Republic of Ghana

MINISTRY OF SANITATION AND WATER RESOURCES

Greater Accra Resilient and Integrated Development (GARID) Project

Environmental and Social Impact Assessment (ESIA) for the Waste Transfer Station at West Legon in the Ga East Municipal Assembly (GEMA)

REVISED FINAL ESIA REPORT

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ACRONYMS AND ABBREVIATIONS

ACARP	Accra Compost and Recycling Plant
BoQ	Bill of Quantity
COD	Chemical Oxygen Demand
CRF	Compost and Recycling Facility
DEMC	District Environmental Management Committees
DUR	Department of Urban Roads
EA	Environmental Assistant
EHS	Environmental, Health and Safety
EHSD	Environmental Health and Sanitation Department
EHSU	Environmental Health and Sanitation Unit
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESPA	Environmental Service Providers Association
GAMA	Greater Accra Metropolitan Area
GEMA	Ga East Municipal Assembly
GARID	Greater Accra Resilient and Integrated Development
GoG	Government of Ghana
GPS	Global Positioning System
IESS	Institute for Environmental and Sanitation Studies
LI/L.I.	Legislative Instrument
MEHO	Municipal Environmental Health Officer
MLGRD	Ministry of Local Government and Rural Development
MMA	Metropolitan and Municipal Assembly
MMDA	Metropolitan, Municipal and District Assembly
MSWR	Ministry of Sanitation and Water Resources
MTTD	Motor Transport and Traffic Directorate
OP	Operational Policies

PCU	Project Coordinating Unit
PPE	Personal Protective Equipment
SEMCO	Senior Environmental Monitoring & Compliance Officer
SoP	Standards of Procedures
S&W	Sanitation and Water
TMA	Tema Metropolitan Assembly
ToR	Terms of Reference
UG	University of Ghana
WB	World Bank
WTS	Waste Transfer Station

EXECUTIVE SUMMARY

Overview of the Project

Background

The Government of Ghana (GoG) has applied for IBRD/IDA credit facility from the World Bank towards the cost of implementation of the Greater Accra Resilient and Integrated Development (GARID) Project which will provide both structural works and non-structural services towards improving flood and solid waste management in the Greater Accra Metropolitan Area (GAMA) and to deal with climate change induced-risks. The proposed project is structured into four (4) main components.

As part of Component 2 of the GARID Project, the GoG through the Ministry of Sanitation and Water Resources (MSWR) intends to apply part of the GARID Project funds for construction of a Waste Transfer Station (WTS) at West Legon in Ga East Municipal for proper and efficient management of solid waste in the GAMA.

Key Components of the WTS

The capacity of the proposed waste transfer station is between 600 and 750 tons per day. The operation of the WTS will to be handled by the private sector. The key components of the WTS project include:

- Construction of waste transfer station main buildings and foundation including unloading, sorting, storage and loading levels, hopper and trailer;
- Composting sub-station;
- Plastic recycling sub-station;
- Construction of gate control buildings and foundation including works to house weigh bridge;
- Construction of support buildings and foundation including offices for supervisors and support staff, room for training and meetings, canteen, worker accommodations for washing/ changing/ resting;
- Construction of asphalt access roads from the main roads/highway nearest the transfer station to the reception area within the project site;
- Construction of site roads and parking areas;
- Construction of drainage systems, leachate and waste water treatment and sanitary systems;
- Provision of fire protection systems, including water supply and extinguishers;
- Construction of workshops, including bays for repair and maintenance of transfer trucks;
- Washing facilities for transfer trucks and collection trucks; and
- Other ancillary works.

Main Project Activities

- Feasibility studies, project design and approval processes from University of Ghana and regulatory agencies such as the EPA.
- Land preparation.
- Construction and installation works for main buildings/facilities and ancillary facilities
- Waste collection and haulage from Ga East, Adentan, La Nkwantanang Madina and Ayawaso West Municipalities to WTS
- Further sorting of pre-sorted waste
- Recycling of plastics and composting of organic waste

- Transfer of residual waste from WTS to final disposal site (Kpone landfill and Accra Compost and Recycling Plant)
- Treatment of leachate and wastewater

Alternative Considerations

The alternatives considerations analyzed for the WTS project are as follows:

1) Decision to immediately construct a waste transfer station (WTS) or new landfill site.
    - Waste Transfer Station at West Legon
    - New Landfill site
2) Site selection for the WTS
    - University of Ghana site
    - Ghana Atomic Energy Commission site
3) Transfer station unit process options.
    - Unloading to storage without compaction
    - Surge Pit Transfer Station
    - Direct Tip Transfer Station
4) No action option.

Description of Project Site and Baseline Environmental and Social Conditions

The proposed site for the Waste Transfer station is located at West Legon in the Ga East Municipal. The project site is a property of the University of Ghana and is situated close to the Legon Sewage Treatment Plant. The WTS will serve the University of Ghana and the surrounding municipalities within a 5-7km radius. The site can be accessed from the Haatso-Kwabenya Road.

The proposed project site has thickets and shrubs which is dense on portions of the site. The thickest consist mainly of *Azadirachta indica* (neem) trees. Where the thicket is not dense, patches of perennial grass can be found. The field inspections show that the vegetation is common in the area and no species of ecological value will be lost. The proposed site is in the same vicinity as the stabilization ponds for sewage treatment from the University of Ghana Campus. The proposed project area is drained by the Onyasia River.

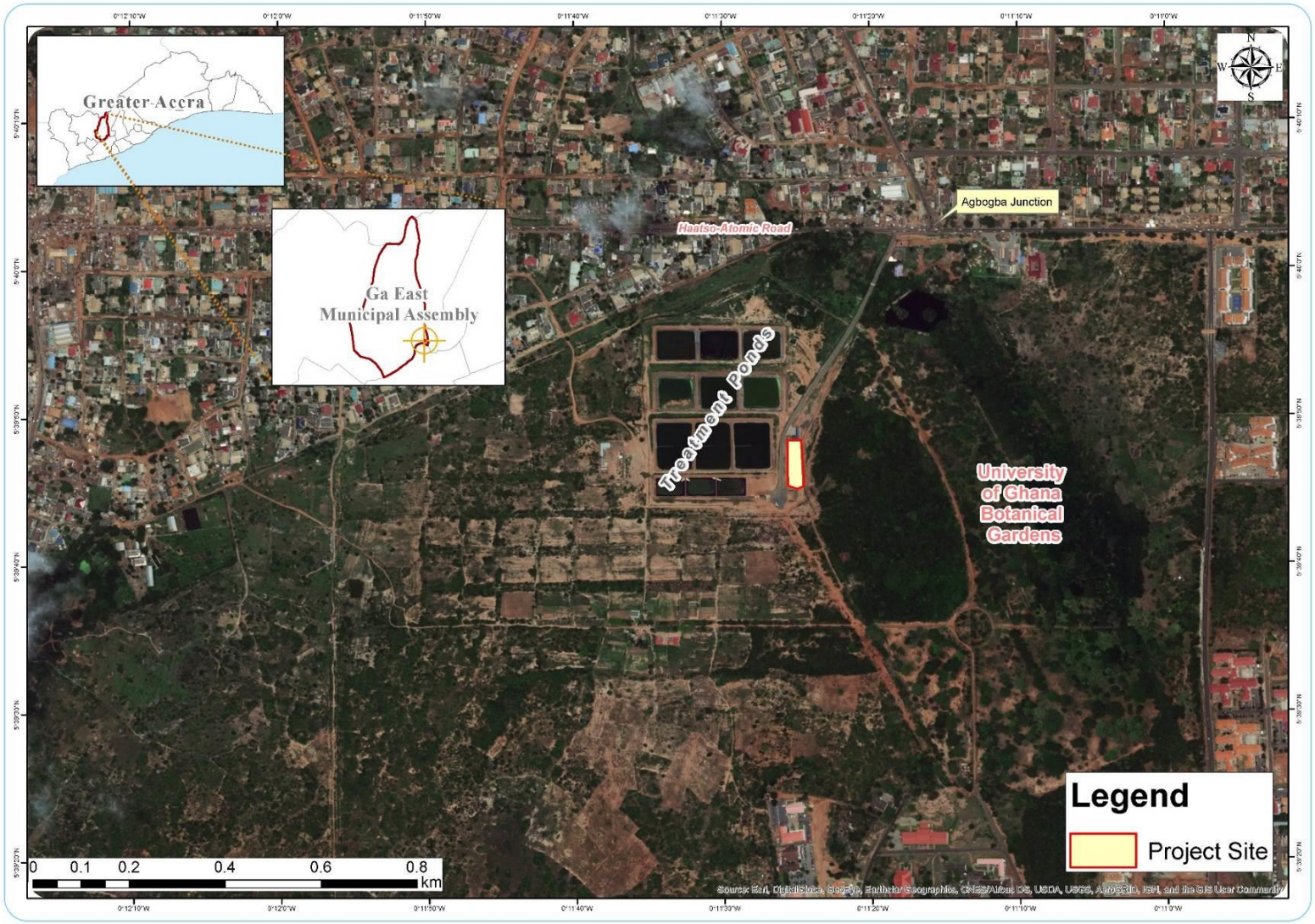
The Onyasia River is an urban stream which carries storm water and wastewater. It drains into the Odaw River at Alajo in the Accra Metropolitan Area. The main use of the Onyasia River is for irrigation of urban farms. A tributary of the Onyasia River flows about 400 metres from the project site. Water quality analysis of the tributary of the Onyasia River showed that chloride, manganese, total coliforms, faecal coliforms and E-coli exceeded the World Health Organization's Drinking Water Quality Guidelines values. Hence, the water from the Onyasia River is not suitable for drinking without treatment.

The soils at the project site are well drained red, sandy clay loam to clay with abundant rough stone and quartz gravel. Infiltration is therefore high, which makes the project site at risk of any leakages of leachates from the WTS.

About 2,476 metric tons of solid waste is produced within the GAMA on a daily basis. Of this quantity, more than three-quarters (76%) is collected, while the remaining 24% is disposed improperly either

through burning, burial, open and indiscriminate dumping (MSWR, 2018). Organic waste is the major form of solid waste generated (60%) and recyclable materials (including plastics, paper and cardboard, metals and glass) together make up 21%. The main challenges to waste management in GAMA include long distances from the generation point to final dumping sites resulting in high haulage cost and operational difficulties due to heavy daytime vehicular traffic.

The map below shows the location of the project site for the WTS.



Map showing the location of the Project Site

Policy, Legal and Institutional Framework

The relevant national and sector policies and plans include:

- The National Environment Policy, 2013;
- The National Environmental Sanitation Policy, 2010;
- The Community Water Supply and Sanitation Programme, 1994; and
- National Health Policy, 2007.

The relevant legal frameworks include:

- The Constitution of the Republic of Ghana, 1992;
- Ghana Investment Promotion Centre Act 1994, Act 478;
- Environmental Protection Agency (EPA) Act 1994, Act 490;
- Environmental Assessment Regulations 1999, LI 1652;
- Fees and Charges (Amendment) Instrument 2015 (L.I. 2228);
- Water Resources Commission Act 1996, Act 522;
- Local Governance Act 2016, Act 936;
- The State Lands Act, 1963 (Act 125);
- Lands Commission Act, 2008 (Act 767);
- The Labour Act 2003, Act 651;
- Workmen's Compensation Law 1987;
- The Fire Precaution (Premises) Regulations 2003, LI 1724; and
- Factories, Offices and Shops Act 1970, Act 328.

The relevant Ga East Municipal Assembly (GEMA) bye-laws relating to waste management and sanitation include:

- Ga East Municipal Assembly (Environmental Sanitation) Bye-Laws, 2016;
- Ga East Municipal Assembly (Solid Waste Management) Bye-Laws, 2016;
- Ga East Municipal Assembly (Collection and Disposal of Wastes) Bye-Laws, 2016; and
- Ga East Municipal Assembly (Abatement of Litter) Bye-Laws, 2016.

The relevant institutional bodies include:

- Ministry of Sanitation and Water Resources (MSWR);
- Ministry of Local Government and Rural Development;
- Metropolitan, Municipal and District Assemblies; and
- Environmental Protection Agency.

The World Bank requirements include:

- World Bank safeguards policies:

  -*OP 4.01: Environmental Assessment;*
  Requires environmental assessment of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. It categorizes proposed projects into categories A, B, C or FI based on the extent of adverse impacts anticipated

from the project. For Category A and B projects, an ESMP is to be prepared to guide the Implementation of mitigation measures for all identified environmental impacts from the project.

