285 Louisa Ofori-Nyarko-0553734573

Discussion

1. Noise and Vibration Situation

Currently, noise, and vibration are not of major concern.

2. Traffic concerns for the project

- Mostly there is less traffic along the Korle-na route.
- During heavy events, the traffic situation increases from the sports facility.
- Efficient regulation of trucks will be necessary to prevent traffic and accidents

3. Suggestions

Trucks could use an alternative route, especially on days when there are sports events. The route from the traffic light will be a better option on such days.

9.2 Pasico

9.2.1 Ashiedu Keteke Sub-Metro Office

Date:26/05/2022	**Time:** 11:55am	
Participants: Hon. Francis Asare- Chairman (Assembly)-0556045032 Mercy Y.A Odoi- Sub-metro Director-0244579730 Samuel Ofosu- Assistant (Chairman)-0203784930	**Interviewers :** Augustine Ampomah - 0204954285 Louisa Ofori-Nyarko - 0553734573	

Discussion

1. Current Situation of the Pasico Refuse Site

- The site has only one skip which has reached its full capacity. The size of the skip is 12 cubic yards.
- The solid waste is collected three times a week, sometimes the collection delays which accumulates more waste.
- The Mudor and Ngleshie electoral areas dump their refuse at the Pasico site.
- Although attempts made by the Assembly to relocate the refuse container were disallowed, a consultancy embarked on an exercise to allocate codes to the caretakers of the site to facilitate compensation for their resettlement.
- Zoomlion Ghana Limited oversees sanitation in the area.

2. Periods for Dumping Waste at Site

- Usually, dumping commences at 5:30am in the morning and 6:30pm in the evening

3. Additional Concerns

- The issue which remains is the siting of the skip during the project implementation phase. It has become cumbersome to find an appropriate location to place the skip.

4. Suggested Measures

- There is a need for more skips specifically three large skips of about 23 cubic yards.
- Two access routes should be created at the project site to ease the movement of large vehicles.
- Traffic regulators will be required during the operational phase.

5. Additional Data Required

- The Assemblyman should provide information on the current number of households and the total population of the jurisdiction.

9.3 Odawna

9.3.1 Assemblyman and Community Members

Date:26/05/2022	**Time:** 2:03pm	
Interviewers: Augustine Ampomah – 0204954285 Louisa Ofori-Nyarko-0553734573		
Participants		
Name	**Occupation**	**Contact**
Hon. Hendrick Kinnah	Assemblyman	0244662363
Kharim Tahiru	Scrap Dealer	0573395710
Yakubu Issah	Scrap Dealer	0541011618
Alhassan Adraman	Scrap Dealer	0244808018
Ernest Asante	Repairer	0541164354

Discussion

1. State of the Odawna Site

- The Odawna area is worsening due to the accumulated waste and flood issues from the choked gutter.
- The heavy rains experienced have resulted in the displacement of properties and the discovery of dead bodies.
- Currently, an alliance for sorting waste has been formed to help with waste management in the area.

2. Flood issues

- The issue of flooding is of topmost concern as the areas around the site suffer greatly.
- The proposed initiative to dredge the Odawna Basin will reduce flooding.
- Four kiosk structures that are sited in front of the gutter will be cleared and persons living there will be relocated.
- The footpath/ bridge exacerbates the flood.

3. Suggested Measures

- More cubicles need to be created on-site for placement and sorting of waste.
- The height of the bridge should be increased to reduce flooding.
- The agenda to relocate persons living on-site should be implemented to prevent future health implications.

9.3.2 Business Along the Project Route

Date: 29/09/2022	Time: 3:10pm
Discussants: Agnes Baba- Provision Shop Owner - 0246299795	Interviewers: Kwakye Mamphey - 0558341865 Susanna Asare -0266439862 Winnifred Aku Addotey - 0593958439 Zawi N Barikisu – 0548925327

Discussions

1. Traffic

- The peak traffic period in the morning is from 6:00 am to 8:00 am and the evening is from 5:00 pm to 8:00 pm.
- The railway line is often used by the train which departs in the morning. Sometimes the train trips twice in the morning, the first departure at 7:30 am and the second departure at 10:00 am. In the evening the train sets off at 5:30 pm.
- Some sections of the road have portholes which causes accidents.

2. Preferred Haulage of Trucks

Trucks hauling at night is the preferred option since there will be too much dust generated in the morning and the afternoon.

3. Floods

Flooding situations in the area is a major problem. When it floods, it takes about 2 to 3 hours before it stretches.

4. Pedestrian Use of the Road

In the evening pedestrians line up at the turning point of the trucks to board a bus to their homes.
5. Stench from Dredged Materials The dredged materials do not cause any nuisance smell.

