PROJECT:  TAKORADI PORT EXPANSION PROJECT: ON DOCK CONTAINER AND MULTIPURPOSE TERMINAL
COUNTRY:  GHANA

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT SUMMARY

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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) SUMMARY

Project Title: Takoradi Port Expansion Project: on-dock Container and Multipurpose Terminal
Project Number: P-GH-DD0-001
Country: GHANA
Department: OPSD3
Division: OPSD
Project Category: Category 1

1. Introduction

The Government of Ghana through the Ghana Port and Harbour Authority has initiated some major infrastructure upgrade and development of the Takoradi Port in order to allow the port to receive larger vessels, handle more cargo, increase storage capacity, reduce the cost of trade and therefore boost Ghana’s trade capacity within the region. It is within this Master Plan that GPHA as Granter has entered into a concession agreement with IBISTEK GHANA LIMITED (IbisTek), a Ghanaian company and concessionaire, to construct a dedicated on dock container and multipurpose terminal inside the Takoradi Port. This will include handling of containers and containerized cargo and other multi-cargo commodities and related terminal services. The African Development Bank is considering the financing of the on dock terminal which entails, the design and construction of dredging works of up to 16m depth, and land reclamation for 5 new berths, construction of 1,495m of quay walls; pavement; electrical installations and utilities, and port facilities such as crain rails.

The project has been categorized as a category 1 project because it involves construction and expansion of a port that will involve dredging activities that will induce irreversible adverse environmental impacts. The project activities will be carried out within the existing port as such there will not be resettlement activities. Based on AfDB requirements the project will require an Environmental and Social Impact Assessment (ESIA) leading to the preparation of an ESMP. The Project ESIA studies were completed in September 2015 for Ghana Ports and Harbour Authority as part of the larger project ‘Port Infrastructure Development including Dredging, at Takoradi Port, Western Region’ and an Environmental Permit by Ghana EPA. Both the ESIA report that was prepared by SAL Consult Ltd in association with Royal Haskoning DHV ESMP report dated July 2017, prepared by a local consulting company SAL Consult Limited were done in accordance with Environmental Assessment Regulations, 199 (LI652) and other national requirements of Ghana. An Environmental and Social Management Plan (ESMP) has been prepared to identify the environmental and social management and mitigation actions required to implement this project component that the AfDB intends to finance so that it is in accordance with the requirements of the Integrated Safeguard Systems (ISS) and Environmental Assessment Procedures (ESAP) of the African Development Bank (AfDB). The ESIA and ESMP provides an overview of the environmental and social baseline conditions on the direct impacted areas, summarizes the potential impacts associated with the proposed project and sets out the management measures required to mitigate any potential impacts. The ESMP is to be utilized by the contractor to be commissioned by IbisTek for the project and will form the basis for development of a Construction Environmental and Social Management Plan (CESMP) that will be prepared by the contractor and sub-contractors as part of their construction methodology prior to works commencing.
2. Brief Project Description and Key Components

The proposed project will involve development and operation of a container and multi-purpose terminal within the existing Port of Takoradi as part of the Takoradi Port Expansion Project.

The main project components include:

**Dredging Works for Basins:** Dredging is proposed to be done using a Cutter Suction Dredger (CSD) type ‘D Artagnan’ or similar and it consists of a stationary dredger that is a floating pontoon or vessel that is able to dredge continuously in a wide range of soils. The scope of the dredging works includes the following: (i) deepening the Southern part of the ‘Northern Basin” from the actual depth of -14m CD to a target depth of -16m CD for dock and a target depth of -18.5m CD for the foundation trench for the future quay wall; and (ii) deepening of the ‘Multipurpose quay Basin” from the actual depth of -11m CD for the dock and to a target depth of -16.5m for the foundation trench for the future quay wall. The foundation trenches are 13.44 m wide at the target level with the connecting slope of 1/1. All dredged materials will be pumped ashore to where the future terminals will be constructed and will be used for land reclamation.

**Reclamation Works:** Land reclamation will be carried out at an average target level of +3.00m CD and the approximate required volume for reclamation is 2,000,000m³. The entire dredged material will be used as reclamation material and it is considered adequate since the area has already been partially filled from earlier dredging works.

**Construction of buildings:** The Takoradi port development requires a series of buildings to accommodate the operations, administrative, and public authorities. The following buildings will be constructed in the on-dock terminal: terminal administration and operation buildings; maintenance and repair (workshop) buildings; and gates and fences.

**Construction of new quay walls, terminal yard, and utilities:** A major part of the terminal investment shall be construction of water front structures to allow for berthing of vessels, cargo handling and other ship to shore crane operations. The quay walls shall be 1495m long with berthing depths of -14 to -16m CD. The quay equipment and furniture shall include: fenders, bollards, revetments, crane rails, locking pits, crane cable channel, turn over pits, and safety ladders. In addition, the terminal areas shall have adequate pavements to withstand traffic and operations. There will also be internal terminal roads well fitted with traffic signs, safety barriers to storage sites, road markings, elevated kerbed footpaths, drainage works with precast concrete channels. The following utilities will also be implemented: storm water network; freshwater network; firefighting water network; sewage water network and electrical network system.

3. BRIEF DESCRIPTION OF PROJECT’S KEY ENVIRONMENTAL, SOCIAL AND CLIMATE CHANGE COMPONENTS

3.1 Physical Environment

**Location:** The on dock container and multipurpose terminal will be located within the current Takoradi Port which is located at a cape on the Gulf of Guinea on longitude 4°52’ 60.00’N and latitude 1°43’ 60.00’ W, with the western part formed with a rock or reef while the northern coast is sandy beach. This is about 230km west of Accra, the capital of Ghana. The slope of the sea bottom is about 1% judging from about
10m fall in the 0.9km distance from the shoreline. The main breakwater is located on the southern side of the port and extends about 1km offshore in the eastwards direction and extending further in a north-north east direction to a distance of about 0.7m.