-*OP 4.04: Natural Habitats;*
Do not finance projects that degrade or convert critical habitats. Support projects that affect non-critical habitats only if no alternatives are available and if acceptable mitigation measures are in place. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water areas where most of the native plant and animal species are still present).

-*OP 4.11: Physical Cultural Resources; and*
Investigate cultural resources potentially affected. Include mitigation measures when there are adverse impacts on physical cultural resources or avoid if possible.

- *OP 4.12: Involuntary Resettlement.*
Assist displaced persons in their effort to improve or at least restore their standards of living. Avoid resettlement where feasible or minimize. Displaced persons should share in project profits. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. The policy prescribes compensation and other resettlement measures to achieve its objectives.

- World Bank Group General Environmental Health and Safety Guidelines; and,
- Industry Sector Guidelines on Waste Management.

Potential Environmental and social risks and Impacts

The significant potential adverse impacts (rated as moderate or major) identified from the analysis and evaluation of the impacts on the environmental and social resources in the project influence area are:

Preparatory Phase
- Loss of 10 acres (4ha) of undeveloped land by University of Ghana.

Construction Phase
- Soil impacts (soil erosion and contamination);
- Occupational Health and Safety issues (accidents, injury/ailments to workers);
- Traffic disruption and risk of accidents at WTS site and along haulage routes;
- Generation and disposal of waste;
- Sanitation and public health issues (unsightly conditions, cholera and malaria infestation) in communities around project site;
- Unwanted pregnancies and transmission of HIV/AIDS and other sexually transmitted diseases (STDs); and
- Child labour and abuse of construction workers.

Operational Phase
- Nuisance from odour at the University and Haatso community;
- Surface and groundwater pollution;
- Breeding of disease vectors and risk of vector borne diseases;
- Public nuisance from windblown solid waste, broken down waste collection vehicles and clandestine dumping;

- Occupational Health and Safety issues (accidents, injury/ailments to workers);
- Traffic disruption and risk of road accidents on WTS access roads and along haulage routes;
- Sanitation and public health issues (unsightly conditions, cholera infestation) in communities around project site;
- Risk of fire at WTS from combustible waste; and
- Hiring of minors and abuse of workers at the WTS.

Stakeholder Engagement and Consultations

Relevant stakeholders for the project have been identified and consulted. These include the following:

Project Proponents and Engineers
- Ministry of Sanitation and Water Resources;
- GARID Project Coordinating Unit; and
- Design Engineer for the project.

Regulatory Authorities
- Environmental Protection Agency;
- Ghana National Fire Service; and
- Factories Inspectorate Department.

Other Government Authorities
- Ministry of Works and Housing;
- Ministry of Local Government and Rural Development; and
- Department of Urban Roads.

Landowner
- University of Ghana, Legon including:
  - Institute of Environment and Sanitation Studies (IESS); and
  - Students.

Local Government Authority/Operator of the WTS
- GEMA, including:
  - Waste Management Department; and
  - Environmental Health and Sanitation Department.

Waste Collection/Management Companies in GAMA
- Environmental Services Providers Association (ESPA). This comprises the large waste collection/ management companies in GAMA, including:
  - Zoomlion Ghana Limited;
  - Zoompak Ghana Limited;
  - Meskworld Limited;
  - Rural Waste Limited;
  - Daben Limited;
  - Zoom Alliance; and
  - J. Stanley-Owusu (JSO) Limited; and
- Some small waste management operators, including:
  - Operators of motorized tricycles; and

- Operators of “borla” taxis.

Receiving facilities for sorted waste from the WTS

- Operators of Kpone Landfill (Waste Landfills Company Ltd); and
- Accra Compost and Recycling Plant (ACARP).

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Beneficiary communities

- Communities within Ga East, Adentan, La Nkwantanang Madina and Ayawaso West Municipalities.

Communities along Onyasia River downstream of project site

- These include:
  - Haatso;
  - West legon, etc.

Summary of Stakeholder Consultation

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
Project Proponent				
- MSWR -GARID Project Coordinating Unit (PCU).	-K. Ohene Sarfo -Frank Dei -Henrietta Osei-Tutu (0206021605)	GARID PCU	Ongoing	Provided the available information and documents on the description, scope and design of the WTS project. Specifically, this included the following: • Project scope and description captured in the terms of reference (ToR); and • Preliminary layout for the proposed Waste Transfer Station.
Other Government Authorities				
DUR	Ferdinand Yali (0244513583)	Head, Environment Unit	26/9/2018	• The proponent(s) must write officially to inform DUR about the project. • The design of the access roads to the WTS must be submitted to DUR for their inputs. • A representative from DUR must be on the project team to provide technical inputs during project meetings and also act as a liaison between DUR and the proponents. • The access road after construction will be a public road hence maintenance of the road will be transferred to government. • DUR has Road Units within MMDAs which are responsible for maintenance of roads within their jurisdictions. The Road Unit within GEMA will therefore be responsible for maintaining the access road to the WTS. • DUR is mindful of the environmental and social impacts of the project, particularly traffic impacts and safety issues from moving of construction materials and equipment to site. Traffic impact assessment and traffic management plan should be prepared for the project.
Local Government Authority				
GEMA	Derrick Tata-Anku (0244016563)	Municipal Environmental Health Officer (MEHO)	13/7/2018	• The Environmental Health Unit is responsible for waste management in the municipality. It has two (2) zonal offices in Dome and Abokobi. Schedule Officers are in charge of bins and the operations of refuse trucks belonging to the Assembly. • Private waste management companies manage waste in most parts of the Municipality. • GEMA has sixty (60) bylaws for waste management. • The Assembly has budget provision for waste management though it is inadequate.

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				• GEMA is in the process of registering small waste management operators in the Municipality. • The Assembly had a successful meeting with the University of Ghana (UG) on acquiring the proposed site for the project. The UG authorities requested for the following documents/information: - Size of land; - Architectural drawings of the project; - ESIA report; and - Feasibility study report. • The Assembly should be empowered to manage the WTS facility. • Segregated organic waste from the WTS can be sent to the ACARP. • GEMA has distributed dustbins to 33 basic schools in the Municipality for waste segregation. The bins are labelled as organics, plastics and paper. Waste segregation is ongoing in these schools. • The Assembly intends to construct a paper factory under the 1D1F to recycle waste paper. • There should be good public education and sensitization on the project.
Land Owner				
University of Ghana	Charles Kofi Nti (0260759919)	Director (Physical Dev't and Municipal Services Dept.)	27/7/2018	• Confirmed that the Ga East Municipal Assembly has had initial discussions with the Vice Chancellor on the project. The University requested detailed information on the project to be able to make an informed decision. The University requires such information as: - Detailed project designs including land size needed; - Description of the operation of the waste transfer station; - End use of the sorted plastics and organic materials; - Copy of environmental assessment reports; and - Design of main and ancillary facilities such as access roads; etc. to study prior to any further discussions and decision. • After reviewing the project designs, the University may wish to schedule a meeting with all stakeholders including the Institute for Environment and Sanitation Studies (IESS) to further

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				discuss the project. • Confirmed that the proposed WTS may be sited near the Sewage Ponds as indeed some students from the IESS are already carrying out recycling project activities in the proposed area. This makes it prudent to involve the IESS in the project discussions.
Institute for Environment and Sanitation Studies (IESS) -See **Plate 6-1** for picture of meeting with IESS	Dr. Tedd Annan (0204336677)	Coordinator, IESS	--	• Confirmed that GEMA has had preliminary discussions with the university authorities earlier but follow up actions by the Assembly has been lacking. • It is envisaged that, the proposed Plastic Recycling and Compost Plant by IIESS and the WTS would complement each other and provide learning opportunities for students. • The land size required by the WTS alone is estimated to be about 10 acres. Together with the IESS pilot projects, a total land area of up to 15 acres will be needed. • The parties will later have formal meetings to discuss and agree on the design concepts and relative locations of the various facilities on the available land. These must complement each other. • The IESS has ongoing initiative to segregate waste prior to collection at market places and market women have been trained to be at the forefront. GEMA also has similar programmes which involves national service personnel. Some good work is therefore being done already within the Assembly. • IESS is happy with the prospects of partnering MSWR to implement the project. Their involvement should provide some comfort to all stakeholders especially the university authorities that best practices will be followed with minimal impact on the physical and social environment hence, there should be little or no inconvenience to life on the university campus. • This may be assured because the facilities will be rightly located at areas properly identified for both solid and liquid waste facilities on the campus. The proposed site is far from active areas on campus and aesthetic nuisances will be minimal. • The MSWR would immediately submit a formal request to the University through the IESS for urgent attention. The IESS will provide the required support to the request to receive swift approval from the University authorities. • A formal response will be received from the university authorities within a week which

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				should lead to the signing of a memorandum of understanding (MoU) between all parties. • The meeting was mindful of the urgent time constraints and expected that the formal approval from the university authorities will be received by 16 August 2018. • It is worth noting that the IESS has a MoU with the GEMA to jointly cooperate and partner to improve waste management in the Assembly.
Further consultation with IESS -See **Plate 6-2** for picture of further meeting with IESS	Dr. Tedd Annan (0204336677)	Coordinator, IESS	10/9/2018	• Concerns from IESS included the following: - Size of land required for the project; - Technology to be used; - Volumes of waste to be received at the WTS; - risk management of the WTS; - Role of the University in the construction and operation of the facility; and - Sustainability of the project. • The MSWR requested the IESS to partner the Ministry in the design of the project and assured the IESS of the sustainability of the project.
Waste Collection/Management Companies in GAMA				
ESPA	Ama Ofori Antwi (0208154588)	Executive Secretary	20/9/2018	• ESPA is an association of private waste companies handling waste for MMDAs. The solid waste members of the association include Zoomlion Ghana Ltd, Zoompak Ghana Limited, Meskworld Limited, Rural Waste Limited, Daben Limited, Zoom Alliance, J. Stanley-Owusu (JSO) Limited, ACARP, Waste Landfills Co. Ltd, etc. • MMDAs are responsible for providing disposal sites for waste within their jurisdictions. • Current disposal sites within GAMA include the Kpone landfill, Weija, Nsumia and Pantang dump sites. The Kpone, Weija and Nsumia are approved dumpsites. • For efficient waste management, the turnaround distance should be 40km. The current turnaround distance is 80-90km. • About 4000 small waste collectors (users of motorized tricycles and "borla taxis") have been registered. Out of this number, only about 800 are under ESPA with about 500 being active members. • Recommends that a private company is made to operate the WTS to ensure effective

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				management and the sustainability of the project. • ESPA has competent Environmental Engineers and should be consulted by the Design Engineer/Consultant to provide useful inputs into the project design. • ESPA has had meetings with MSWR and provided recommendations to the Ministry on effective waste management which should be considered for the project. • The communities around the proposed project site will be the key recipients of any environmental and social impacts from the project and hence should be the key stakeholders considered for the ESIA.
Small waste management operators: -Operators of motorized tricycles -Operators of "borla" taxis. (See **Plate 6-3** for picture taken during consultations with some small waste management operators.	-Clement Forson -Ayi Aryeetey -Odartey Lamptey -Odartey Lawson	Small waste management operators	6/7/2018	• Refuse/waste is collected from various sites within GAMA including Spintex, Avenor, Alajo, Mallam, La Paz, etc. • The current operations at the temporary transfer station involves loading boys transferring waste directly from the "borla" taxis and motorized tricycles into transfer trucks belonging to Zoomlion. • The transfer trucks are inadequate, hence operators who are unable to offload their refuse have to park and wait till the next day or move to a dumping site to dump their refuse. This is partly the reason why some small waste management operators dump in unauthorized places in order to go round to collect more waste from households and make money. • Small waste management operators are charged between Gh¢35 and Gh¢45 for their load (depending on the size of the truck) and they also pay Gh¢10 for the services of the loading boys. They consider the charges to be expensive and want it reduced for the operation of the new WTS to be constructed by this project. • The dumping of refuse by some small waste management operators at unauthorized places may also be attributed to the high charges/fees. • Employment opportunities should be created for the small waste management operators and the loading boys at the temporary transfer sites. • The loading boys at the current temporary transfer sites may lose their source of livelihoods as the new WTS may not require loading boys. • The advantages and disadvantages of the project should be thoroughly considered.