9.4 Engagement with Anyaa Community

9.4.1 Community Members Along Haulage Route

Date: 11th June 2021	**Time**: 8:15 am
Interviewers Augustine Ampomaah - Joshua Wemegah - 0249742014 Kojo Amoyaw-Osei – 0547917870 020495428 Kwasi Larnyo - Winnifred Aku Adotey - 0593958439	





Participant: - George Nelson - Account Clerk – 5712779675
Discussion
1. Haulage Route • The haulage route leading to the disposal site should be constructed due to the bad nature of the road. • Some sections of the haulage route have no streetlights and it's very dark at night. • Streetlights should be provided in the neighbourhood.
2. Noise Level It is feasible for the trucks to come at night and honking from the truck drivers should be reduced since the truck already make too much noise.
3. Disposal Site The disposal site should be well levelled to prevent dumping of waste on the site.

Participant: Esther Danso - 18 Sovam Street - 0561914506
Discussion
1. Haulage Route Hipped sand on the route of the haulage trucks should be brought into an apartment on the commencement of the project.

2. Noise Level
Measures should be put in place to check the noise levels from the haulage trucks.

Participant: Nana Yaa Meraa - Interior Decorator - 0243647002

Discussion

1. Haulage Route

- The road leading to the disposal site should be constructed due to the bad nature of the road.
- Provision of streetlight since the neighbourhood is very dark at night.
- The trucks working at night will scare away thieves from the neighbourhood.

2. Noise Level
Honking from the truck drivers should be reduced since the truck already make too much noise.

3. Disposal Site
The site should be levelled to prevent dumping of waste on the site

Participant: Helen Beatum Kommey - Caterer - 17 Sovam Street - 0244244393

Discussion

1. Haulage Route
Provision of streetlight since the neighbourhood is dark at night

2. Noise Level
Honking from the truck drivers should be reduced since the truck make too much noise.

3. Disposal Site

- Measures should be put in place to prevent dumping of waste on the site.
- The creek passing through the site has it source from the rocks. The creek flows more in the raining season and sometimes dries up in the dry season.

Participant: Frederic Dery - Forklift Operator - 0545286433

Discussions

1. Haulage Route

- The road leading to the disposal site should be constructed due to the bad nature of the road to prevent the sand from toppling off the truck.
- Provision of streetlight since the neighbourhood is dark at night

2. GRM
A committee should be formed in the community to be in charge of receiving grievances resulting from the project.

Participant: Regina Agyapomaa - 0592244439

Discussions

1. Haulage Route

- The road leading to the handling site must be constructed due to the bad nature of the road
- Provision of streetlight since the neighbourhood is dark at night

2. Noise Level
Measures should be put in place to check the noise levels from the haulage trucks

3. Disposal Site
The creek passing through the site has it source from the rocks and sometimes the leachate from the waste dumped into the handling site. It also feeds into the Ayorkor Botswe Bridge.

Participant: Asana Issa – Hausa koko vendor - 0544945445

Discussion
1. Haulage Route Haulage trucks should work in the evening.

Participant: Joseph Wellington – Dog breeder - 2 Asubonteng - 0277227722
Discussion
1. Noise Level The noise from the trucks can be managed by the residents for the success of the project.

Participant: Henry Boateng - 0243608673
Discussion
1. Haulage Route The road leading to the handling site should be constructed due to the bad nature of the road
2. Noise Level Noise levels from waste trucks that used to deposit waste in the pit, created a lot of issues in the neighbourhood. To prevent this from reoccurring, measures should be put in place to reduce the noise levels of the trucks.
3. Stench • Stench from the sand will be problematic and could spread diseases. • The sand accumulated at the disposal site should be sprayed with disinfectants to prevent the spread of diseases.
4. GRM • The neighbourhood should be first informed about the project through the Assembly Man. • There is a community association in the neighbourhood, in charge of handling affairs and welfare of the people and each household has a rep that attends the association's meetings.

Participant: Lydia Aryee - 0264210464
Discussion
1. Haulage Route Streetlight should be provided for the neighbourhood.
2. Noise Level Honking from the truck drivers should be reduced since the truck already make too much noise.
3. Stench The sand deposited at the handing site should be sprayed with disinfectants to prevent any bad odour and spread of diseases.

Participant: Bella Nyametse – Hairdresser - 0544748033
Discussion
1. Stench • Stench from the sand will disturb the community especially when it rains. • Measures should be put in place to prevent any form of stench from the site. • The disposal site should be sprayed often to prevent the spread of diseases.