**Climate:** The mean monthly temperature in the Sekondi-Takoradi area is usually 33°C and it occurs between February and April and the lowest temperature of about 27.4°C occurs in September. The mean annual rainfall in the region falls between 1,200mm-1,500mm. The first wet period is from March to July and the minor wet season is from September to November. Relative Humidity is generally high varying from 60% to 87% in the afternoon to 90% -99% at night/mornings. Wind speeds along the coast of Ghana ranges between 8km/hr and 16.1km/hr with September being the windiest month of the year.

**Seismicity:** Generally Ghana is a stable land mass and features very low seismic activity, with the exception being the coastal region of Ghana along the Gulf of Guinea where earthquakes up to a magnitude 5.5 to 6.5 according to the RICHTER-Scale have been historically recorded (1906 and 1939). They occur on repetitive periods of between 50 and 140 years. Past earthquakes have had their epicenters located along the coast in the area surrounding Accra, and Cape Coast. The project area is located within the coastal region hence it is recommended that structural design should take into account possible imposition.

**Tidal Levels and Tidal Current:** The tide in Ghana has semidiurnal pattern with two high and two low tide levels each day. It is estimated that the velocity of the tidal current is generally less than 0.1m/s but could go up to 0.5m/s.

**Bathymetric Conditions:** Two distinct rock types are present in the harbor area, which were identified as Rock Types A and B. Rock Type A is made up of strong lithified arkosic sand and occur in the south and west of the port. Rock Type B is said to be a carbonate cemented quartz sandstone, grading into sandy clay and occur in the northern part of the port.

**Water and Sediment Quality:** The water quality at the Takoradi port were within the EU Estuary and harbor basin water standards, suggesting a relatively clean marine environment. The physico-chemical and microbial quality within the port basin were found to be contaminated due to increased anthropogenic activities because water quality in the open waters were relatively better. Sediment quality analysed in the same period revealed concertation of pollutants in the sediment within the port but were found to be low and within the maximum permissible levels of the internationally accepted Australian Water Quality Guidelines for Fresh and Marine Waters and Interim Sediment Quality Guidelines (ISQG). The implication is that dredging and consequent reuse of the dredged silt does not pose a danger of contamination of the marine environment.

**Air Quality:** Previous air quality studies in and around the port showed no major variation from what pertains in the metropolis although the nuisance of dust released from the clinker operations by GHACEM generally pollute the immediate surroundings of that area in the port. Similarly, the manganese jetty and cocoa shed area also have excessive dust levels though within the EPA National Ambient Air Quality Guidelines (NAAQG) values.

3.2 **Aquatic Biota**

The project area was found not to have any significant aquatic species that are of conservation significance or status.

**Flora:** The macroalgae was dominated by the brown alga, *Bachelotia antillarum*. Other phaeophytes recorded are the *Chnoospora minima* and *Ralfisia expansa* as well as a chlorophyte,
**Chaetomorpha linum.** They are dominant on the rocks and other substratum available for attachment.

**Fauna:** The fauna at the harbor is dominated by rocky intertidal macro-benthic fauna. The community was visibly dominated by the barnacle, *Chthamalus dentate*, the upper shore littorinid, *Echinolittorina pulchella* and the oyster *Ostrea tulipa*. They are abundant on the sides of the wharf, rocks, breakers, and tyres alongside the wharf. Other taxa represented are gastropods, crustaceans, echinoderms and the cnidarian.

3.3 Socio-economic Environment

**Population, Ethnicity and Religion:** The Sekondi-Takoradi metropolis recorded a population of 559,548 with 273,436 males and 286,112 females based on the 2010 Population and Housing Census. The average household size is 3.7. There are four sub-metropolitan areas in the metropolis namely, Sekondi, Takoradi, Kwesimintsim and Esikado-Ketan. The metropolis has its roots from the Ahantas Ahantas. Fantes, Nzemas, Wassas also have a composition due to proximity to the metropolis. Guans and other tribes are in the minority.

**Economy:** The Metropolis has a vast revenue base and well Sekondi-Takoradi is one of the hubs of industrial activity in Ghana. It is the third most industrialised city and can boast some of the big manufacturing industries in the country. Commerce continues to be the dominant sector of the economy.

**Land Tenure:** The project area is within the Takoradi Port and is owned by Ghana Port and Harbour Authority. Most of the land that will be used to construct the on dock container and multipurpose terminal will be reclaimed from the sea.

**Tourism:** The Sekondi-Takoradi is a major tourist destination in Ghana. The tourist attractions include historical preserves and cultural events such as festivals.

**Road Infrastructure:** There are three access roads to the port, two fairly big roads and a smaller one. Lines of articulated vehicles and trucks parking and waiting for the loading / unloading of goods are often observed on the main access roads, though they occupy an estimated no more than 10% of total traffic volume.

**Waste Management and Sanitation:** Toilet sewerage of the Takoradi port is collected into one cesspit at the port. The cesspit is emptied regularly and transported STMA’s designated dumping area at Sofokrom. Sewage is generated on board vessels and by the port users including visitors. The waste management division of the Port of Takoradi has two sewage disposal tankers for the purposes of siphoning sewage from vessels on request for disposal at STMA designated disposal sites. The solid waste at the port premises is usually garbage generated by calling vessels and port users including visitors. It is estimated that averagely, about 5 tons of solid waste is generated per month (JICA/ GPHA, 2002). The solid waste is currently managed by a private company contracted by GPHA, called Zoom Lion Company Limited, a waste management firm that disposes it at STMA designated landfill site.