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
Receiving facilities for sorted waste from WTS				
Waste Landfill Company Ltd (Operators of Kpone Landfill)	Kwei Dagadu (0208630954)	General Manager	14/9/2018	• The Kpone Landfill is owned by Tema Metropolitan Assembly (TMA) and operated by Waste Landfills Company Ltd. • The Kpone Landfill is designed to receive about 500 metric tons of waste per day, and receives only municipal solid waste and industrial waste. It does not receive liquid waste and hazardous waste. • An EIA was prepared for the Kpone Landfill. • The landfill site is technically full. By end of first quarter of 2019, the site will not be able to receive any waste unless it is expanded. • Most of the available lands around the site which were earmarked for expansion of the landfill have been encroached on. • Government has secured portions of the available land and has plans to construct additional one or two cells to extend the capacity of the facility by about 3-4 more years. • Environmental management and monitoring conducted at the site include the following: - Groundwater analysis; - Leachate; - Gas; - Dust control; - Vector control; and - Odour. • Environmental monitoring reports are submitted to TMA. • Environmental monitoring reports, copies of the EIA, permit and other environmental reports/ documents should be obtained from TMA. • Fire control measures at the station include fire hydrants, fire extinguishers and a dedicated water tanker for emergency cases. • The project should consider other approved landfill sites such as Nsumia landfill (around Nsawam) and Adepa Landfill for the disposal of sorted waste. • Other waste transfer stations such as those at Achimota and Teshie should be consulted.

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				They are currently underutilized due to the current charges at the stations. Waste collectors claim the charges at those stations are unaffordable, hence do not patronize them. • According to the Site Supervisors, receiving decomposable waste from the WTS will be preferable.
ACARP	Mawutor Attah	Project Manager	2/10/2018	• ACARP has a design capacity of 600 metric tons per 16-hours and thus processes 300 metric tons of municipal solid waste per every 8-hour shift. • The facility receives and processes municipal solid waste. It does not receive medical, construction and hazardous waste. • ACARP has a contract with the government of Ghana to manage waste and does not charge waste collection operators for the waste brought to the facility. • ACARP currently processes around 250 metric tons of waste per 8-hour shift, which is around 80-90% of the Plant's design capacity. • ACARP has unlimited capacity to receive sorted waste material from the WTS, i.e. sorted recyclable materials or sorted organic materials. This is because sorted materials will be readily processed without going through the material recovery facility which is limited by its design capacity. • ACARP will be currently limited in receiving unsorted waste from the WTS due to the plant's current capacity. However, plans have commenced to expand the facility to about 1200-1500 metric tons per day. When this is done, the plant will be able to receive and process more unsorted waste. • According to the Project Manager of ACARP, the planned expansion is expected to be carried out in 2019. • The project proponents must officially inform ACARP about the WTS project, including the project timelines so ACARP can factor it in their plans. • Effective collaboration between the project proponents and ACARP will contribute to effective implementation of the WTS project.

Stakeholder Engagement Plan for Further Engagement with WTS Beneficiary Communities

A stakeholder engagement plan which will be followed to ensure further engagement with stakeholder communities of the WTS project is provided below.

Stakeholder Engagement Plan

Stakeholder	Information to be shared	Method of engagement	Responsibility for engagement
University community (including students)	***Preparatory Phase*** • Project designs • Project schedules and timelines • ESIA report • Grievance redress process	-Formal meetings -Submission and joint review of project designs -Disclosure of ESIA documents at Library	-MSWR -Design consultants -IESS
	Construction Phase • Project schedules and timelines • Grievance redress process	-Project meetings including representatives from UG on the management team. -Posters on notice boards	-Supervising Engineer -Contractor -MSWR/GEMA
	Operational Phase • Grievance redress process • Solicit views and opinions on the project.	-Project meetings including representatives from UG on the management team. -Posters on notice boards	-WTS Management Team -Private operator of WTS
Beneficiary communities (Ga East, Adentan, La Nkwantanang Madina and Ayawaso West Municipalities) *NB: This includes communities along Onyasia River, downstream of the WTS site.*	***Preparatory Phase*** • Project schedules and timelines • ESIA report • Project impacts and benefits • Grievance redress process	-Formal meetings with Municipal Assemblies and waste management operators -Disclosure of ESIA report at Municipal Assemblies -Municipal Information Service Department (ISD) information vans. -Posters on public notice boards.	-MSWR -GEMA
	Construction Phase • Project schedules and timelines • Project impacts and benefits • Grievance redress process	-Municipal Information Service Department (ISD) information vans. -Posters on public notice boards.	-MSWR - Supervising Engineer -Contractor -GEMA in collaboration with the beneficiary Municipal Assemblies
	Operational Phase • Grievance redress process • Solicit views and opinions on the project.	-Municipal Information Service Department (ISD) information vans. -Community public address systems	-WTS Management Team -Private operator of WTS

Environmental and social Management Plan (ESMP)

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
Preparatory Phase					
Loss of 10 acres (4ha) of undeveloped land by UG	• The UG authorities will be adequately consulted on the project to obtain their free, prior and informed consent on the project. • The IESS (UG) is desirous of partnering the MSWR to implement the project and therefore will assist to acquire the land. • The MSWR will follow all due processes as maybe spelt out by UG to obtain official approval or agreement or acquire the land for the project and obtain all necessary documentation. • Land acquisition should be in accordance with OP 4.12. • The concept note and draft MoU under consideration between MSWR, GEMA and UG is attached as **Annex 6**.	-Written consent/approval for project from UG. -Land acquisition documents/Memorandum of Understanding (MoU) between MSWR and UG on project site	Design and planning phase of project	GARID Project Office/MSWR	To be determined through negotiation with UG
Design considerations for the WTS	The design of the WTS should incorporate the following: • Constant (24-hour) water supply; • Leachate and wastewater treatment system; • Proper drainage system to channel out leachates and wastewater to the leachate and wastewater treatment system. • Fencing and/or construction of wall and green buffers	Designs provided for the following: -24-hour water supply system -Leachate and wastewater system -Fencing and/or construction of wall and green buffers on the WTS boundary	Design and planning phase of project	GARID Project Office/MSWR/ Design Consultant	As part of cost of project designs

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	on the WTS boundary. • Industrial odour control fans or ventilation system to capture and control odour at the WTS. • A misting system and exhaust for neutralizing odour at the WTS when necessary. The air exhaust should have a biofilter to further reduce the odour before entering the external environment. • The layout of the WTS should take into consideration the predominant wind direction (south-south westerly) and the facility should have adequate ventilation to ensure it is well aerated, especially the sorting and storage area. • Proper and extended roofing to prevent rain from getting inside. • An Operations & Maintenance Plan which should include specific schedule for the operations of the facility (waste collection, hauling, sorting and transfer to Kpone landfill and ACARP) based on Material Flow Analysis.	-Fencing and/or construction of wall and green buffers on the WTS boundary -Misting system and exhaust for neutralizing odour. -Operations & Maintenance Plan for the WTS			
Sub-Total 1:					**--**
Construction Phase					
Soil impacts (soil erosion and	• Clear vegetation at project site only on commencement of construction works and limit the clearance to the	-Observable change in turbidity of water in	Duration of construction works	Supervising Engineer/	As part of contractor's

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
contamination)	demarcated site. • Reuse excavated soil for backfilling and immediately collect any excess soil material for disposal at approved dump site. • Deliver only required quantities of sand for a specified period at the project site. Cover any heaped sand for construction works with tarpaulin. • Prohibit fueling or oil change of machinery/trucks/vehicles at the project site.	stabilization ponds and tributary of Onyasia River - Observable oil sheen in stabilization ponds and tributary of Onyasia River -Observation of rills/gullies at project site		Contractor	work
Occupational Health and Safety Issues (accidents, injury/ailments to workers)	• Develop and implement a Health & Safety Policy for the project construction. The Health & Safety Policy should at least have the following outline: o General policy statement o Commitments for the following: - Training - Carrying out risk assessment - First aid - Welfare facilities - Personal protective equipment (PPE) - Hazardous chemicals - Accident reporting - Dust - Noise	-Workers' awareness of Contractor's health and safety policy -Availability and proper use of PPEs -Availability and proper use of warning signs -Availability of first aid kit -Adherence to health and safety procedures -Records on frequency, type and source of illness/accident/injury -Records on non-compliances -Training and induction records	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	○ Responsibilities (for what and who reports to who). • Conduct health and safety induction for all workers. • Employ only well-trained and experienced personnel for the construction works. Ensure only drivers and operators with the requisite licenses are allowed to handle vehicles and machinery. • Provide initial training and testing in machine/equipment handling and safe working procedures for all new drivers and machine operators. • Utilize only good conditioned and well serviced machines for the project construction. • Ensure proper supervision and monitoring during construction works. • Provide and strictly enforce the use of appropriate PPEs such as safety boots, rain coats, hand gloves, earplugs and nose masks. Implement sanctions where this is not followed. • Provide first aid kits on site and train supervisors to administer first aid for minor ailments/injuries on site. Refer major cases to the UG Hospital.				
Traffic disruption and risk of accidents at WTS site and along	• Prepare and implement a Traffic Management Plan for the construction works. The Plan must be approved by the Supervising Engineer/MSWR prior to	-Traffic Management Plan prepared. -Absence of unauthorized persons at project site	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
haulage routes	implementation. • Cordon off the project site and enforce strict security measures prevent entry of unauthorized persons to the site. • Use warning signs at vantage points to warn the public against dangers. • Train drivers on safe driving and vehicle procedures. • Haulage trucks should comply with the approved speed limit of 30-50km/hr within communities along the haulage road. • Immediately remove any broken down vehicles/trucks from the road. • Adjust material/equipment delivery times to avoid peak traffic periods. • Engage officials of the MTTD of the Ghana Police Service where necessary to direct traffic at the junction on the Haatso-Atomic Road (which leads to the project site, sewage treatment plant and botanical gardens). • Create awareness and sensitize workers and the public on prevention of HIV/AIDS and other sexually transmitted diseases.	-Availability and use of warning signs and cautionary tapes at project site -Records on frequency and type of incident/accidents involving public -Records on awareness creation/sensitization programmes.			
Generation and disposal of waste	• Develop and implement a waste management plan for the construction works. The construction waste	-Workers awareness of waste management plan	Duration of construction works	Supervising Engineer/	To be captured in contractor's

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	management plan should address the following: o Who will be responsible for resource management. o What types of waste will be generated. o How the waste will be managed (reduced, reused, recycled). o Which contractors will be used to ensure the waste is correctly recycled or disposed of responsibly and legally. o How the quantity of waste generated by the project will be measured. • Adopt efficient construction methods and re-use construction materials to minimize waste generated. Excavated soil material should be re-used in backfilling and levelling as much as possible. • Ensure waste segregation at the site. Provide different bins/skips for different types of waste generated such as scrap metals, plastic materials, etc. • Sell recyclable waste such as plastics/polythene and scrap metals to authorized recyclers for recycling. • Frequently collect and dispose vegetative and excavated material which cannot be re-used as well as other construction waste such as wood chippings at the nearest GEMA approved dumpsite.	-Absence of piled excavated material -Availability and use of bins -Records on frequency and location of waste disposal site of domestic and construction waste		Contractor	BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
Sanitation and public health issues (unsightly conditions, cholera and malaria infestation) in communities around project site	• Ensure proper housekeeping at the project site. • Provide adequate waste bins at the project site for use to prevent littering of the project site with cans and bottles which can collect water and breed mosquitoes. • Provide temporary toilet facilities for the construction period for use by workers. Educate workers against open defecation and sanction any person found engaging in it. • Cover and level excavations properly to prevent collection of water (pools).	-Absence of pools of water at construction site -Availability and use of mobile toilet at project site -Records on public complaints related sanitation and public health issues	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ
Unwanted pregnancies and transmission of HIV/AIDS and other STDs	• The Works Contractor, in collaboration with relevant stakeholders such as the Ga East Municipal Health Directorate, will organize awareness creation and educational programmes for all construction workers and the general public on behavioural changes required to prevent teenage/unwanted pregnancies and the spread of HIV/AIDS and other STDs.	-Records on sensitization of construction workers on irresponsible sexual behavior and STDs. -Public complaints against irresponsible sexual behavior by construction workers. -Health records on pregnancy, HIV/AIDS and other STDs	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ
Child labour and abuse of construction workers	• The Works Contractor will develop a Code of Conduct/Ethics to be vetted and approved by MSWR prior to engagement. This will include transparency with workers, working conditions, not engaging	-Minors hired for construction work -Complaints from construction workers on abuse	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	trafficked persons, etc. • The Works Contractor will thoroughly check the background of any person to be hired to ensure they are of the right age (above 18 years). • The Works Contractor would ensure that there will not be any form of exploitation of workers including forced labour or services, sexual exploitation, prostitution etc.				
Sub-Total 2:					--
Operational Phase					
Nuisance from odour at the University and Haatso community	**<u>Waste Collection and Transfer</u>** • Design and strictly implement a weekly schedule for waste collection from each of the Municipalities. • Utilize only good conditioned trucks (leak-free) for waste collection and transfer. Thoroughly inspect the trucks of any private company/individual registering to provide waste collection/transfer services before granting approval. Regularly inspect trucks and suspend any truck in poor condition. • All open trucks for waste collection should be covered with tarpaulin when transporting waste to the WTS. • Utilize only enclosed trailers for waste transfer. **<u>Operations of the WTS</u>**	-Availability and use of odour control fans/ ventilation system. -Availability and use of misting system with biofilter exhaust. -Records on conditions of trucks -Schedule for waste collection and transfer. -Records on cleaning and disinfection at WTS -Records on washing and disinfection of trucks -Public complaints related to nuisance from odour.	-Operational phase	-EHS Committee, SEMCO and EAs	-4,000 per annum (p.a)