Participant: Abena Bemah - GC-090-3773
Discussions
1. Drains Drains should be constructed for the neighbourhood; and
2. Other Matters The project is beneficial to the community and should be commenced.

Participant: Rosemond Darko – Hairdresser - GC-090-4080 - 0542830529
Discussions
1. Noise Level Noise levels should be controlled;
2. GRM Grievances should be first channelled to the community association.

9.4.2 Community Association

Date: 11th June 2021	**Time:** 2:30 pm
Participant: George Tetteh Anim - 14 Afomosia - GC-109-7911	
Interviewers Augustine Ampomaah - Joshua Wemegah - 0249742014 Kojo Amoyaw-Osei – 0547917870 020495428 Kwasi Larnyo - Winnifred Aku Adotey - 0593958439	
Discussions	
1. GRM • To establish a sound coherence between the neighbourhood and the project activities, the appropriate measures must be put in place and protocols followed to prevent any form of nuisance. • Reports associated with the project should be made available to the community association. • The community association has the capacity to handle any form of grievances. • First point of call for a grievance should be the community association, of which the assembly man is a member. • A grievance redress committee can be formed from the community association. • The level of grievance channelization should be in this order o Community association including unit committee of the assembly; o Municipal assembly; and o The Ministry. • Reps from the consultancy firm should officially visit the community association during one of the Sunday meetings to speak to the association on the quality of the project activities.	
2. Other Matters • Previously, the site used to be a dump site and the daily capping of the waste was not done. This resulted in the site breeding snakes, flies and other nuisance. This posed a lot of challenges to the neighbourhood. • The community association had to put in a lot of effort to stop the waste contractors from dumping their waste into the pit.	

Appendix 10.0

Stakeholder Engagement Process

10.1 Previous Stakeholders Engaged

Category	Stakeholder	Key Outcomes
Government Agencies/Departments	• Environmental Protection Agency	• Access roads to the sites will be rehabilitated before the commencement of dredged material disposal. • Baseline conditions for air quality and noise assessment will be ascertained, and the impacts from the project assessed immensely for adequate mitigation measures. • Dredge materials will be covered during transit to prevent litter of the dredge material en route to the sites.
	• Hydrological Services Department	• The project will explore the use of the interceptor weir for capturing plastics from the upstream Odaw River channel into the sea or otherwise determine which phase under the GARID project it will be implemented. • The deferred dredging project will consider the installation of sand traps in the upstream catchment (upstream of Caprice) at various selected locations. Re-use options of sediments recovered from sand traps should be explored (in industrial uses; under paved roads, housing).
Metropolitan/District Assemblies	• Accra Metropolitan Area o Metro Public Health Department o Drains Maintenance and Waste Management Unit	• The dredged materials will be dewatered on the banks for about 3 days before onward transportation to minimize the aesthetic nuisance the slurry may cause if transported wet. • Advancements of the civil works which aim at improving the flood situation are covered under the GARID project but not under this sub-project.
	• Ablekuma Central Municipal Assembly (AbCMA)	• The Ministry will ensure the AbCMA is adequately informed about subsequent meetings. • The Assembly is willing to support and assist project proceedings when called upon
	• Ayawaso Central Municipal Assembly (ACMA)	• The Ministry will liaise with ACMA to ensure that those within the project area are well informed about project activities.
	• Pokuase o Ga North Municipal Assembly	• The dredged material will be dewatered and treated to be free from organics and any odour before transportation and disposal at the site.
Surrounding Communities	• Pokuase o Traditional Authority o Windy Hills Residents o Heights Estates	• The dredged materials will be cleared of all organic waste before transfer to the Pokuase disposal site. • Prior to the commencement of the project activities, the access road will be

		rehabilitated to ease vehicular movement in the project area. • Stakeholders indicated their full support to the project but advised that truck drivers will be trained to avoid over speeding within the community
	• Korle-na ○ Ga Gbese Traditional Authority	• Stakeholders indicated their full support for the project.
	• Odawna area (including auto-mechanics, squatters, petty traders, cattle rearers, vegetable farmers) • Pasico area	• Scenarios of flood events that had occurred in the area were cited and how their livelihoods were impacted negatively.
	• Residents near Anyaa pit	• The community will gladly accept any intervention that will stop illegal dumping of municipal waste into the pit or covering of the pit entirely to enhance the aesthetic of the fast-developing community. • Adequate engagement and approval will be sorted from the Resident Association before further actions are taken due to the past experience from the dumping of municipal solid waste. • Appropriately dried desilted materials will be transported to avoid odour and other forms of pollution along the roads

Project Affected Persons (PAPs)	• Odawna area
	  ○ LETAP building area to Circle (20 mechanics along the Odaw drainage channel)
	  ○ Residents
	  ○ Commercial activities such, as traders, vehicle repairs, drivers ploughing their activities along the dredge
		• The need for RAP and compensation issues will be confirmed by the project.
		• The PAPs were taken through the activities of the dredging works.
		• The PAPs appreciated the need for the dredging activity and were willing to move their activities outside the buffer area to make way for the works.