**Hazardous and Oily Waste:** Oily wastes generated by calling ships are collected into skips and given to Messrs Zoil, who operates an approved oily waste management facility in the Sekondi-Takoradi Metropolis. Zoil is also able to handle the treatment of oil based mud cuttings from oil & gas drilling operations. Another thermal desorption plant to also handle the treatment of oil based mud cuttings from oil & gas drilling operations installed by SWACO at the port is yet to be operational. Zeal Environmental Technologies provides Maritime waste reception services at the Takoradi Port in Ghana in accordance to MARPOL 73/78 Treaty. Managed waste streams could be Hazardous or non-hazardous from Vessels that visit the port.
4. Major Environmental and Social Impacts and Climate Change Risk

This section summarises the main environmental and social impacts/risks during construction and operation which are generally low to medium impacts. Figure 1. Below presents the project area of influence.

4.1 Beneficial Impacts

The potential positive impacts from the port expansion and implementation of the container and multipurpose terminal include the following:

*Significant savings on overall transportation costs* – Significant reductions in overall transportation costs with regards to imports and exports of containers at the port due to optimization of the handling (e.g. there will not be double handling of cargo due to shallow draft).

*Technology and knowledge transfer* – Private Investors are expected to be highly experienced in port management and therefore introduce state-of-the-art technology and knowledge and internationally accepted best practices that will be transferred to local staff during the operations phase.

*Improvement in harbour performance* – The new port facilities will allow for increased port traffic and lead to handling of more vessels at a time reducing significantly turnaround time. This will allow more revenue collections by GPHA and the port operators that will enable the proper running and maintenance of port facilities.

*Employment opportunities* – There will be significant increase in skilled and unskilled labour opportunities during both the construction and operation phases of the project. Locals will also be given opportunities for employment especially for non-skilled labour. In addition, there will also be subcontracting of services to 3rd parties that will also create more employment opportunities. Local consultancy firms will also be subcontracted to carry out various activities.
Improvement in port environmental management – The designated container storage areas will allow for better storage and handling of different types of cargo and commodities. The designation of various business units will ensure that all like commodities and associated handling activities are confined to specific areas thereby ensuring an effective approach to management of associated environmental impacts.

Improvement in local and national economy – The planned expansion will have positive contributions to the local and national economy as follows: increased capacity and smoother process for movement of goods in and out of the country - this is expected to encourage export through improved efficiency of the port operational processes which will serve to reduce delays at the port; the importation of goods and equipment, to support local industry and economic activities, will also receive a boost from improved efficiency at the port; a substantial amount of funds will be injected into the local and national economy through payment of workers’ wages/salaries as well as workers fulfilling their tax obligations; the purchase of local raw materials and wages/salaries of construction workers will have a positive impact on the local economy; improvement in port performance during operation will facilitate the collection of revenue that will increase corporate revenue/ profit and positively impact on the national economy; and the subcontracting of local contractors and consultancy firms, including the patronage of local commercial activities by the increased port users and truck drivers will result in an increase the income within the STMA area.

4.2 Potential Negative Impacts
4.2.1 Impacts associated with Construction Phase Activities

Marine Water Pollution and Impact on Aquatic Life: Dredging works within and outside the port basin and reclamation works are likely to temporarily increase suspended solids concentrations and turbidity in the marine environment as a result of runoff from reclamation area at discharge point as well as disturbance of sediments at dredging site. However, the extended breakwater will serve to significantly reduce the extent of transport of the suspended particles from dredging within the port basin (deepening activities) and keep them largely localized. Sediment analysis carried out during the ESIA stage at the proposed site indicate that sediment from the proposed dredging site is uncontaminated. Dredging activities may also directly impact on benthic fauna. It is expected that fish and invertebrate populations will be temporarily affected by the construction of facilities will be able to re-populate the area within few months as soon as work is completed. Fisheries, for instance, will relocate from construction areas to safe distances when disturbed. Increased turbidity, surface pollution through oil spills will limit passage of light and disrupt oxygen dissolution can threaten marine life. The impact is of moderate environmental significance.

Waste Generation and Disposal Problems: Dredging will generate mostly slurry/solid waste in the form of dredged spoil consisting mostly of sand, gravels and sea water. All the dredged material will be used for reclamation. It is expected that approximately 2,000,000 m$^3$ of dredge material will be taken out of the sea and used for land reclamation of the proposed terminals. Construction and demolition activities will result in waste generation. Solid wastes such as packaging material used for various inputs such as cement bags, wooden crates, broken concrete blocks and debris from demolition, metal pieces among others will be generated. Improper disposal of such wastes will create poor sanitary conditions and pose safety risks. This impact is of moderate significance.

Occupational Health and Safety Risks: Workers will be exposed to risks during demolishing of clinker jetty and existing dolphin structure at the oil berth, dredging and reclamation works as well as construction of terminals and associated installations. Risks to safety and health of workers during construction will arise from operation of construction machinery/ equipment, transportation of construction materials, inhalation of dust and fumes, accidents from falling objects and fire and explosion risks from welding. Accidents on the dredger could lead to drowning of workers if adequate preventive and safety measures are not taken. This impact is of major significance.
**Traffic Impacts and Public Safety Challenges:** Movement of heavy equipment and transportation of machinery and materials such as terminal infrastructure, cables, poles, transformers, stone aggregates and cement to the project sites will pose a risk to inhabitants living along the affected routes, especially in densely populated areas. Any unattended mechanical breakdown of such cargo trucks on the roads can induce traffic and serious accidents. The situation can be aggravated without carefully planned materials movement. The effect of traffic disruptions includes increased travel time, congestion, social stress and agitations. This impact is of moderate significance.