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Practice good housekeeping at the WTS including regular cleaning/ washing and disinfecting of sorting and storage areas, equipment, drains and other surfaces which come into contact with waste. • Regularly wash and disinfect waste collection and transfer trucks. • The organic fraction of the waste will be composted at the composting station. • Residual waste should be regularly collected (daily) from the WTS and transferred to the Kpone landfill or ACARP.				
Surface and groundwater pollution	• Incorporate a drainage system in the design of the WTS for collecting, storing and treating leachate and wastewater from the operations of the WTS. • Design of the WTS will include leachate and wastewater treatment system. • The design of the WTS should gently slope the sorting and storage floors, and the washing area for trucks to channel leachate and wastewater through the drainage system for treatment at the leachate and wastewater treatment system. • All operational areas of the WTS including composting area, sorting area, storage area, washing area for	-Functional drainage system. -Records on leachate treatment and disposal. -Records on maintenance of concrete floor. -Environmental monitoring results (refer to **Table 9-3**)	-Design measures to be incorporated during construction phase -Operational phase	- Design Consultant/ MSWR/ Contractor (to ensure design measures are incorporated during construction) -EHS Committee, SEMCO and EAs	-Part of Contractor's BoQ -2,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	trucks, etc. should be concreted to prevent ground seepages. Regularly inspect and maintain the concrete floor. • Maintain ideal composting condition as recommended by the US EPA (1995). This includes: o Carbon: nitrogen (C:N) ratio between 25:1 and 35:1; o Moisture content of 50 to 60% of total weight during treatment (and less than 50% for marketing following screening); o Balance between particle size and void space to promote rapid decomposition. Void space should be sufficient to achieve a 10 to 15% oxygen level within the pile in aerobic systems; o Optimum temperature levels which can range between 32 and 60 °C. Pathogen destruction can be achieved by attaining and maintaining a temperature of 55 °C for 15 days in a windrow system; and o pH of between 6 and 8.				
Breeding of disease vectors and risk of vector borne diseases	• The WTS should be regularly disinfected, particularly the working areas (sorting floor, storage area, etc.) and the entire facility regularly fumigated. • Practice good housekeeping at the WTS. • Collect and transfer residual waste daily from the WTS	-Observation of rodents and other pests -Records on disinfection and fumigation at the WTS	Operational phase	SEMCO and EAs	2,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	to the Kpone landfill or ACARP. • Regularly wash and disinfect the tipping, sorting and storage areas after the decomposable waste has been collected from the WTS. • Clean and disinfect other potential breeding areas such as drains. The design should slope the drains and washing areas to prevent collection of stagnant water. • The WTS facility should be regularly inspected to seal/screen any openings that will allow rodents and insects into the facility.				
Public nuisance from windblown solid waste, broken down waste collection vehicles and clandestine dumping	• All open waste collection trucks including motorized tricycles and "borla" taxis should be covered with tarpaulin during transport of waste to the WTS. • The WTS should have a vehicle maintenance team equipped with all the necessary logistics to immediately fix any broken down collection/transfer truck on the road. Any truck with a major fault which cannot be fixed immediately should be towed off the road to the WTS for fixing. Alternatively, Management of the WTS should contract a licensed vehicle maintenance company to provide the above services. • Standby trucks should be readily available to offload the waste from broken down trucks where necessary.	-Records of services of vehicle maintenance team -Availability of standby trucks. -Public complaints on windblown solid waste, broken down trucks and clandestine dumping. -Observation and reports on dumping of refuse in unauthorized places (streets, drains, vicinity of WTS, streams, open spaces, etc. -Public awareness/sensitization	Operational phase	Management of the WTS/ SEMCO and EAs	20,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Establish a grievance redress process to address any grievances/ concerns regarding the operation of the WTS and registered waste management operators and made known to the public. • Register all waste management operators, including operators of motorized tricycles and "borla" taxis within GAMA will be registered. • Enforce strict monitoring procedures to strictly monitor the activities of waste management operators in and out of the WTS. • Contact numbers of the WTS should be made known to the public to report all recalcitrant drivers found dumping waste in unauthorized places. • Take punitive measures against any driver found/reported to be have dumped refuse in unauthorized places. Punitive measures should include a life-time ban from engaging in waste management operations. • Consult stakeholders including waste management operators on fees to be charged at the WTS to ensure all parties are in agreement. • MMDAs should provide adequate bins along walkways and in public areas within their jurisdictions and ensure	campaigns against littering and indiscriminate dumping of waste. -Provision of adequate bins along walkways and public areas. -Absence of full and overflowing dustbins along walkways and public areas.			

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	the bins are always emptied on time to avoid spillage into the surrounding environment. • Continuously sensitize the public against irresponsible behavior such as littering and indiscriminate dumping.				
Occupational Health and Safety issues (accidents, injury/ailments to workers)	• Develop and implement an EHS policy for the operations of the WTS. • Develop and implement SoP which should include supervision, monitoring and maintenance of the WTS. • Train all workers at the WTS and all waste management operators on the SoP and EHS policy. Induction should be carried out for all new employees. • Organize continuous training on the SoP, EHS policy and toolbox sessions for staff and waste management operators. • Provide and strictly enforce the use of appropriate PPE including safety boots, nose masks, rubber gloves and coveralls for workers and waste management operators. • Provide first aid kits at the WTS and train supervisors in administering first aid for minor ailments/injuries. Major cases should be referred to the UG Hospital. • Register all staff of the WTS on the National Health Insurance Scheme/any registered private health	-Workers' awareness of EHS policy and SoP -Availability and proper use of PPEs -Availability of first aid kit -Adherence to health and safety procedures -Records on frequency, type and source of accidents -Records on non-compliances -Training and induction records -Health insurance for staff -Health screening/checkup records	Operational phase	EHS Committee, SEMCO and EAs	6,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	insurance scheme and regularly organize health checkup/screening for all staff. • Develop emergency response plan for the operation of the WTS.				
Traffic disruption and risk of road accidents on WTS access roads and along haulage routes	• Prepare and implement a Traffic Management Plan for the operation of the WTS. The Plan must be approved by the Management Team of the WTS prior to implementation. • Engage only drivers/waste management operators with the requisite driving licenses for the project. • All waste collection and transfer trucks should comply with the approved speed limit of 30-50 km/hr within communities along the haulage route. Take punitive actions against any driver found to be non-compliant. • Train all drivers on road safety regulations and defensive driving. • Extend the vehicle maintenance services (as explained above) to all waste collection/ transfer operators (mandatory) registered to operate at the WTS at a fee to ensure broken down trucks are quickly moved off the road. • Use appropriate warning signs around broken down vehicles on the road to warn other road users prior to	-Traffic Management Plan prepared. -Absence of unauthorized persons at the WTS -Records on frequency and type of incident/accidents involving public at the WTS and from operations of waste collection and transfer trucks. -Training records for drivers on road safety regulations and defensive driving. -Availability of valid driving licenses for all drivers and waste management operators. -Use of warning signs (triangles) around broken down trucks on roads. -Records of public	Operational phase	Management of the WTS/EHS Committee, SEMCO and EAs	5,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	be being fixed/towed off the road. • Design the WTS to have a large parking area to accommodate waste collection, transfer and reserve transfer trucks. • Prohibit queuing/waiting of incoming waste collection trucks on public streets. In the event of temporary congestion at the WTS, waste collection trucks should be directed to park at a designated temporary waiting area to be determined by the management of the WTS. • Identify alternative approved landfill sites and recycling companies where residual waste can be transported to in the event of a closure or inability of the Kpone landfill or ACARP to accept waste from the WTS.	complaints/grievances relating to public safety and traffic issues			
Sanitation and public health issues (unsightly conditions, cholera infestation) in communities around project site	• Utilize/approve only good conditioned trucks which are leak-free for collection and transfer of waste. Regularly inspect trucks and anyone found with holes/openings in the bucket should be suspended until it is fixed. • All open waste collection trucks including motorized tricycles and "borla" taxis should be covered with tarpaulin to prevent wind-blown garbage during transport of waste to the WTS. • Draw a weekly schedule for waste collection from each of the Municipalities and strictly follow it to ensure	-Condition of waste collection and transfer trucks -Vehicle inspection records -Use of tarpaulin to cover open waste collection trucks -Schedule for waste collection -Records of public complaints/grievances	Operational phase	Management of the WTS/EHS Committee, SEMCO and EAs/ MEHOs in GEMA and other MMAs	-As part of job functions of Management of the WTS/EHS Committee, SEMCO and EAs/ MEHOs in GEMA and other MMAs

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	regular waste collection from households and communal containers. • GEMA and other MMAs in GAMA should strictly enforce their bye-laws on waste management to ensure proper organization of waste collection in the Municipalities.	related to sanitation and public health issues			
Disease outbreak in the WTS neighbouring communities/ facilities	• Strictly implement the mitigation measures described above for preventing/minimizing breeding of disease vectors in and around the WTS. • Regularly inspect/monitor the WTS environment to ensure proper housekeeping.	-Observation of rodents and other pests. -Records on disinfection and fumigation at the WTS -Public complaints on disease outbreak	Operational phase	SEMCO and EAs	As part of duties of SEMCO and EAs
Risk of fire at WTS from combustible waste	• Develop and implement a Fire Management Program which should include: - Training on fire prevention, firefighting and rescue; - Fire drills; and - Emergency response plan; etc. • Obtain a fire permit from the Ghana National Fire Service for the WTS which should be renewed annually. • Install firefighting equipment such as fire hydrants, sprinkler systems and fire extinguishers at vantage points at the WTS. • Install automatic fire and smoke detection equipment at the WTS including the offices.	-Installation of smoke detectors, fire alarms, sprinkler system, fire hydrant and fire extinguishers at the WTS including offices. -Availability of fire extinguishers at vantage points at the WTS -Availability of Emergency Assembly Points and emergency contact numbers at vantage points. -Records on servicing of	-Design measures to be incorporated during construction -Operational phase	- Design Consultant/ MSWR/ Contractor (to ensure design measures are incorporated during construction) -Management of the WTS/EHS Committee, SEMCO and EAs	-Part of Contractor's BoQ -10,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Demarcate an Emergency Assembly Point at the WTS. • Collaborate with the University of Ghana and Abokobi Fire Service to develop training programs for workers at the facility. • Conduct regular emergency drills for workers to always prepare them for an emergency. • Visibly display emergency contact numbers of the University of Ghana and Abokobi Fire Service, and the National Disaster Management Organization (NADMO) at the WTS.	firefighting equipment. -Records of training on fire and explosion prevention and control. -Records on fire and explosion incidents/accidents and investigation reports.			
Hiring of minors and abuse of workers at the WTS	• Develop a Code of Conduct/Ethics to be vetted and approved by MSWR prior to engagement. This will include transparency with workers, working conditions, not engaging minors, etc. • Adhere to all applicable policies and laws including the Labour Law, Children's Act, Persons with Disability Act, Human Trafficking Act and Gender Policy. • Thoroughly check the background of any person to be hired to ensure they are of the right age (above 18 years). • Ensure that there is no form of exploitation of workers including forced labour or services, sexual exploitation, physical abuse, etc.	-Minors hired at WTS -Complaints from WTS workers on abuse	Operational phase	-Management of the WTS/EHS Committee, SEMCO and EAs	As part of duties of Management of WTS/ SEMCO and EAs