	• Pokuase PAPs ○ Artisanal stone winners at the project site 2	• Compensation or otherwise of such PAPs will be ascertained and dealt with in accordance with World Bank Operational Policies regarding resettlement.
Civil Society Organisations (CSO)	• People's Dialogue	• Considering those living or having structures very close to the lagoon, the project proposes to minimize displacement as much as possible. • The project is assessing the resettlement impacts in another document which will be made available when completed.

10.2 Categorization of Stakeholders

Category	Stakeholder
Local Government	• Ashiedu Keteke Sub-metro • Ablekuma South Sub-Metro Office • KoKMA • Ga Central Municipal Assembly (GCMA) • Ga West Municipal Assembly (GWMA)
Surrounding communities/Neighbouring facilities	• Korle-na ○ Trust Sports Emporium Limited

	○ St. Mary's Senior High School • Odawna ○ Assemblyman and community members ○ Businesses along the project route
Haulage route/ Disposal sites	• Anyaa ○ Community members along haulage route ○ Community Association • Pokuase ○ Windyhills Residents Association

10.3 Stakeholder Notification and Engagement Plan

Type of Notification	Use	Stakeholder
Introductory Letter	Formal letters of introduction from MWH were sent to the various stakeholders requesting for their involvement in the consultative engagement process.	• Ablekuma South Sub-Metro • Ashiedu Keteke Sub-metro
Phone Calls	Phone numbers of these stakeholders were obtained, and key personnel contacted to schedule engagement.	• Windyhills Resident's Association (Pokuase)

10.4 Stakeholder Engagement Schedule

Stakeholder	Date	Engagement Tool/Venue	Main Contact Person	Position	Contact Details
Ablekuma South Sub-Metro Office	26/05/2022	Interview/	Otutu Philip Attah	Sub-Metro Director	0593024544
St. Mary's Senior High School (SHS)	26/05/2022	Interview/ St. Mary's SHS	Philomena Owusu-Ansah	Headmistress	0244806118
Trust Sports Emporium Ltd	26/05/2022	Interview/	Jonathan Opoku Acheampong -	Manager	0240274160
Ashiedu Keteke Sub-Metro	26/05/2022	Interview/ Ashiedu Keteke Sub-Metro Office	Mercy Y. A Odoi	Sub-metro Director	0244579730
Assemblyman and Community Members (Odawna)	26/05/2022	Community engagement/Odawna	Hon. Hendrick Kinnah	Assemblyman	0244662363
Business along the project route	04/10/2022	Questionnaire/Odawna	Agnes Baba	Provision shop owner	0246299795
Anyaa Community Members	11/06/2022	Community engagement/Anyaa	Henry Boateng	Representative	0243608673
Windyhills Residents Association (Pokuase)	28/10/2022	Phone call	Mr. Daniel Asare	Chairman	0246677004
Community Association	11/06/2022	Interview/ Anyaa	George Tetteh Anin	Executive Member	0554105190

10.5 Project Life cycle Stakeholder Engagement

Project Stage	Target Stakeholder	Purpose	Engagement Method/ Tools	Location/Frequency	Responsible Personnel
Pre-Site Preparation and Transportation phase	• AMA • KoKMA • GCMA • GWMA	Introduction of Site Preparation and Transportation phase Contractor and informing stakeholders of the project phase timelines and activities	Focused group discussions	AMA Office/One time with follow up calls/emails on outstanding issues	MWH PIU and GARID PCU
	The Ngleshi Stool of James Town			Chief's palace/One time with follow up calls/emails on outstanding issues	
	Ashiedu Keteke Sub-metro			Ashiedu Keteke Office/One time with follow up calls/emails on outstanding issues	
	Surrounding communities			Pasico, Odawna and Korle-na/One time with follow up calls on outstanding issues	
	Anyaa community			Anyaa/ One time with follow up calls on outstanding issues	
	Pokuase community			Pokuase/ One time with follow up calls on outstanding issues	
Material Handling and Transportation phase	• AMA • KoKMA • GCMA • GWMA • The Ngleshi Stoolof James Town • Ashiedu Keteke Sub-metro	• Introduce stakeholders to the GRM to report sexual harassment, human right violations and other grievances • Feedback on effectiveness of mitigation measures	Focused group discussions	• AMA Office/quarterly • Chief's palace/quarterly	HSD of MWH
	• Surrounding communities • Anyaa community • Pokuase community		One-on-one meeting	• Community meeting/quarterly	
Pre-closure	• AMA • KoKMA • GCMA • GWMA	State in which the sites may be handed over to the Assembly and Stool	Focused group discussions	• AMA Office/One time with follow up calls/emails on outstanding issues • Chief's palace/ One time with follow up calls on outstanding issues	HSD of MWH