**General Disturbance of Port Operations:** The dredging and reclamation activities will adversely impact on port performance in the short term by disturbing port operations. The dredging of the harbour basin will disrupt ship movements leading to delays to berthing and unberthing of ships and this could mean increased time spent in port for ships. This impact is of moderate significance.

**Air Pollution:** Impacts on air quality will arise from increase in dust and particulates emissions. Air pollution will result from exhaust/smoke emissions from vehicles and construction equipment as well as dust emission to air during handling of quarry products and cement. The major recipients of dust, smoke emissions, and noise nuisance are construction workers, workers and commuters in and around the port, as well as pedestrians along the road corridors. The main harbour area is a restricted area and only authorized persons are allowed inside. Construction workers will have to use appropriate nose masks or respirators. The local meteorological information indicates that the major wind movement is from the south-west direction this means that during daytime, the wind generally blows from the sea to the land and any serious air pollution episodes will thus affect New Takoradi Township. However, as the distance to the nearest residential area although within 3km, the impact on the community will be insignificant as a result of wind dissipation and dampening over the ocean. The impact significance is minor.

**Noise Nuisance:** The construction activities will result in elevated noise levels in the port environment. Noise will be generated from the conveyance of machinery, equipment and construction materials. The expected ambient noise level during construction phase would generally be between 65-80 dBA. Average noise levels measured around the project area during the day ranged from 63dB (A) -67dB (A). Noise levels are not expected to exceed these values during the period. The major recipients of noise nuisance during construction period will be project workers, workers at nearby wharf in the main harbour area. The main harbour area is a restricted area and only authorized people are allowed inside in the port.

4.3 **Impacts during Operation Phase**

**Cargo spillage or material losses:** cargo and material spillage can result from structural damage to the containers (e.g. holes or tears in the exterior paneling, broken or distorted door hinges, locks, or door seal gaskets) as well as leaking bulk liquid cargo in the containers. The multipurpose terminal would also handle cocoa (in bulk and bagged), wheat (bulk), biomass (palm kernel shells in bulk). These spilled products at the quay, container yard or during transshipment could be washed into the port basin by uncontrolled storm water/runoff from the container terminal.

**Waste generation:** There is potential for contamination of the marine environment of the harbour from sewage, as well as from discharge of ballast water, bilge water, oily wastes, sewage, garbage and other residues in vessels at the terminal. Garbage made up of litter, fine dust, plastic bags, metal cans etc. may also be introduced into the marine environment by illegal disposal of waste by vessels at anchorage.
Wastewater generation: Wastewaters may be generated from container washing during maintenance and repair activities may also contaminate the marine environment. Uncontrolled runoff from fueling station, power substation and maintenance and repair areas may contain hazardous materials, such spilled lubricants and chemicals which could potentially contaminate the marine environment. These solid and liquid wastes pose disposal challenges and inappropriate disposal of the wastes will contaminate the sea water and create sanitation problems within the port environment.

Oil Spills: The operation of the Takoradi Port may result in accidental spills of oils, lubricants, fuels and other oily liquids from vessels and other port operations may contaminate the water quality at the port. Biodegradation of oil also generates polymerized oil particles and possibly toxic aromatic fractions using dissolved oxygen in the water, and eventually form dense particles, which indirectly cause damages to bottom biota and habitat after sinking.

Air Quality Deterioration: It is anticipated that exhaust emissions within the port area will increase as a result of the expected increased number of vessels, operation of horizontal-transport machines, storage equipment and power generators. Volatile organic compounds (VOC) may also be emitted from fuel storage and transfer facilities.

Noise pollution: Noise level in the harbour area are mainly as a result of the operation of ships, stevedoring activities, container handling works at the terminals, vehicular movement for the haulage of materials by goods vehicles and power generators. The mechanical operations existing of systems and subsystems with moving parts might be noisy, especially when the equipment gets older and is worn out.

Occupational Health and Safety Risks: The occupational health and safety risks can result from the following operational activities: cargo handling; vehicular accidents within the port, mechanical injuries from equipment; exposure to chemicals, noise; and fire.

Traffic Impacts and Public Safety Challenges: Traffic impacts are anticipated from the increase in the number of truck trailer units that are expected to visit to the port. Most of the roads leading to the port are narrow and in poor condition, the increased traffic from port bound trucks will therefore pose a danger to other road users and especially pedestrians. Any unattended mechanical breakdown of such cargo trucks on the roads can induce traffic and serious accidents.

Spread of HIV/AIDS and Sexually Transmitted Diseases (STDs): The HIV/AIDS pandemic is a severe one that should continue to engage the attention of authorities in all sectors and in the management of the workers. Findings of international studies of HIV/AIDS in work places suggest that the construction sites are a breeding ground and a vehicle for the HIV/AIDS epidemic and other sexually related diseases.

Community Security: Generally, the influx of migrants to an area will greatly influence the security of the affected communities as migrants may not conform to the societal norms and cultural practices and may upset the social structure of these communities. The increased population will also put stress on the available resources such as drinking water, accommodation
and even cause an increase in rent. The project is mainly redevelopment of an existing port and will therefore not alter community interactions significantly.

**Introduction of Invasive Marine Pest Species by Vessels:** Vessels will be arriving at the port from all over the world. Several thousand marine species are thought to be transported globally in ships’ ballast water every day (Smith et al. 1996) which also leads to introduction of new invasive species that could result in substantial impacts to the marine environment through competition for resources, predation or disease.

5. **Enhancement / Mitigation measures and Complimentary Initiatives**

The following mitigation and enhancement measures for the significant direct impacts of the project are described in the Table below.