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Establish a grievance redress process for WTS workers and waste management operators to address their grievances/ concerns.				
Environmental, health and safety measures at final disposal sites	• Environmental and social audit of the Kpone landfill was conducted and measures to improve and expand its operation will be supported by the project. • Environmental, health and safety management and monitoring measures should be in accordance with the EPA's directives in the environmental permit. This should also include environmental reporting to EPA. • Leachate and groundwater monitoring should be conducted at Kpone landfill according to the Ghana Landfills Guidelines Requirements as follows: o Weekly measurements on site of leachate flow, pH, temperature and conductivity and monthly analysis of leachate samples for chemical oxygen demand (COD), chloride, ammoniacal nitrogen, cyanide and heavy metals; and o Monthly analysis of groundwater for pH, conductivity, COD, chloride, ammoniacal nitrogen, cyanide and heavy metal. • Management of Kpone landfill and ACARP should continue to provide adequate PPE for workers and use	-Environmental management, monitoring and reporting in accordance to environmental permit. -Leachate and groundwater monitoring reporting at Kpone landfill according to Ghana Landfills Guidelines Requirements. -Provision and use of appropriate PPE. -24-hour water supply at Kpone landfill. -Functional fire hydrant and serviced fire extinguishers at Kpone landfill. -Fencing restored around entire Kpone landfill site and around leachate ponds. -Demarcated emergency assembly point.	Operational phase	MSWR/ GARID Project Coordinating Unit/ Waste Landfills Company Ltd/ ACARP	-To be incorporated into WTS project implementation cost. -Environmental management, monitoring and reporting measures are part of responsibilities of Waste Landfills Co. Ltd and ACARP

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	strictly enforced. • The following specific environmental, health and safety measures should be implemented at the Kpone landfill: o Provision of 24-hour water supply; o Fire hydrants and extinguishers should be serviced; o Improve security fencing around the entire facility and around the leachate points; o Replace damaged and illegible warning/caution signs; and o Provide/demarcate emergency assembly point. • Construct two (2) additional cells at Kpone landfill to accommodate residual wastes from the WTS. • Implement the recommended improvements of the Kpone landfill operation based on the 2015 audit report and the ongoing audit of the Kpone landfill.	-Availability of legible warning/caution signs. -Two (2) additional cells constructed at Kpone landfill. -Recommendations in 2015 audit report of Kpone landfill implemented.			
Sub-Total 3:					***49,000 p.a***
GRAND TOTAL (Sub-Total 1 + Sub-Total 2 + Sub-Total 3):					**49,000 p.a**

Environmental Monitoring Plan

No.	Environmental Media/ Compliance Measure	Monitoring Parameters/ Indicators	Measurements/ Methodology	Frequency/ Period	Responsibility	Budget (GH₵)
Operational Phase						
1.	Effluent/wastewater	Refer to **Annex 8** for National Effluent Quality Guidelines for Discharge into Natural Water Bodies (includes parameters to monitor).	-Effluent/ wastewater sampling and laboratory analysis	-Monitor monthly/ quarterly or as specified by EPA in permit schedule	SEMCO and EAs	12,000 per annum (p.a)
2.	Surface and groundwater	Refer to **Annex 8** for National Effluent Quality Guidelines for Discharge into Natural Water Bodies (includes parameters to monitor).	-Surface and groundwater sampling and laboratory analysis	-Establish comprehensive baseline water quality data by carrying out surface water and groundwater sampling at onset of operations to compliment baseline water quality information in this ESIA. Refer to **Annex 8** for parameters. -Subsequently, Monitor monthly/ quarterly or as specified by EPA in permit schedule.	SEMCO and EAs	-20,000 p.a
3.	Environmental compliance	-Annual environmental, health and safety audits -Quarterly returns of Monitoring Reports to EPA (in line with LI 1652) -Preparation of Annual Environmental Reports (in line with LI 1652) -Preparation of Environmental and Social Management Plan (in line with LI 1652)	Analysis of monitoring reports/ Environmental Assessment Regulations, LI 1652	Quarterly/ Annually	SEMCO and EAs	As part of duties of SEMCO and EAs
TOTAL:						**32,000 p.a**

Grievance Redress Mechanism

Construction Phase Grievance Redress Process

Registration of complaints

Complaints can be lodged verbally or in writing or through phone calls to the Municipal Environmental Health Officer (MEHO) of GEMA or Assembly member. The elected local Assembly member is eligible to receive complaints and ensure that such complaints reach the MEHO at the Assembly. The MEHO shall receive all complaints and officially log the complaints in a log book. The MEHO will inform the Team Leader for the Grievance Redress Committee within 24 hours on any complaint received**.**

Determining and implementing the redress action

When a grievance/dispute is recorded as per above-mentioned registration procedures, the grievance redress team will be called into action, and mediation meetings will be organized with interested parties. Minutes of meetings will be recorded.

The grievance redress team will determine the redress action in consultation with the complainant if necessary. The proposed redress action and the timeframe in which it is to be implemented will be discussed within 3 working days of receipt of the grievance. The grievance issue will be resolved within 5 working days of receipt of complaints.

Verifying the redress action

The grievance redress team will contact the complainant to confirm that the redress action is carried out. If the complainant is not satisfied with the outcome of the redress action, additional steps will be taken to resolve the issue or reach an amicable agreement. Verification will be completed within 7 days of the execution of the redress action.

Monitoring and Evaluation

The GARID Project Office will monitor the activities of the Grievance Redress Team to ensure that complaints and grievances lodged by complainants are followed-up and resolved amicably as much as possible during the construction period. The GEMA will take up this activity when the project is completed and handed over to the Municipal Assembly to operate.

Additional Steps and Court of Law

If the complainant is not satisfied with the decision of the grievance redress team, he/she can bring it to the attention of the Director for EHSD at MSWR or the GARID Project Coordinator will inform the Director for EHSD about the unresolved grievance. The Director will mediate on the issue within 5 days from the date of receipt of the issue at the Ministry. If such a timeline is not possible, the Director should inform the GARID Project Office accordingly giving reasons and possible new date.

If the complainant remains dissatisfied with the mediation effort of the MSWR, the complainant has the option to pursue appropriate recourse via judicial process in Ghana. The Constitution allows any aggrieved person the right of access to Court of law. However, noting that court cases can be cumbersome and time consuming, all effort must be made to reach amicable settlement with the affected person(s).

Operational Phase Grievance Redress Process

During the operational phase of the project, the SEMCO of the WTS will be officially responsible for receiving grievances on the operations of the WTS and all registered waste management operators. The

grievances may be channeled to him/her directly through face-to-face communication, phone calls, letters, e-mail, text messages, etc. Aggrieved individuals or community members may also submit their complaints/concerns to their respective Assemblymen, the EHSU at GEMA or at the Client Service/Front Desk of GEMA which will be channeled to the SEMCO for redress.

All grievances, presented in writing or verbally, will be logged by the SEMCO by filling a grievance redress form. It will be ensured that each complaint has an individual reference number and is appropriately tracked and recorded actions are completed.

There will be a log book for keeping records of all grievances received and copies of the records kept with all the relevant authorities. A review of grievances will be conducted at least every three months during implementation in order to detect and correct systemic problems. The log book should take into account the following: date the complaint was reported; date on which the grievance form was submitted to the grievance committee, date information on proposed corrective action was sent to complainant (if appropriate); the date the complaint was closed out and the date response was sent to complainant.

Redress decision, feedback and implementation

The Grievance Redress Committee (see composition below) will make a decision on all matters received, in consultation with the complainant, if necessary, in not more than two working days. The agreed redress action should be implemented within an agreed timeframe of not more than five days, depending on the nature of the complaint.

If field verification is required, the redress committee, in the company of the complainant, will visit the complaint area to verify that satisfactory redress action is carried out. When the complainant is satisfied with the redress action, the complaint will be closed and logged in the grievance log book and endorsed by the complainant.

Dissatisfaction and alternative action

1. If no understanding or amicable solution is reached, or the affected person does not receive a response from the redress committee within 5 working days, the affected person may appeal to the MEHO of GEMA. Grievances involving community members will be resolved in consultation with the community leadership and complainant, as necessary.
2. If the grievance remains unresolved, the affected person can appeal to the Municipal Chief Executive of GEMA who, in consultation with the grievance redress committee, should act on the complaint/grievance within 5 working days of its filing.
3. If a resolution is not reached from the first three steps, the complainant may appeal to the Director for EHSD at the MSWR. Subsequently, the complainant may seek legal action for redress. However, noting that court cases can be cumbersome and time consuming, it is of high opinion that Court cases should be the last 'resort' and all effort must be made to reach amicable settlement at the very early stages of complaints by affected persons.

Monitoring and Evaluation

Monitoring and evaluation activities will be conducted by the GEMA to ensure complaints and grievances lodged by the affected persons are followed-up and amicably resolved.

Institutional Arrangement

Institution	Responsibility	Phase of Implementation
GARID Project Coordinating Unit (PCU)/ MSWR	-Overall responsibility for the design and implementation of the WTS project. -Enter into contract with Consultants including the ESIA Consultant and Design Consultant. -Lead the land acquisition process with the University of Ghana. -Ensure all design measures proposed in the ESIA are incorporated in the project design and implemented. -Ensure all necessary environmental reports, permits and approvals such as ESIA, environmental permits, etc. are prepared/ obtained for the project. - Ensure that all measures during preparatory phase are addressed by the PCU and design consultants. - Ensure that all measures related to construction of the WTS are included in the bidding documents; - Ensure that all measures for O & M of the WTS are included in the contract with the Private Operator of the WTS. - GARID PCU will hire Environmental Specialist and Social Development Specialist.	Project lifespan (design and implementation)
Civil Works Contractor	-Ensure all environmental and social management measures in the project designs and ESIA are implemented during construction. -Responsible for environmental and social management of the project during construction. -Responsible for health and safety and welfare of workers and communities during construction.	Construction phase
Supervising Engineer	-Responsible for the overall supervision of construction works and conduct of the contractor. -Ensure environmental and social management considerations in the project design are implemented during construction.	Construction Phase
Contracted Company to operate the WTS	-Responsible for the operations of the WTS. -Overall responsibility for environmental and social management of the operations of the WTS. -Manage and supervise the operations/activities of waste collection companies for the WTS.	Operations phase
GEMA	-Collaborate and partner with the MSWR/GARID Project Coordinating Unit and IESS/UG in the design and management of the WTS. -Play role in grievance resolution.	Entire project duration
IESS/UG	-Partner with the MSWR/GARID Project Coordinating Unit and GEMA in the design and management of the WTS.	Entire project duration

Environmental and Social Management Budget

No.	Programme	Cost/year (GH₵)
1.	Implementation of mitigation and enhancement measures (refer to **Table 9-2**)	49,000
2.	Environmental monitoring (refer to **Table 9-3**)	32,000
3.	Environmental, Health and Safety Training/Capacity Requirement (**Table 10-2**)	25,000
4.	Implementation of the operator ESMS (annual budget line)	30,000
5.	Environmental Auditing and Reporting • Annual environmental, health and safety audits • Returns of Monitoring Reports to EPA (in line with LI 1652) • Preparation of Annual Environmental Reports (in line with LI 1652) • Preparation of Environmental and Social Management Plan (in line with LI 1652)	25,000
6.	Grievance Redress Management and Stakeholder Meetings	4,000
Total		**165,000.00**

Conclusion

The MSWR and GEMA are committed to ensuring sustainable environmental management and safeguarding the health and safety of workers as well as the general public in the construction and operation of the WTS at West Legon. MSWR and GEMA are also committed to ensuring that the construction and operation of the WTS complies with good international industry practice in environment and social sustainability as well as national environmental laws and regulations of Ghana.

In keeping with these laws as well as from consultations with stakeholders, review of relevant literature, field inspections, data collection, studies and evaluation, this ESIA report has identified and assessed key environmental, social, health and safety risks, impacts and concerns that may arise from the construction and operation of the WTS at West Legon and has proposed mitigation and environmental monitoring measures to address them.

The construction phase material measures and E&S clauses will be included in the bidding document for the WTS project prior to its advertisement. This ESIA will serve as a guide to the Works Contractor to develop a Health and Safety Plan and Waste Management Plan for review and approval by MSWR prior to commencement of works. The private operator of the WTS will also develop and implement an Environmental and Social Management System.

1.0 INTRODUCTION

1.1 Background

The Government of Ghana has applied for IBRD/IDA credit facility from the World Bank towards the cost of implementation of the Greater Accra Resilient and Integrated Development (GARID) Project which will provide both structural works and non-structural services towards improving flood and solid waste management in the Greater Accra Metropolitan Area (GAMA) and to deal with climate change.