	• The Ngleshi Stool of James Town				

Appendix 11.0

Labour Management Plan

This Labour Management Plan provide an overview of the applicable national legislative and how the risks and issues related to labour will be managed in the implementation of the project.

The project will adopt a zero-harassment policy for all of its workers and sub-contractors. The zero-harassment policy will be part of the workers Code of Conduct developed by the project. This policy will be broadcast to all workers through various mediums and several formats.

The project through the labour management procedures plan will ensure that all applicable occupational health and safety provisions in Section 118 of the Labour Act, 2003, Persons with Disability Act, 2006 (Act 715), WBG General Environmental Health and Safety Guidelines and OP 4.01 are observed.

Some of the highlights specific to certain areas in in the Labour Act and Persons with Disability Act, 2006 (Act 715) are listed:

Employment of Persons with Disability (PWD)
Section 46 of the Labour Act makes provisions for an employee who employs a person with disability to notify the nearest Centre for Registration of the employment and where the employer fails to do so, the Chief Labour Officer shall direct the employer to comply. Also, special incentives are provided to an employer who employs persons with disability.

Section 11 of the Persons with Disability Act, 2006 (Act 715), also charges persons who employs persons with disability to provide the relevant working tools and appropriate facilities required by the PWD for efficient performance of functions required by the employment.

Brief Overview of Labour Legislation: Terms and Conditions
The primary law and regulations that govern employment relationships in Ghana are the Labour Act 2003 (Act 651) and the Labour Regulations. The Labour Act consolidates all laws relating to employment. The act refers to three categories of workers, namely: permanent workers; temporary workers; and casual workers.

Interpretation
Section 78. of the Act defines terms that are applicable in the law

- "Temporary worker" means a worker who is employed for a continuous period of not less than one month and is not a permanent worker or employed for a work that is seasonal in character; and
- "Casual worker" means a worker engaged on a work which is seasonal or intermittent and not for a continuous period of more than six months and whose remuneration is calculated on a daily basis.

The Labour Act distinguishes between a 'contract of employment' and a 'contract for employment'. A contract of employment creates an employer-employee relationship between the parties. This affords the employer and especially the employee protection under the Labour Act. On the other hand, a contract for employment does not create an employment relationship between the parties, but rather a principal-contractor relationship. Here, the contractor is neither considered to be an employee of the principal nor entitled to benefits of employment such as social security contributions. Section 74 of the Act spell out the conditions of a contract of employment:

1. A contract of employment of a casual worker need not be in writing;
2. A casual worker shall;

a) Be given equal pay for work of equal value for each day worked in that organization;
b) Have access to any necessary medical facility made available to the workers generally by the employer;
c) Be entitled to be paid for overtime work by his or her employer in accordance with section 35; and
d) Be paid full minimum remuneration for each day on which the worker attends work, whether or not the weather prevents the worker from carrying on his or her normal work and whether it is possible or not, to arrange alternative work for the worker on such a day.

On the other hand, Section 75 of the Act highlights the conditions for a temporary worker:

1) A temporary worker who is employed by the same employer for a continuous period of six months and more shall be treated under this Part as a permanent worker; and
2) Without prejudice to the terms and conditions of employment mutually agreed to by the parties, the provisions of this Act in respect of minimum wage, hours of work, rest period, paid public holidays, night work and sick leave are applicable to a contract of employment with a temporary worker.

Salary, Wages, Allowances and Deductions

The Labour Act provides that all salary, wages and allowances are payable in legal tender, in addition to any non-cash remuneration. Generally, employers are precluded from deducting any amount from the remuneration of their employees – whether it is a pecuniary penalty imposed on the employee or interest or discount on remuneration advanced to the employee.

However, Section 70 of the Labour Act sets out situations in which an employer can, with the consent of the worker, legally deduct funds from their remuneration in relation to:

- Provident, pension or other funds or contributions agreed to by the employee;
- A financial facility advanced by the employer to the employee or guaranteed by the employer;
- Amounts paid in error or in excess of the employee's remuneration to the employee;
- Membership fees or contributions to an organisation of which the employee is a member; and
- Deductions for any loss suffered by the employer as a result of damage to its property under the control of the worker; however, no deduction can be made in this regard unless it is shown that the worker is fully responsible for the damage.