<table>
<thead>
<tr>
<th>BENEFIT</th>
<th>ENHANCEMENT MEASURES</th>
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| Increase in employment opportunities | - Employ local people for all unskilled labour during construction and operation.  
- Employ local technical expertise if available |
| Enhanced economic activities and livelihood strategies | - Subcontracting services to 3rd parties from the local area  
- Use of local contractors and consultancy firms |

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation Measures</th>
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| Impact on aquatic flora and fauna due to dredging and construction works | - Dredging will be done in the shortest possible time in small sized enclosed areas with silt curtains, blasting mats  
- Use of technology that minimizes spillage and maximizes transport of dredged materials to suction mouth  
- Reclamation procedures will avoid and minimize leakages; reduction of suspended solids during dewatering; construction of weirs to control site runoff  
- The contractors will be required to prepare a spill prevention and control plan |
| Generation of waste | - Contractor will develop a waste management plan that will follow the waste hierarchy measures  
- Private waste management companies will be contracted to dispose of waste appropriately  
- Dredged spoil will be used for land reclamation |
| Safety and Health impacts | - GPHA has a policy with high standards of Occupational Health, safety and environmental protection at work and these will be implemented  
- Contractors will be required to have and implement its own occupational Health and safety procedures in compliance with GPHA standards  
- The Environment and Estate Manager for GPHA and Sellhorn/PHC the supervising consultant will ensure contractor compliance and that workers will be trained accordingly  
- Only qualified and certified workers will be allowed to handle vehicles and equipment in the port and regular defensive training lessons will be provided  
- Provision of Personal Protective Equipment (PPE) and implementation of mandate usage of the PPEs and good housekeeping practices  
- Emergency response plan will be developed |
| Traffic Impacts and Public Safety | - Traffic Management Plan will be put in place to control construction and cargo vehicle movements  
- Materials and equipment will be transported during daylight |
<table>
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<tr>
<th>Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
</table>
|                        | - Traffic and danger warning signals will be used on access roads and the port  
|                        | - GPHA will maintain security that will only allow authorized personnel entry  
|                        | - Trucks transporting materials will be covered and speed limits of between 20-30km/hr will be allowed  
|                        | - The port will be linked to rail transport in future to enable its utilisation  
| Air Pollution          | - Dust emissions will be controlled and minimized for workers, and residents along the transportation routes using standard dust suppression techniques  
|                        | - Speed of vehicles and material dumping will be controlled to minimize dust emission  
|                        | - Contractors will incorporate the Air Quality Management Plan of the GPHA into standard operations  
|                        | - GPHA will encourage all port users to put in place maintenance regimes for vehicles to reduce emissions  
| Noise Nuisance         | - Employing standard noise abatement measures and engineering best practices  
|                        | - all equipment and vehicles will be operated and maintained based on industry and equipment standards including noise specifications  
|                        | - Machines with intermittent use shall be shut down or throttled down to a minimum  
|                        | - Ear muffs will be provided for workers where necessary  
|                        | - During operation, low noise versions of equipment will be used and noise levels will be reduced through optimizing terminal layouts, reduction methods  
| General Disturbance of port operations | - Sellhorn/PHC and contractor with Ghana Maritime Authority will provide adequate warning to port users on schedule of works to ensure operations are not unduly disturbed  
| Contamination of Marine environment | - Regular inspection of storm water drains to ensure proper discharge of drainage networks  
|                        | - Regular maintenance and inspection of sewage treatment plant and manhole for runoff and coalescence separator for treatment of run off in areas where fuel and light liquids are handled  
|                        | - Ensure that waste reception facilities for the collection, storage, treatment and transfer of wastes at the port are utilized by vessels arriving at the port  
|                        | - Put in place filter mechanisms to prevent sediments and particulates reaching port water  
|                        | - Ensure that likelihood of oil spills are reduced through regular monitoring and audits. The polluter pays principle is currently in place  
|                        | - Implementation of an oil spill contingency plan & use of punitive measures  
|                        | - Conduct education campaigns for all port users to prevent pollution  
| Introduction of invasive species | - Ensure awareness of information on Ballast water management procedures as prescribed in International Convention for the control and management of Ships Ballast Water and Sediments  
|                        | - Training and education of ship masters and crew on risks associated with biofouling transference of marine pests and invasive alien species  
| Waste Generation and Disposal | - Implementation of a Waste Management Plan and education campaigns of all construction workers and port users  
|                        | - Waste collection and disposal procedures that will also include use and enforcement of waste collection bins  
|                        | - Contracting private entities to collect and dispose of wastes  
| Resistance to Privatisation | - Sensitization and awareness creation on PPP arrangements and the role of private investors in port management by GPHA and Private Investors  
| Spread of HIV/AIDS and other STIs | - Sensitisation and awareness creation on HIV/AIDS and STI transmission and prevention.  
|                        | - Provision of VCT and Counselling services  
| Climate Change Impacts | - Put in place resource use and efficiency measures at the dock and multipurpose terminal  
|                        | - Ensure that port equipment and vehicles are regularly serviced  

The responsibility of implementing the ESMP is that of the contractor. The supervision of the implementation of the ESMP shall be undertaken by the Supervising Engineer, Sellhorn-PHC.
Both the Contractor and the Supervising Engineer shall engage Environmental and Social Experts in their teams. The Contractor will be required to recruit a full time Environmental, Health and Safety Officer for the preparation of the Construction ESMP (CESMP) and for the day to day implementation of the CESMP of the project. The Supervising Engineer will also require Environmental and Social Officer who shall visit the sites on a part time basis to monitor compliance and prepare quarterly reports on the CESMP implementation and overall E & S Compliance. To ensure that the mitigation measures are taken on board by the Contractor, GPHA and IbisTek shall ensure that the project ESMP requirements are included as part of the contract and bidding documents.