The proposed project is structured into four main components comprising:

Component 1: Drainage and flood management improvements within the Odaw Drainage Basin
Component 2: Improvements in solid waste management capacity including minimizing solid waste in waterways
Component 3: Support to most vulnerable communities within the Odaw Drainage Basin to reduce their vulnerability and improve living conditions.
Component 4: Strengthening capacity for planning, coordination, monitoring and evaluation.

As part of Component 1 of the Project, the Government of Ghana through the Ministry of Sanitation and Water Resources (MSWR) intends to apply part of the GARID Project funds for construction of a Waste Transfer Station (WTS) to be situated at West Legon in Ga East Municipal Assembly for proper and efficient management of solid waste in the GAMA. The Transfer Stations will be used to receive domestic and commercial waste from neighborhoods within GAMA for onward transportation to final disposal sites; and will also serve as sorting points for recyclable materials for processing and/or reuse.

Solid waste collection and transfer in the GAMA is saddled with many challenges that hamper efficient and timely evacuation of solid waste from points of generation. Some of the challenges are long distances from the generation point to final dumping sites resulting in high haulage cost and operational difficulties due to heavy daytime vehicular traffic.

The direct haulage of waste generated in the Accra Metropolitan Area is uneconomical for travel distance in excess of 17.7 km and 25.9 km for the skip trucks and compaction trucks respectively (AMA, 2013). The increased travel distance is a disincentive to some of the smaller waste collection vehicle operators who dump their contents at unauthorized places. The proposed transfer stations, when constructed in the GAMA, will serve (i) to receive domestic and commercial waste from neighborhoods within GAMA for onward transportation to final disposal sites; and (ii) as sorting points for recyclable materials for processing and/or reuse.

In line with Ghana's Environmental Assessment Regulations LI 1652, 1999, the proposed construction of waste transfer station at West Legon falls in the category of undertakings for which an Environmental Impact Assessment (EIA) is required to help understand the likely implications, alternatives and mitigations to consider, to ensure sound decision-making, and sustainable development of the subprojects, and to obtain the EPA Environmental Permit for the works. The West Legon WTS Project also triggered the World Bank Safeguards policies: Environmental Assessment Policy OP 4.01; Natural Habitats OP 4.04; Physical Cultural Resources OP 4.11 and Involuntary Resettlement OP 4.12, requiring that the conduct and procedures for the Environmental and Social Impact Assessment (ESIA) study conformed to these Policies.

The MSWR has registered the proposed construction and operation of the WTS at West Legon with the Environmental Protection Agency (EPA) in accordance with the Ghana Environmental Assessment Regulations 1999, LI 1652. Scoping for EIA/ESIA study was carried out as per the provisions of the LI 1652 which generated a scoping report and the relevant Terms of Reference (TOR) to guide a satisfactory conduct of the ESIA study.

This ESIA report is prepared by an independent consultant to guide the planning, construction, operation and maintenance of the WTS in West Legon, and to support the implementation of a good environmental and social programme for the project.

1.2 Purpose/Aim of the ESIA Study

The purpose of the ESIA study is to identify potential environmental, social, health and safety risks and impacts of the proposed WTS project at West Legon and to recommend adequate and appropriate mitigation and monitoring measures to avoid and/or minimize these risks and impacts during construction and operation of the WTS. The ESIA study is also to assist in decision making as to the siting of the project, nature and type of design, and whether to proceed with the WTS project or not based on identified potential environmental, social, health and safety considerations.

The study satisfies both legal and institutional obligations specified under Environmental Protection Agency Act 1994 (Act 490) and Environmental Assessment Regulations 1999 (LI 1652), as well as satisfy the World Bank's environmental and social safeguards policies.

1.3 Scope of Work for the ESIA Study

The scope of work for the ESIA study is to among other things achieve the following:

- provide technical description of the proposed project and identify all activities of environmental/social concern;
- establish the existing environmental and socio-economic baseline conditions of the project area of influence;
- predict and examine all the significant environmental and social impacts on the surrounding communities and the general environment during implementation of the proposed project and advise on appropriate mitigation and abatement measures against potential adverse impacts;
- provide a monitoring programme for predicted impacts in a Provisional Environmental and Social Management Plan (PESMP) framework;
- outline the roles and responsibilities of stakeholders in ensuring the implementation and motoring of the mitigation measures; and
- document the socio-economic and cultural advantages and disadvantages associated with the proposed project for stakeholders and interested groups to make an informed decision on the level of environmental compromise.

1.4 Approach/Methodology for the ESIA Study

The approach and methodology for the ESIA study involved:

- Site inspection and field work;
- Stakeholder identification and consultations;

- Desktop study and document/literature review;
- Data analysis;
- Identification and assessment of environmental and social impacts;
- Development of mitigation and monitoring measures.; and
- Reporting.

1.4.1 Site Inspection and field work

The West Legon site (GPS coordinates: N 5.662935°; W 0.190384°) was inspected on 14th June, 2018 in the company of officials from Ga East Municipal Assembly (GEMA). The general area to locate the facility was identified near the University of Ghana sewage treatment ponds. The consultant obtained a good appreciation of the project area of influence, the nature of biophysical environment to be affected, the relevant baseline data to be obtained and the socio-economic characteristics of the area to be impacted by the project. Photographs were taken of the proposed project landscape.

Field work for the preparation of the ESIA included air quality assessment, noise level monitoring and water quality assessment which were carried out between July and September 2018. Field visits were also carried out between September and October 2018 to assess the operations and environmental and social conditions at the Kpone landfill site and the Accra Compost and Recycling Plant.

1.4.2 Stakeholder Identification and Consultations

Key stakeholders of the project have been identified for consultation to obtain their comments and concerns on the proposed project with respect to the potential environmental and socio-economic issues and impacts that may arise from the project. This includes the University of Ghana (landowner), relevant government institutions and regulatory bodies, the project engineers and beneficiaries, and local political authorities. Details of the stakeholders identified for consultation are provided in **Chapter 6.**

1.4.3 Desktop Study and Document/Literature Review

Extensive desktop study and document/literature reviews were carried out as part of the ESIA study. The major reports reviewed include available project documents, related Environmental Impact Statements (EIS), as well as Government of Ghana (GoG), World Bank and IFC reference documents as follows:

- Project documents
  - Project scope and description captured in the Terms of Reference (ToR);
  - Preliminary layout for the proposed Waste Transfer Station; and
  - Concept note on collaboration between University of Ghana, Ministry of Sanitation and Water Resources and Ga East Municipal Assembly.
- Other related documents
  - Emergency Solid Waste Management Improvement Programme (E-SWMIP) (2015) – Report on alleviating impacts within the built environment by securing sustainable solid waste haulage and disposal;
  - Draft proposal for inclusion of Waste Management Departments (WMDs) in Metropolitan and Municipal Assemblies (MMAs) in GAMA;

- Draft Situational Assessment Report – Consultancy Services for Preparation of Integrated Urban Environmental Sanitation Master Plan and Preliminary Engineering Designs of Proposed Prioritized Interventions for Immediate Implementation for the Greater Accra Metropolitan Area. Volume 1 – Main Report; and
- 2015 Technical Audit Report of the Operations and Maintenance (O&M) Management of the Kpone Landfill – Final Report.

- Safeguards framework documents
  - ESMF for the Greater Accra Resilience and Integrated Development (GARID) Project; and
  - RPF for the Greater Accra Resilience and Integrated Development (GARID) Project.
- GoG and World Bank Reference Documents
  - Ghana EIA Procedures;
  - Environmental, Health and Safety Regulations of Ghana;
  - World Bank's Safeguards Policies;
  - World Bank Group's General Environmental, Health, and Safety Guidelines;
  - World Bank Group Industry Sector Guidelines for Waste Management Facilities.

1.4.4 Data Analysis and Reporting

The relevant data and information obtained from the desktop study/literature reviews and field visits were collated, analysed where necessary and have been presented in this draft ESIA report. The major headings of the report are:

- Non-technical executive summary
- Introduction
- Policy, legislative and administrative requirements
- Description of proposed project
- Analysis/consideration of alternatives
- Description of existing environment/baseline
- Stakeholder consultation
- Impacts identification and significance
- Mitigation and enhancement measures
- Environmental and social management plan
- Institutional arrangement
- Environmental and social management budget
- Decommissioning
- Conclusion
- Bibliography

2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

There are policies and legislations that govern and regulate projects that may have potential impacts on the environment. These may be national and sector policies; national legal framework and assembly bye-laws; national guidelines; as well as international policies and guidelines. The various policy and legal framework are formulated to provide the vision for the management of the environment in a sustainable way to benefit the nation with respect to the use of national resources and the safety of the populations and the environment.

2.1 Policy Framework

The National Environment Policy (2013)

The Ghana National Environmental Policy was formulated in 1995 and revised in 2013. The ultimate aim of the National Environmental Policy of Ghana is to improve the surroundings, living conditions and the quality of life of the entire citizenry, both present and future. It seeks to promote sustainable development through ensuring a balance between economic development and natural resource conservation. The policy thus makes a high quality environment a key element supporting the country's economic and social development.

The National Environmental Sanitation Policy dated April 2010

The revised Environmental Sanitation Policy seeks to refocus the priorities of the sector, so it is forward looking and effectively embraces the challenges of changing life-styles associated with modernization and improving wealth status. The policy lays the basis for developing a systematic approach and framework for identifying and harnessing resources for value-for-money (economy, effectiveness and efficiency) services to all.

The Community Water Supply and Sanitation Programme (1994)

The Government has adopted a national water supply and sanitation programme to rationalize the water sector to promote and improve the delivery of water services in terms of economy, efficiency, effectiveness and satisfaction. The long term goals of the programme are generally directed at covering the entire country with potable water and adequate sewage disposal system by the year 2020 with emphasis on payment of adequate tariffs by consumers to ensure full cost recovery and to provide revenue for operations and maintenance and replacement of systems.

National Health Policy (2007)

The National Health Policy document, which aims at creating wealth through health, among other things places emphasis on improvements in personal hygiene, immunization of mothers and children. The National Health Policy also argues that a healthy population could only be achieved if there were improvements in environmental hygiene and sanitation, proper housing and town planning, provision of safe water, safe food and nutrition and encouragement of regular physical exercise.

2.2 Legal Framework

The Constitution of the Republic of Ghana (1992)

The Constitution includes some provisions to protect the right of individuals to private property, and also sets principles under which citizens may be deprived of their property in the public interest (described in Articles 18 and 20). Article 18 provides that "…Every person has the right to own property either alone or in association with others."

In Article 20, the Constitution describes the circumstances under which compulsory acquisition of immovable properties in the public interest can be done:

"No property of any description, or interest in, or right over any property shall be compulsorily taken possession of or acquired by the State unless the following conditions are satisfied:

- The taking of possession or acquisition is necessary in the interest of defence, public safety, public order, public morality, public health, town and country planning or the development or utilization of property in such a manner as to promote the public benefit; and
- The necessity for the acquisition is clearly stated and is such as to provide reasonable justification for causing any hardship that may result to any person who has an interest in or right over the property."

Article 20 of the Constitution provides further conditions under which compulsory acquisition may take place: no property "shall be compulsorily taken possession of or acquired by the State" unless it is, amongst other purposes, "to promote the public benefit (Clause 1).

Article 36, clause 9 indicates that "The State shall take appropriate measures needed to protect and safeguard the national environment for posterity'' and clause 10 states that "The State shall safeguard the health, safety and welfare of all persons in employment".

Ghana Investment Promotion Centre Act 1994, Act 478

The Ghana Investment Promotion Centre Act 1994 (Act 478) requires that every investor wishing to invest in the country must in its appraisal of proposed investment projects or enterprises, "…have regard to any effect the enterprise is likely to have on the environment and measures proposed for the prevention and control of any harmful effects to the environment...".

Environmental Protection Agency Act 1994, Act 490

The Environmental Protection Agency Act 1994 (Act 490) gave mandate to the Agency to ensure compliance of all investments and undertakings with laid down environmental assessment procedures in the planning and execution of development projects, including compliance in respect of existing ones.

Environmental Assessment Regulations 1999, LI 1652

The Environmental Assessment Regulations 1999 (LI 1652) enjoins any proponent or person to register an undertaking with the Agency and obtain an Environmental Permit prior to commencement of the project.