Family and Medical Leave

Female employees are entitled to a statutory maternity leave of 12 weeks in addition to any annual leave that they may have. This statutory leave can be enhanced by contractual agreement between the parties. Female employees on maternity leave must be paid their full salary and other benefits while on leave. In addition, a female employee is entitled to additional leave to be determined by a medical practitioner where it is found that she has developed an ailment as a result of her pregnancy. Leave is also typically granted for bereavement in relation to close family members.

The Labour Act strictly prohibits discrimination of employees based on race colour, national extraction, social origin, religion, political opinion, sex, marital status, family responsibilities or disability. An employee also has the right, by law, to remove himself or herself from a work situation which he or she reasonably believes presents an imminent or serious danger to life or health.

Brief Overview of Labour Legislation: Occupational Health and Safety

Part XV (Occupational Health, Safety and Environment), of the Labour Act confers the duty on an employer to ensure that every worker works under satisfactory, safe, and healthy conditions.

Occupational Health and Safety (OHS): The HSS and the SSS of the Contractor will be responsible for matters related to health and safety. A Code of Conduct for workers is required and will be developed and implemented.

Training of Workers: Training of workers in environmental and social standards and OHS will be the responsibility of both the SSS, HSS and ESS. Training on the Code of Conduct will be conducted by the Human Resources Manager with assistance from the SSS of HSD.

Worker Grievances: The process for addressing workers' grievance will be the Grievance Redress Mechanism provided in Section 11.

Age of Employment

The project will be guided by the Labour Act, 2003 which states that the minimum age of employment in Ghana is eighteen (18) years old.

Employees over the minimum age of 18 and under the age of 21, may be employed or engaged in connection with the project only under the following specific conditions:

- The work is not likely to be hazardous and is not harmful to the child's health or physical, mental, spiritual, moral or social development, and will not interfere with the child's education; and
- An appropriate risk assessment is conducted prior to the work commencing.

The following process will be followed to verify the age of project workers:

All project employees will be asked to produce identification documents (ID) that are acceptable in local laws, employment and human resources practices as "proof of age". These forms of ID will be birth certificates, national drivers' licenses and national registration cards. In the absence of one of those forms of IDs the project will apply and document an age verification process.

The age verification process will consist of alternative methods including copies of academic certificates, testimony/affidavits from officials of the schools attended, a medical examination, statements from family members and parish/village officials/local authorities. In addition, all documents will be cross-referenced and subjected to a verification process to ensure the validity of the documents. In instances where the documents are thought to be falsified the project will conduct the same process to ensure their authenticity. In all the processes, the attendant care will be provided to ensure that the applicant or employee's data are protected and their right to privacy is guaranteed.

All copies of the IDs and documents pertaining to the applicant's age and other supporting materials will be kept in files with the human resources personnel. Audits and controls of the process will be a requirement of the contractors and included in the contracts, in keeping with the Labour Act 2003 (Act 651) and Data Protection Act, 2012.

In the event that underage workers are found working on the project the following actions will be undertaken:

- Termination of the contract and services agreement immediately as per the Labour Act of 2003 (Act 651);
- Schedule a meeting with the child and seek to determine the reasons for seeking employment;
- Refer the child to other support services including social services and the Ministry of Education; and
- Leverage the services of Non-government and Community Based Organizations to assist the child.

The Labour Act 2003 (Act 651) will be used as a guide in the conduct of the assessment of risks associated with young persons. The procedure for assessing the risks will be as follows:

- All persons will be asked to provide a medical certificate with the results of a medical examination;
- There will be clear policy guidelines regarding supervision of young persons to prevent exploitation and sexual harassment; and
- Young persons will be provided with educational and awareness information on the policies of the workplace including sexual harassment policies and labour related grievances and the grievance redress mechanism of the project.

Terms and Conditions

The following terms and conditions will apply to project workers in accordance with the Labour Act 2003 (Act 651).