The Takoradi Commercial Harbour Oil Spill Contingency Plan is being implemented by the Ghana Ports and Harbour Authority to combat oil spills that occur in the port. The port is equipped with one tug at Takoradi fitted with booms, skimmers and tank receptacles for spill management. Other port operators such as Tullow Oil Ghana Limited has equipment which can be utilized by the GPHA in response to spills. Zoil Ghana Limited also has equipment which are the disposal of GPHA to handle any oil spillages.

6. Environmental and Social Monitoring Program

A monitoring programme has been designed to ensure the successful implementation of the ESMP and related lending covenants. The responsibility for implementation of the Environmental and Social Monitoring Programme during the Construction Phase is the EPC Contractor. IbisTek will ensure the monitoring activities are carried out to acceptable standards through Sellhorn-HPC, the project’s engineering consultants. The EPC Contractor will be required to assign an officer responsible for implementation of the Health, Safety and Environmental considerations, including the ESMP and other lending covenants. The summary of environmental and social monitoring programme proposed for the construction and operational phase of the container and multipurpose terminals are presented in the table below.

Table 1: Summary of Environmental Mitigation and Management and Costs for Construction Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Parameters to be monitored</th>
<th>Frequency/Responsibility</th>
<th>Estimated Cost GHS/annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Marine Pollution and Impact on Aquatic environment</td>
<td>pH, turbidity, TSS, conductivity, dissolved oxygen, Trace metals (V, Cu, Zn, Pb, As, Mn, Fe and Cd), Total and faecal coliforms</td>
<td>10 days before dredging and reclamation &amp; continuous during dredging/EEM HM</td>
<td>22,000.00</td>
</tr>
<tr>
<td>2</td>
<td>Sediment Quality</td>
<td>Heavy metals (V, Cu, Zn, Pb, Mn, Fe and Cd), PAHs</td>
<td>10 days before dredging and reclamation &amp; quarterly during dredging/EEM HM</td>
<td>24,000.00</td>
</tr>
<tr>
<td>3</td>
<td>Air Quality</td>
<td>Odour, VOCs, NOx, COx, SOx, PM10 and TSP</td>
<td>Daily during dredging and reclamation /EEM Monthly after dredging and reclamation /EEM</td>
<td>30,000.00</td>
</tr>
<tr>
<td>4</td>
<td>Waste Generation &amp; Disposal</td>
<td>Metallic wastes, Garbage, Waste oil, Hazardous waste</td>
<td>Weekly/ EEM</td>
<td>20,000.00</td>
</tr>
<tr>
<td>5</td>
<td>Occupational health and safety hazards</td>
<td>Type and frequency of injuries /accidents; Use of Personal</td>
<td>Daily-PSM/Quarterly-HMS; Daily/PSM &amp;FSM; Quarterly</td>
<td>15,000.00</td>
</tr>
<tr>
<td>No.</td>
<td>Component</td>
<td>Parameters to be monitored</td>
<td>Frequency/Responsibility</td>
<td>Estimated Cost GHS/annum</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Traffic Impact and Public Safety</td>
<td>Protective gears; Occupational health and safety training</td>
<td>Daily - PSM</td>
<td>4,000.00</td>
</tr>
<tr>
<td>7</td>
<td>Noise Levels</td>
<td>Sound levels in dBA</td>
<td>Daily during dredging and reclamation /EEM</td>
<td>5,000.00</td>
</tr>
<tr>
<td>8</td>
<td>HIV/AIDS Programs</td>
<td></td>
<td>Monthly after dredging and reclamation /EEM</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Public complaints</td>
<td></td>
<td>Daily - EEM/PSM/FSM</td>
<td>10,000.00</td>
</tr>
</tbody>
</table>

**During operation and maintenance Phase**

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Parameters to be monitored</th>
<th>Frequency/Responsibility</th>
<th>Estimated Cost GHS/annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Contamination of Marine Environment (Water quality)</td>
<td>pH, turbidity, TSS, conductivity, dissolved oxygen, -Trace metals (V, Cu, Zn, Pb, As, Mn, Fe and Cd), Total and faecal coliforms</td>
<td>Quarterly for port basin/ EEM and HM Monthly for waste water treatment facilities/ EEM and HM</td>
<td>16,000.00</td>
</tr>
<tr>
<td>11</td>
<td>Sediment quality</td>
<td>Heavy metals (V, Cu, Zn, Pb, Mn, Fe and Cd), PAHs</td>
<td>Quarterly/EEM and HM</td>
<td>24,000.00</td>
</tr>
<tr>
<td>12</td>
<td>Air Quality</td>
<td>Odour, VOCs, NOx, SOx, PM10 and TSP</td>
<td>Monthly/EEM</td>
<td>30,000.00</td>
</tr>
<tr>
<td>13</td>
<td>Waste Generation</td>
<td>Metallic wastes; Garbage, Waste oil, Hazardous waste</td>
<td>Weekly/EEM</td>
<td>20,000.00</td>
</tr>
<tr>
<td>14</td>
<td>Noise Levels</td>
<td>Sound levels in dBA</td>
<td>Monthly /EEM</td>
<td>4,000.00</td>
</tr>
<tr>
<td>15</td>
<td>Occupational Health and Safety Risks</td>
<td>Type and frequency of injuries/accidents; Use of Personal protective gears; Occupational health and safety training</td>
<td>Daily-FSM; Quarterly-HMS</td>
<td>5,000.00</td>
</tr>
<tr>
<td>16</td>
<td>Resistance to Privatisation</td>
<td>Acceptance of private involvement in port management</td>
<td>Continuous/ Director of Port</td>
<td>10,000.00</td>
</tr>
<tr>
<td>17</td>
<td>Community Health, Safety and Security including HIV/AIDS awareness</td>
<td>Human and vehicular traffic Port related road accidents/ incidents</td>
<td>Monthly-PSM</td>
<td>4,000.00</td>
</tr>
<tr>
<td>18</td>
<td>Introduction of Invasive Marine Pest Species</td>
<td>Marine ecology (Mollusc and crustacean)</td>
<td>Annually /EEM and HM</td>
<td>20,000.00</td>
</tr>
<tr>
<td>19</td>
<td>Public complaints</td>
<td></td>
<td>Daily – EEM/PSM/FSM</td>
<td>5,000.00</td>
</tr>
</tbody>
</table>