Fees and Charges (Amendment) Instrument 2015 (LI 2228)

The Fees and Charges (Amendment) Instrument 2015 (L.I. 2228) gives regulation to the fees and charges (Miscellaneous Provision) Act 2009, Act 793. The law provides a comprehensive rates, fees and charges collectable by Ministries, Department and Agencies (MDAs) for goods and services delivered to the public.

Water Resources Commission Act 1996, Act 522

The Water Resources Commission Act 1996 (Act 522) establishes and mandates the Water Resources Commission as the sole agent responsible for the regulation and management and the ummarized of water resources and for the co-ordination of any policy in relation to them. The Act states under Section 24 that any person who pollutes or fouls a water resource beyond the level that the EPA may prescribe, commits an offence and is liable on conviction to a fine or a term of imprisonment or both.

Local Governance Act, 2016 Act 936

This Act replaces the Local Government Act 462. It establishes and regulates the local government system and gives authority to the RCC and the District Assembly to exercise political and administrative power in the Regions and District, provide guidance, give direction to, and supervise all other administrative authorities in the regions and district respectively. The Assembly is mandated to initiate programmes for the development of basic infrastructure and provide municipal works and services as well as be responsible for the development, improvement and management of human settlements and the environment in the district. A District Assembly shall in the performance of its functions establish the departments specified in the First Schedule, which includes the Urban Roads and Physical Planning Departments, in relation to that Assembly.

The State Lands Act, 1963 (Act 125)

The Act 125 vests the authority to acquire land for the public interest in the President of the Republic. It also gives responsibility for registering a claim on the affected person or group of persons, and provides details of the procedure to do this. The State Lands Act, 1962 provides some details to be taken into consideration when calculating compensation such as definitions for (1) cost of disturbance, (2) market value, (3) replacement value, and so on.

Lands Commission Act, 2008 (Act 767)

This Act provides for the management of public lands and other lands and for related matters. The Commission manages public lands and any other lands vested in the President by the Constitution or by any other enactment or the lands vested in the Commission. The Act advises the Government, local authorities and traditional authorities on the policy framework for the development of particular areas to ensure that the development of individual pieces of land is coordinated with the relevant development plan for the area concerned.

The Minister may, with the approval of the President, give general directions in writing to the Commission on matters of policy in respect of the management of public lands. The Commission has the following divisions:

- Survey and Mapping;
- Land Registration;

- Land Valuation; and
- Public and Vested Lands Management.

The Labour Act, 2003 (Act 651)

Section 118(1) of the Labour Act 2003 (Act 651) stipulates that it is the duty of an employer to ensure that every worker employed works under satisfactory, safe and healthy conditions. Act 651 contains a number of specific provisions relating to an employer's duty to its workers. These include providing and maintaining "*at the workplace, plant and system of work that are safe and without risk to health*" and taking "*steps to prevent contamination of the workplaces by, and protect the workers from, toxic gases, noxious substances, vapours, dust, fumes, mists and other substances or materials likely to cause risk to safety or health*". A worker is required to report situations that he believes may pose "an imminent and serious danger to his or her life, safety or health".

Workmen's Compensation Law, 1987, PNDCL 187

It is to provide for the payment of compensation to workmen for personal injuries caused by accidents arising out and in the course of their employment. The tenets of the law places a large share of the burden of supporting workers injured at the workplace on the shoulders of the employers.

The Fire Precaution (Premises) Regulations 2003, LI 1724

The Fire Precaution (Premises) Regulations 2003 (LI 1724) requires all premises intended for use as workplaces to have Fire Certificates.

Factories, Offices and Shops Act 1970, Act 328

The Factories, Offices and Shops Act of 1970 (Act 328), as amended by the Factories Offices and Shops (Amendment) Law 1983 PNDCL 66, the Factories Offices and Shops (Amendment) Law 1991 PNDCL 275 s.1 (a), and the Ghana National Fire Service Act, 1997 (Act 537) requires all proponents to register every factory/workplace with the Chief Inspector of Factories Inspectorate Division. The Act makes requires all factories, offices and shops to among others, notify the Chief Inspector of accidents, dangerous occurrences and industrial diseases, post in a prominent position in every factory the prescribed abstract of the act and other notices and documentations, as well as outlines the regulations to safeguard the health and safety of workers. The Act compliments the provisions made in the Factories (Dock Safety) Regulations 1960, LI 86.

2.3 Ga East Municipal Assembly Bye-Laws

Ga East Municipal Assembly (Environmental Sanitation) Bye-Laws, 2016

The bye-law provides for disposal of refuse and removal of weeds and rubbish. Schedule 1 (1) states that "no person shall place, cause or permit to be placed any carrion, filth, refuse or rubbish or any offensive or unwholesome matter, on any street, yard, premises, enclosure or open space within the Municipality". Schedule 2 (1) indicates that the occupier(s) of any premises shall clear and keep free from all dirt, under bush, under-wood, weeds, high grass, rubbish, rags, broken bottles and all offensive matter (filling up holes with stones, gravel, or other like materials) on the streets or roads at the front, back sides, drains, gutters and channels.

Ga East Municipal Assembly (Solid Waste Management) Bye-Laws, 2016

The bye-law states that GEMA has interest in the management of all waste within the municipality. The Assembly's registered agents or contractors shall be exclusively responsible for the management of solid wastes within the entire area of the Ga East Municipal Assembly administration. Households, industries, offices and any other premises shall make their solid waste available to GEMA or its authorized agents or contractors for appropriate handling. The solid waste shall be collected, treated and disposed of at designated sites by only GEMA or its agents or contractors.

The disposal of all types of waste at any treatment and/or disposal site owned by GEMA or its authorized agent shall attract a charge which may be included in any charge payable for the removal of the waste or charged separately by the operator at the plant site or by special arrangements. The Assembly shall monitor and control all activities of service providers. Service providers are required to collect waste in their respective catchment areas at least twice a week.

Ga East Municipal Assembly (Collection and Disposal of Wastes) Bye-Laws, 2016

This bye-law states that the Ga East Municipal Assembly is the sole authority responsible for the collection and disposal of waste as per functions of GEMA defined in Act 936 Act 2016, Establishment Instrument of the GEMA, and the Public Health Law Statutes of 1975. GEMA reserves the right to license (or revoke licenses) its agents or contractors to provide the same service as the GEMA may direct. Licensed agents and contractors (private operators) of GEMA shall cause all vehicles and equipment for the collection (and transport) of waste to be inspected for make, condition and age and shall be issued a certificate of inspection by the appropriate authorizing officer of GEMA. GEMA shall ensure that adequate arrangements are made by the Assembly (and/or its agents) for the purpose of disposal of all waste collected within its service area.

Ga East Municipal Assembly (Abatement of Litter) Bye-Laws, 2016

According to this bye-law, no person shall place, deposit, throw or sweep from any shop, vehicle or premises litter (including paper, plastics, bottles, sharp substances, orange peel, banana skin or the skin of any fruit or the leaves or refuse of any vegetable) in any street, park, recreation ground or other public or open space to which the public has access, or in any ditch, water course, gutter or drain, other than a receptacle or place provided by the Assembly for that purpose.

The bye-law also stipulates that a person who conveys any filth, dust, ashes, refuse or litter or a noxious or offensive matter or liquid must operate a vehicle that has body of adequate size and construction for the type of waste being collected. The person shall cover the receptacle with a net, tarpaulin or a suitable material to prevent the litter from falling into or upon the street or any drain or gutter and where necessary use a cart or other suitable vehicle or receptacle properly and sufficiently covered.

2.4 Institutional Framework

Ministry of Sanitation and Water Resources (MSWR)

MSWR is a new ministry created by the government to be responsible for the water and sanitation sub-sectors. It was created out of the previous Ministry of Water Resources, Works & Housing and Ministry of Local Government & Rural Development to give focus to the water and sanitation sub-sectors. The Environmental Health and Sanitation Directorate (EHSD) of MSWR has oversight responsibility for sanitation. The Ministry has developed and is currently implementing a National Environmental

Sanitation Policy and an accompanying plan, the National Environmental Sanitation Strategy and Action Plan (NESSAP) and Strategic Environmental Sanitation Investment Plan (SESIP). The Ministry has a Project Coordinating Unit (PCU) which is coordinating the GARID project.

Ministry of Local Government and Rural Development

The Ministry of Local Government and Rural Development (MLGRD) exists to promote the establishment and development of a vibrant and well-resourced decentralized system of local government for the people of Ghana to ensure good governance and balanced rural based development.

Metropolitan, Municipal and District Assemblies

Metropolitan, Municipal and District Assemblies (MMDAs) are responsible for the provision of waste management and sanitation services within their respective areas of jurisdiction, including the planning and implementation of projects where necessary. They serve as the planning authority responsible for the overall development of their areas of jurisdiction. The proposed construction of the WTS at West Legon is within the jurisdiction of Ga East Municipal Assembly (GEMA) and will be operated by GEMA. Waste collected from other MMDAs within the GAMA may be sent to the WTS at West Legon.

Environmental Protection Agency

The Environmental Protection Agency is the 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;
- promoting effective planning in the management of the environment;
- imposing and collecting environmental protection levies in accordance with the Environmental Protection Agency Act 1994, Act 490 or regulations made under the Act; and
- acting in liaison and co-operation with government agencies, District Assemblies and other bodies and institutions to control pollution and generally protect the environment.

2.5 World Bank requirements

The World Bank (WB) has specific environmental and social requirements to borrower when it provides support to projects. The construction and operation of this station trigger some of this requirements which this ESIA is addressing. These are as follows:

- ***OP 4.01: Environmental Assessment***

Requires environmental assessment of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. The environmental assessment takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources); and trans boundary and global environmental aspects. It categorizes proposed projects into categories A, B, C or FI based on the extent of adverse impacts anticipated from the project. For Category A and B projects, an ESMP is to be prepared to guide the Implementation of mitigation measures for all identified environmental impacts from the project.

- ***OP 4.04: Natural Habitats;***

Do not finance projects that degrade or convert critical habitats. Support projects that affect non-critical habitats only if no alternatives are available and if acceptable mitigation measures are in place. The policy strictly limits the circumstances under which any Bank-supported project can damage natural habitats (land and water areas where most of the native plant and animal species are still present).

- ***OP 4.11: Physical Cultural Resources; and***

Investigate cultural resources potentially affected. Include mitigation measures when there are adverse impacts on physical cultural resources or avoid if possible.

- ***OP 4.12: Involuntary Resettlement.***

Assist displaced persons in their effort to improve or at least restore their standards of living. Avoid resettlement where feasible or minimize. Displaced persons should share in project profits. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

3.0 DESCRIPTION OF PROPOSED PROJECT

3.1 Justification/Need for the Project

Solid waste collection and transfer in the GAMA is saddled with many challenges that hamper efficient and timely evacuation of solid waste from points of generation. Some of the challenges are long distances from the generation point to final dumping sites resulting in high haulage cost and operational difficulties due to heavy daytime vehicular traffic.

A downstream effect of the operational difficulties is irregular evacuation of house-to-house receptacles and communal containers when they are full leading to over-spillage of refuse causing unsanitary conditions at these sites. This overflow of refuse containers is a major source of garbage ending up in open drains, water courses, road sides and streams. In addition, some households in avoiding pay-as-you dump at container sites "hoard" refuse only to dump into drains during rains. Smaller waste collection vehicles (including hand-drawn carts, Motorized Tricycles and Borla taxis) used for pre-collection, typically dump the contents in open drains and other unauthorized places. The recent flooding disaster of June 3, 2015 was exacerbated by the blockage of drains by non-degradable solid waste materials and silt. Research shows that direct haulage of waste generated in the Accra Metropolitan Area is uneconomical for travel distance in excess of 17.7 km and 25.9 km for the skip trucks and compaction trucks respectively (AMA, 2013). The increased travel distance is a disincentive to some of the smaller waste collection vehicle operators who dump their contents at unauthorized places. The proposed transfer stations, when constructed in the Greater Accra Metropolitan Area (GAMA), will serve (i) to receive domestic and commercial waste from neighborhoods within GAMA for onward transportation to final disposal sites; and (ii) as sorting points for recyclable materials for processing and/or reuse.

The project will therefore eliminate the bottleneck of waste collection trucks travelling long distances to dump their refuse and the dumping of refuse in open drains and unauthorized places by small waste collection vehicles and the associated perennial flooding environmental health challenges. It will also promote recycling and reuse of materials by sorting of recyclable materials.