Contracts

- The project and sub-contractor, sub-contractor and assignees of contracts shall pay rates of wages and observe hours and conditions of employment which are not less favourable than those established in the country (minimum wage);
- Contractors and sub-contractors shall be certified according to the Government requirements for governmental contractors including contractors certifying that the wages and conditions of employment of all those employed by the contractor in the trade or industry in which the contractor is seeking to contract with the Government are fair and reasonable;
- The contracts will be guided by the principle of collective bargaining if applicable. The guiding principle will be of fair wages and reasonable rates commensurate with governmental minimum wage and similar established rates and conditions;

- In keeping with the Labour Act, the contractor shall keep proper wage records and time sheets for all those employed in relation to the execution of the contract, and the contractor shall produce the wage records and timesheets for the inspection of any person authorised by the project or the Labour Commission of Ghana;
- Contractors are required by law, to post conditions of work in conspicuous places informing workers of their rights and conditions of work;
- A subcontractor shall be bound to conform to the conditions of the main contract and the main contractor shall be responsible for the observance of all contract conditions; and
- Contractors and subcontractors shall recognise the right of their workers to be members of the trade unions.

Minimum Wage

All project workers shall be paid a wage that is above or equal to the minimum wage as established by the Government of Ghana. Wages will be paid on a weekly, bi-weekly or monthly basis. Each employee is entitled to a statement accompanying pay that itemised the following: "(a) the employee's gross wages due at the end of that pay period; (b) the amount of every deduction from his or her wages during that pay period and the purpose for which each deduction was made; and (c) the employee's net wages payable at the end of that pay period."

Hours of Work

The maximum number of ordinary hours of work for employees shall be eight hours a day or forty hours a week except in cases expressly provided for in the Labour Act.

Project employees are prohibited from working more than 10 hours per day inclusive of two hours for lunch and rest periods. No person under the age of eighteen years shall be employed or allowed to work. Other provisions related to hours of work will be guided by the Labour Act (Act 651) on this matter.

Contractor Management

It is mandated that the contractor execute the management of the contract in a manner that is acceptable to the client and is in accordance with the WBG General Environmental, Health and Safety Guidelines, specifically relating to management of labour issues, including health and safety as well as reporting on workers under the project.

Information on Public Records: The Contractor must have in place information on corporate registers and documents relating to the violation of applicable law, including reports from labour inspectorates and other enforcement bodies.

Certification and Approval of Business and Workers: Documentation of approved business licenses, registration, permits and other approvals and workers' certification/permits and training to perform the work.

Health and Safety: Have in place labour management systems as it relates to organizational health and safety. Records of incidents and corresponding root cause analysis with a corrective mitigation plan. First aid cases, high potential near misses, and remedial and preventive activities required. Identification and establishment of safety committee and records of meetings.

Workers Payroll Records: Documentation of the number of hours work and pay received inclusive of all payments made on their behalf, for example payment made to the National Insurance Scheme and other entitlements regardless of the workers being engaged on a short- or long-term assign mentor fulltime or part time worker.

Community Workers

The construction aspect of the project will envisage the hiring of community workers on the work. Community workers hired by the project will be provided with contracts similar to other project staff and workers. The Grievance Redress Mechanism of the project will also be applicable to community workers of the project.

Appendix 12.0

Institutional Needs Assessment

The needs assessment is to examine the institutional strength and weakness for the implementation of the ESMP by the project stakeholder, more especially, the Project Implementation Unit.

Action Plan	**Capacity of PIU Implement ESMP**	**Third Party Intervention Required**	**Training Requirement**	**Required Resources for Implementation and Budget**
Public health and safety risks (HIV/AIDS)	No, the PIU does not have the capacity to undertake public health education. There is the need for a collaboration with the contractor to do this.	Yes, the contractor could collaborate with the PIU to undertake this intervention.	Yes, some training on public health and safety risks will be required for staff of the Unit	Project funds can cater for interventions
Occupational health and safety risk	Yes, capacity exists at the PIU. Staff of the unit have undergone some basic training in occupational health and safety management.	No, the PIU possesses adequate capacity to implement the remedy.	Yes, some intermittent training/refresher course on Health and safety will be required	Project funds can cater for interventions
Traffic Congestion	The PIU can implement this remedy through monitoring. The contractor's team can augment this process	No, the PIU possesses adequate capacity to implement the remedy	No training required	Project funds can cater for interventions
Noise pollution and vibration	The PIU does not have the required equipment/ device to monitor noise pollution level.	Yes, there is the need for the EPA to be brought on board to help implement a remedy for this.	No idea	Project funds can cater for interventions
Air pollution (Dust and other emissions)	The PIU does not have the required equipment/ device to monitor air pollution.	Yes, there is the need for the EPA to be brought on board to help implement a remedy for this.	Yes, where necessary	Project funds can cater for interventions
Waste management (Organic and Hazardous Waste)	No, the PIU does not possess the capacity to manage organic and hazardous wastes; we have not been trained on those wastes.	Yes, there is the need for the EPA to be brought on board to help implement a remedy for this.	Training of staff at the PIU on management of hazardous waste will be required.	Project funds can cater for interventions
Gender and labour issues	Yes, capacity exists in-house.	No, the PIU possesses adequate capacity to implement the remedy.	No training required	Project funds can cater for interventions
Workman's compensation issues	Yes, internal capacity exists to monitor the contractor on this.	No, the PIU possesses adequate capacity to implement the remedy.	No training required	Project funds can cater for interventions