**TOTAL COST** 266,000.00

External monitoring shall be done by the Ghana EPA according to their regulatory mandate prescribed in the Ghana Environmental Assessment Regulations of 1999 LI 1652 and AfDB requirements. Monitoring will be done through site inspection, review of grievances logged by stakeholders and ad hoc discussions with various stakeholders. Internal Monitoring will be undertaken as indicated in the monitoring plan over the construction and operation period whereas external monitoring shall be done annually or as need arises. AfDB will monitor implementation through supervision missions and quarterly and annual reports from the Client.

### 7. Public Consultation and Disclosure Requirements

Stakeholder participation during project planning, design and implementation is widely recognized as an integral part of environmental and social management for projects. The AfDB ISS
requirements, the client is responsible for undertaking meaningful public consultation at an early stage and throughout the project to ensure participation and broad support for the project. Ghanaian environmental assessment laws provide for consultations during scoping and after the draft Environmental Statement.

Public consultations for the project were undertaken at various levels with stakeholders at both the national level, and local level during the ESIA studies for the whole Takoradi Port Infrastructure Development Project including Dredging. The following stakeholders were consulted between 26/06/2012 and 28/06/2012: GPHA (the project implementers); Takoradi Port Operators (45); Environmental Protection Agency, Head Office and Sekondi Regional Office; Sekondi-Takoradi Municipal Assembly; Fisheries Officer, Takoradi Fisheries Office; Local opinion leaders and Fisherfolk in New Takoradi. The draft ESIA report was presented at a workshop held on 1st November 2012 which was attended by 123 participants. During the preparation of the ESMP Report, consultations were held with IbisTek and GPHA.

Overall there was broad support for the project. The stakeholders supported the proposed expansion of the Takoradi because it will bring development to the area. A stakeholder engagement plan has been developed for the implementation of the ESMP and is presented below.

### Further Stakeholder Engagement Plans

<table>
<thead>
<tr>
<th>Period</th>
<th>Focus of Consultation/Engagement</th>
</tr>
</thead>
</table>
| Preparation Stage           | - Project Description and Activities  
- Potential Environmental & Social impacts  
- Compliance Requirements (National & AFDB  
- Proposed Mitigation Measures in ESMP  
- Scope of project & institutional facilities                                                                                                                   |
| Site Preparation Stage/Prior to construction | - Information on schedule of preparation & construction works  
- Awareness of potential impacts & remedial measures  
- Integration of ESMP into planning of construction works  
- Grievance redress mechanisms  
- Capacity building for ESMP implementation                                                                                                 |
| During Construction       | Information on Construction works schedule  
- Awareness of potential impacts and mitigation measures in place  
- ESMP and its implementation  
- Grievance redress mechanism  
- Capacity building for ESMP implementation                                                                                     |
| Demobilization Phase       | - Commissioning and handover of terminal  
- Operation and maintenance requirements of the terminals and roles and responsibilities                                                                 |
| Operation & Maintenance Phase | - General stakeholder meeting on environmental and occupational health and safety awareness  
- Operation and maintenance roles and responsibilities including review of grievance mechanism                               |

In terms of public disclosure, the ESIA draft report was disclosed to the public and copies of ESMP and its summary will be disclosed. The ESMP summary for the project shall be disclosed on the GPHA/IbisTek website and AfDB website for a period not less than 60 days prior to the presentation of the project to the Board for consideration.

8. **Institutional Arrangements and Capacity Building Requirements**
<table>
<thead>
<tr>
<th>Organization</th>
<th>Designation</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| 1 AfDB/ DFIs       | Donor/Funders             | • To provide financial support to the project  
• To provide technical and supervisory support on implementation of ESMP & Compliance with AfDB E & S requirements  
• Ensure timely reporting on E & S performance quarterly reports  
• To monitor through supervision missions and review E & S Performance Reports submitted by the Client |
| 2 Ibistek/GPHA     | Borrower and project implementers | • To oversee and assist the Contractor and Environmental experts in ESMP Implementation during construction  
• To ensure the effective implementation of ESMP by putting in place monitoring and evaluation programs for ESMP  
• Ensure implementation of ESMP during the operation and maintenance phase  
• Provide strategic, policy and operational guidance  
• Ensure that the GRM for the project is functional and stakeholders are aware of it |
| 3 Contractor       | Contractor                | • To executive the implementation of the project  
• To implement the ESMP by developing a construction environmental and social management plan during Construction  
• To ensure that they comply with E & S contractual clauses and compliance standards (national & international) |
| 5 Supervising consultant Sellhorn-PHC | Supervisors | Co-ordinates implementation of ESMP i.e.  
• Oversee implementation of the ESMP and CESMP to be developed by the contractor  
• Ensure review of ESMP/CESMP including corrective actions that may be identified  
• Monitoring mitigation sub-plans and occupational health and safety management plan and implementation of monitoring plan and ensuring reporting of E & S performance  
• Provide progress report on the implementation of ESMP to management and  
• Oversee the inter-institutional coordination for environmental mitigation, monitoring and supervision |
<p>| Ghana EPA          | Enforcement Agency        | • Ensure that the contractors are adhering to the national environmental compliance standards and the schedule |</p>
<table>
<thead>
<tr>
<th>Organization</th>
<th>Designation</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| Sekondi-Takoradi Municipal Council | Supervisors    | • Monitor compliance with ESMP development and review as stipulated in the permit schedule  
• Ensuring that all relevant stakeholders are aware of the project and the existence of a GRM  
• Supports implementation of mitigation Plan through regular monitoring  
• Ensure that the project and the contractor do not violate all public policies/rules and regulation  
• Ensure that the pub |
| Other Stakeholders            | Supervisory and advisory roles | • Monitor the contractor and the client in the implementation of ESMP |