Appendix 13.0

Grievance Redress Mechanism

13.1 Complaint/Grievance Form

Complaint or Grievance Form

Date:(e.g., 15-Jan-2021) _____

Activity: (Please tick)

1. Component 1 - Construction of 2 No. Detention Ponds
2. Component 1 - Deferred and Routine Maintenance Dredging of the Odaw
3. Component 1 - Development of Flood Early Warning System
4. Component 1 - Replacement of Critical Bridges
5. Component 1 - Urgent Repairs of Prioritized Sections of the Odaw Drainage
6. Component 2 - Capping of Abloragyei Dumpsite
7. Component 2 - Capping of Old Fadama Dumpsite
8. Component 2 - Community Based Solid Waste Management SWM Interventions in Targeted Low-Income Communities
9. Component 2 - Construction of a Waste Transfer Station at GAEC
10. Component 2 - Construction of Engineered Landfill Site at Anyaa
11. Component 3.1&2 - Participatory Community Upgrading at Akweteman
12. Component 3.1&2 - Participatory Community Upgrading at Alogboshie
13. Component 3.1&2 - Participatory Community Upgrading at Nima
14. Component 3.1&2 - Public Engagement at Nima, Akweteman and Alogboshie by an NGO
15. Component 3.1&2 - Public Engagement at Old Fadama by an NGO
16. Component 3.3 - Develop Geospatial Asset Management System for MMDAS
17. Component 3.3 - Development of a Joint Basin Management Plan
18. Component 3.3 - Facilitate the Establishment and Operationalization of an Inter-Jurisdictional Coordination Management Committee (ICMC)
19. Component 3.3 - Operations and Maintenance Study
20. Component 4 - Construction of PCU office
21. Component 4 - Development and Implementation of Behaviour Change Communication Strategy and Action Plan
22. Component 4 - Development of Online Grievance Redress Mechanism
23. Component 4 - Establishment and Implementation of a Comprehensive M&E System for The Project
24. Component 4 - Gender-Based Violence (GBV) Services Mapping and Development of SEA/SH Prevention and Response Action Plan
25. Component 4 - Technical Pre-Feasibility Study Towards the Comprehensive and Sustainable Rehabilitation/Upgrading of the Commercial Parts of Old Fadama
26. Component 5 - COVID - EPRP
27. Component 6 - (I don't Know)
28. Component 6 - Associated Facility

Category:

1. Administrative 2. Compensation, Land Acquisition and Resettlement 3. Compliments
4. Construction Related 5. Environment, Health and Safety 6. General Community Concerns
7. Procurement 8. Enquiry
9. Gender Based Violence / Sexual Harassment / Sexual Exploitation Abuse
10. Others

Complainant(s):

(tick): 1. Individual 2. Institution 3. Group / Association 4. Whole Community

Name:

Do not fill the name field if you choose to remain anonymous

Sex (tick): 1. Male 2. Female

Telephone:

Email:

Mode of contact: (tick) 1. SMS 2. Email 3. Phone Call 4. Physical Meeting

Preferred method you would wish to be contacted

District: **Community/Area:**

GPS Address: **Close Landmark:**

Description of grievance(s), attach supplementary information/ photos as required

13.2 Sample Grievance Resolution Form

Grievance and Resolution Form

Name (Filer of Complaint): _____

Gender: Male _____ Female _____

Contact Information: _____ (Community; mobile phone)

Nature of Grievance or Complaint: _____

_____

_____

Date	Individuals	Summary of Discussion
_____	_____	_____

Signature: _____ Date: _____

Signed (Filer of Complaint): _____

Name of Person Filing Complaint: _____ (if different from Filer)

Position or Relationship to Filer: _____

Review/Resolution

Date of Conciliation Session: _____ Was Filer Present?

YES NO

Was field verification of complaint conducted? YES NO
Findings of field investigation:
_____
_____
_____

Summary of Conciliation Session Discussion:
_____
_____
Issues_____

Was agreement reached on the issues? Yes No
If agreement was reached, detail the agreement below:
If agreement was not reached, specify the points of disagreement below:
_____
_____
_____

Signed (Conciliator): _____ Signed (Filer): _____

Signed: _____
Independent Observer

Date: _____