9. Estimated Costs

The environmental management and monitoring programmes earmarked for implementation require detailed cost analysis to determine the actual budget needed. Certain costs elements may form part of the operational cost of the Port of Takoradi and the contractor. Provisional cost estimates are provided in Table 2 below.

Tentatively, about GH¢325,000.00 will be needed in the first year for environmental as well as occupational health and safety management actions.

Table 1: Provisional Environmental and Social Management Budget

<table>
<thead>
<tr>
<th>NO</th>
<th>ISSUE</th>
<th>COST (GH¢)/ YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Environmental Monitoring Plan</td>
<td>263,000.00</td>
</tr>
<tr>
<td>2</td>
<td>Implementation of mitigation measures construction</td>
<td>Incorporated in bill of quantities for Contractor</td>
</tr>
<tr>
<td>3</td>
<td>Staff Training and Education and Seminars</td>
<td>Incorporated in operational cost for the terminal and port</td>
</tr>
<tr>
<td>4</td>
<td>Annual Environmental and Safety Auditing</td>
<td>10,000.00</td>
</tr>
<tr>
<td>5</td>
<td>Annual Environmental Reporting</td>
<td>12,000.00</td>
</tr>
<tr>
<td>6</td>
<td>Capacity Building and training for staff</td>
<td>40,000.00</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>325,000.00</td>
</tr>
</tbody>
</table>

10. Implementation Schedule and Reporting

The Environment and Estates manager in GPHA and the Supervising Consultant’s Environmental expert will oversee the implementation of the ESMP in accordance with the monitoring plan. The
Supervising consultant will carry our environmental compliance monitoring and review of the ESMP and will be responsible for reporting on compliance and corrective measures and review of the ESMP. The Contractor shall develop a CESMP for the construction phase and shall be responsible for its implementation under the supervision of the supervising consultant. They shall produce quarterly E and S reports on compliance and corrective measures and submit to the supervising consultant.

In order to comply with statutory as well as internal review, periodic reporting will be done. Reports to be prepared to serve as sources of environmental and safety information for stakeholders will include:

- Annual Environmental Reports – statutory requirement to EPA;
- Quarterly Environmental Monitoring Returns – statutory requirement to EPA; and
- Annual Environmental Audit Report – for in-house reporting.

Progress on the implementation of the ESMP will be included in the overall periodic progress reports, and annual monitoring and evaluation reports of the project that will be submitted to the EPA and AfDB as per loan agreement (quarterly and annually).

11. Conclusion

The proposed project is expected to bring positive impacts nationally and locally for the Sekondi-Takoradi Municipality. These include: (i) increase in direct and indirect employment opportunities and consequently household benefits during construction and post construction operational phases (ii) integration benefits with neighbouring landlocked countries; (iii) contribution to positive infrastructure development outcomes through the port expansion (iv) increase in additional tax and other revenues payable to the government of Ghana; (v) diversification of exports and foreign exchange earnings; (vi) reduction of greenhouse gas emissions as a result of no double handling of vessels (vii) indirect benefits to Ghanaian farmers through a decrease in agricultural produce transportation costs as a result of use of Takoradi port in the western region (viii) facilitating greater trade in essential commodities and consequently augmenting the economic livelihoods of people employed in the agribusiness and other industries; and (ix) promoting trade activities which will further increase access to goods, services, technologies, and knowledge. Women and other vulnerable groups will also benefit directly through jobs and indirectly through entrepreneurship by providing goods and services at the port thereby contributing to their economic empowerment and growth of their respective businesses.

In order to ensure environmental and social sustainability of the project, the negative impacts of the project will be managed through effective implementation of the ESMP and its sub-management plans that have been developed for the project and the CESMP that will be developed by the contractor. GPHA is currently implementing other dredging and construction projects within the port and it is expected that lessons learnt on managing impacts from that project will be used in this project. Furthermore, the Environmental and Social Monitoring Plan has been incorporated into the ESMP and costed to ensure that the proposed mitigation measures are complied with during project implementation. The design of the project has included measures that will also mitigate some of the impacts through technology choice and having energy and water
efficient buildings. A stakeholder engagement plan has also been developed and it is expected that all the key stakeholders will combine their efforts to ensure effective and efficient implementation of this ESMP for sustainability of the project.

12. References and Contacts

Main References

African Development Bank’s *Integrated Safeguards System 2013 adopted in 2014*

African Development Bank’s *Environmental and Social Procedures (ESAP)*

*Environmental and Social Impact Assessment (ESIA) Studies on Port Infrastructure Development, including Dredging, at Takoradi Port, Western Region.* SAL Consult Ltd in association with Royal Haskoning DHV

*Environmental and Social Management Plan - On Dock Container and Multipurpose Terminal for the Port of Takoradi, July 2017.* SAL Consult Ltd

Contacts

- Orison Amu. Task Manager/Chief Investment Officer, African Development Bank. o.amu@afdb.org
- Archie Chiromo. Consultant, African Development Bank. a.chiromo@afdb.org
- Chimwemwe Mhango. Senior Environmental Officer, AfDB. c.mhango@afdb.org