3.2 Project Location and land size

The proposed Waste Transfer Station will be located at West Legon in the Ga east Municipality. The Ga East Municipal Assembly (GEMA), through the MSWR has a memorandum of understanding (MoU) with the Institute for Environment and Sanitation Studies (IESS) of the University of Ghana to collaborate on waste management through the development and operation of the WTS at West Legon. The WTS will be operated by the Ga East Municipal Assembly upon completion. The proposed project site is a property of the University of Ghana, Legon and is located about 30 metres east of the stabilization ponds for sewage treatment from the university campus. IESS has a pilot Composting and Recycling Facility (CRF) in the project area and the plan between the MSWR and IESS is to co-locate the CRF and WTS. The proposed project site is largely flat and fairly vegetated. The site can be accessed from the Haatso – Kwabenya road. **Figure 3-1** shows the location of the project site.

The land area required for the different components of the transfer station, material recovery plant, center of excellence and a buffer zone will be between 7 and 10 acres.

The proposed project site is isolated from any human dwellings and activities in the area. The nearest facility is the CRF (about 340 metres west of the project site). The Haatso community is about 400 metres north of the project site. The nearest students' residential facility/hostel is located about 800 metres east the project site. **Plate 3-1** shows the stabilization ponds for sewage treatment in the same location as the proposed WTS.

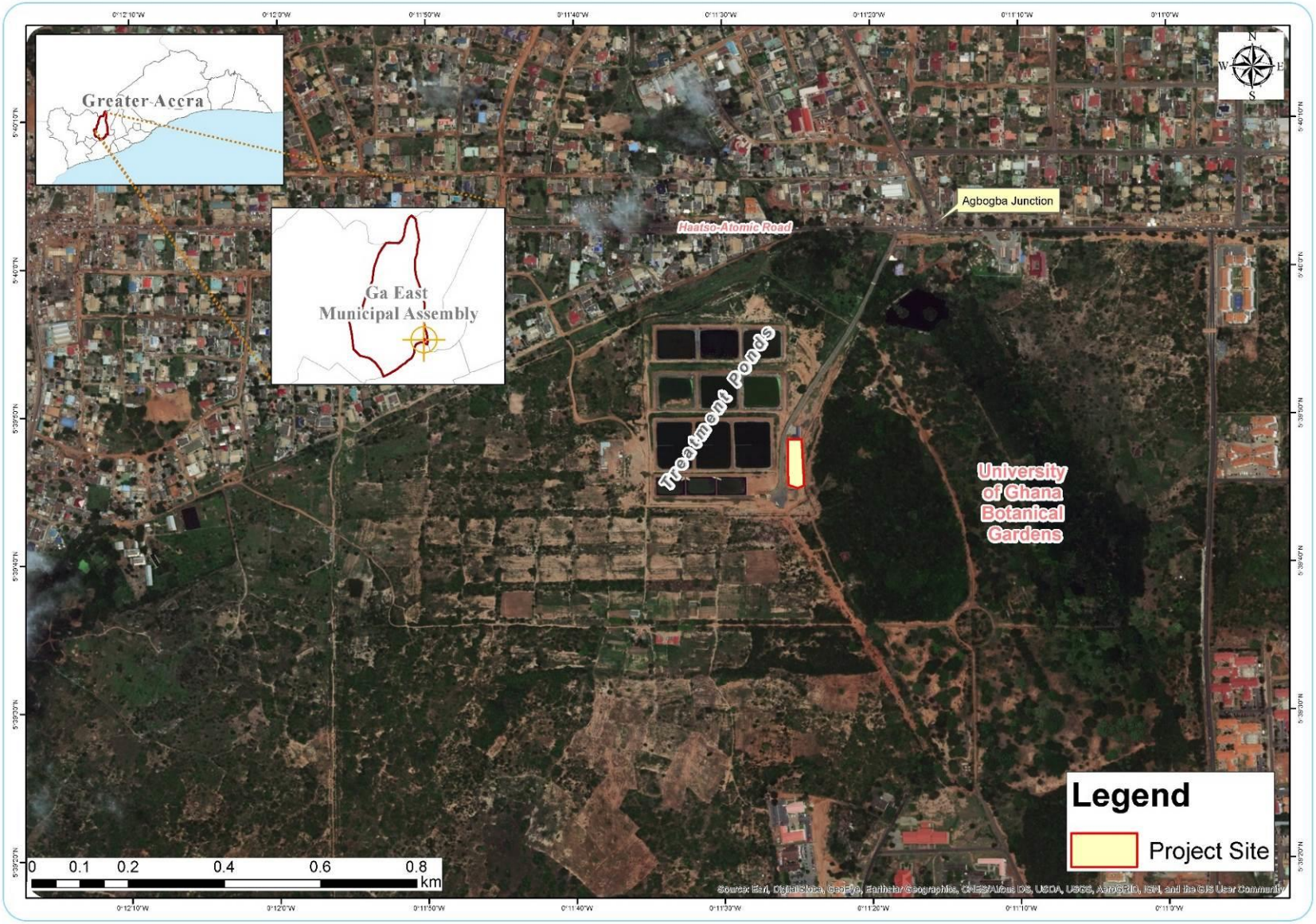

Figure 3-1: Map showing location of the proposed West Legon Transfer Site

*Plate 3-1: **Sewage treatment ponds close to the proposed project site***

3.3 Design and Capacity of the Waste Transfer Station

A state-of-the-art transfer station and material recovery plant will be designed and constructed. The WTS will serve the University of Ghana and the surrounding municipalities within a 5-7km radius. The capacity of the transfer station will be between 600 and 750 tons per day. The design capacity of the transfer station was primarily influenced by the receiving rate, load-out rate and storage amount.

The WTS will have a flow-through capacity of 400 tons per day, which is equivalent to waste generation of the service area, and a storage capacity of 200 tons per day. As waste is generally not delivered to a transfer station at a uniform rate throughout the day, the storage space permits the station to handle peak delivery rates that exceed the rate that transfer vehicles can be loaded. The storage will also increase the reliability of the facility by mitigating the impacts of equipment failures or other problems.

The material recovery plant will include a sorting bay, a plastic recycling and a composting center. In addition, the transfer station will be equipped with a training facility to serve as Center of Excellence for Integrated Solid Waste Management in Accra.

The design of the WTS will be done by a specialized engineering firm. The detailed designs will be based on Material Flow Analysis of the wastes coming in and out of the WTS on a daily basis. The University will be involved through review and comments on draft design and finalization of the design process. Furthermore, the University will be used as a sounding board for the design and technical studies.

3.4 Service Area of the Waste Transfer Station

The proposed WTS at West Legon will receive domestic waste of all types from within a 5-7km radius which will include the Ga East, Adentan, La Nkwatanang Madina and Ayawaso West Municipalities all located within the GAMA. The transfer station will not receive industrial/hazardous waste.

3.5 Projected Solid Waste Generation and Characterization from the Service Area

The total waste generation of the service area is 400 tons/day as of year 2018 as indicated in **Table 3-1**. The projected waste to be generated for the service area assuming a design life of 20 years will rise to 617 tons/day. **Table 3-2** shows the characterization of solid waste to be generated over a design life of 20 years. Organics make up the majority of the solid waste generated with as high as 60% in 2018 and approximately 43% in 2038. Plastics constitute 8% of the solid waste generated in 2018 and 5% in 2038. There is a cumulative reduction of 17%, 4%, 3% for organics, paper and plastic waste respectively. This will be as a result of increased amounts of segregated waste mainly organic, plastic and paper.

The increase in waste generation over the 20-year design life is augmented by increasing rate of segregation. The organics will be composted and plastics will be recycled. It is projected that the total residual waste will only increase by 23 tons with the increased segregation.

Table 3-1: Projected solid waste generation from the service area (adapted from MSWR, 2018)

Beneficiary Municipality	2018 Population	2038 Population	2018 Waste Generation (tons/day)	2038 Waste Generation (kg/day)	2038 Waste Generation (tons/day)
Ga East	178,382	275,118	107	165,071	165
Adentan	94,435	145,648	57	87,389	87
La Nkwantanang Madina	135,137	208,423	81	125,054	125
Ayawaso West (nearby part of AMA)	258, 380	398,504	155	239,102	239
Total	**666,334**	**1,027,693**	**400**	**616,616**	**617**

Table 3-2: Characterization of solid waste during design life (adapted from MSWR 2015, 2018)

Year	Waste Generated (tons/d)	Organic (tons/d)	Paper (tons/d)	Plastic (tons/d)	Metals (tons/d)	Glass (tons/d)	Textiles (tons/d)	Others (tons/d)	Waste sent to disposal site (tons/d)
2018	400	240	32	32	12	8	16	60	400
2023	454	250	32	32	14	8	16	60	412
2028	508	254	30	30	15	8	16	60	413
2033	562	253	28	34	17	8	16	60	416
2038	618	265	25	31	19	8	16	60	424

3.6 Key Components of the Waste Transfer Station

The key components of the WTS project are as follows:

a) Construction of waste transfer station main buildings and foundation including unloading, sorting, storage and loading levels, hopper and trailer;
b) Composting station;
c) Plastic recycling station;

d) Construction of gate control buildings and foundation including works to house weigh bridge equipment for incoming collection trucks and outgoing transfer trucks;
e) Office complex with conferencing facilities and laboratory (Center-of-Excellence);
f) Construction of support buildings and foundation including offices for supervisors and support staff, room for training, canteen, worker accommodations for washing/changing/resting;
g) Construction of drainage systems, leachate and waste water treatment and sanitary systems;
h) Provision of fire protection systems, including water supply and extinguishers to put out fires;
i) Construction of asphalt access roads from the main roads/highway nearest the transfer stations to the reception area within the site including on-off ramps to meet highway design standards for large capacity transfer trucks. The access road will be a dedicated access road for the WTS and will be from the Legon by-pass road. It will not be used by students, staff and public to access the university campus;
j) Construction of site roads and parking areas for loading and turning of large capacity transfer trucks;
k) Construction of workshops, including bays for repair and maintenance of transfer trucks;
l) Washing and cleansing facilities for transfer trucks and collection trucks; and
m) Other ancillary works.

3.7 Waste Transfer Station Layout

The main sections/components of the WTS are as follows:

- Main WTS infrastructure, including:
  - Weighing bridges;
  - Ramp in and ramp out;
  - Tipping area;
  - Loading area (with containers to receive load);
  - Transfer and sorting area.
- Composting station;
- Plastic recycling station;
- Office complex with conferencing facilities and laboratory (Center-of-Excellence);
- Parking area;
- Workshop (for repair and maintenance of transfer trucks);
- Washing area (for transfer and collection trucks); and
- Entrance and exit points.

Plate 3-2 shows a sample waste transfer station. The general layout of the WTS is provided in **Annex 1**.

Plate 3-2: Sample waste transfer station

3.8 Waste Sources, Collection and Haulage to WTS

The WTS will receive domestic waste of all types from within a 5-7km radius which includes Ga East, Adentan, La Nkwatanang Madina and Ayawaso West Municipalities. Domestic waste will be collected and hauled to the WTS by private waste collection companies from the municipalities. Organic waste is the major form of domestic or municipal waste generated in GAMA (60%) and recyclable materials (including plastics, paper and cardboard, metals and glass) together make up 21%. Other forms of waste generated include textiles (4%), inerts or residues (11%) and miscellaneous (4%) (MSWR, 2015). The transfer station will not receive industrial/hazardous waste.

It is expected that the surrounding municipalities to be served by this WTS will engage in source separation of their wastes. The segregation of waste has already been started in the Ga East municipality, University of Ghana and in some of the nearby markets and schools. The segregated waste will be directed to the sorting bay. The unsegregated proportion of the waste will be sent to the transfer bay to be sent to the final disposal site. Myriad initiatives and programmes, including the GARID Project, are underway geared towards increasing source separation of waste in the GAMA area.

In low-income communities, the bulk of the solid waste will be collected from secondary-storage communal containers placed at vantage points within communities. These are shared by a number of households within the community. In more urban affluent and middle to high income areas, most of the waste will be collected by house-to-house collection system. The collection and haulage of the waste to the transfer station will be done by big waste management companies such as Zoomlion Ghana Limited who use big collection trucks and smaller waste collection companies who use motorized tricycles and “borla” taxis.

3.9 Operation of the Waste Transfer Station

The operation of the WTS is expected to be handled by the private sector. An overall management team with relevant stakeholders will oversee the operations of the facility.

The processes to be undertaken at the WTS will include:

- Transfer of residual waste to final disposal sites;
- Waste sorting;
- Recycling of plastics;
- Composting of organic fraction; and
- Any other activities which may be proposed in the future which will be subject to prior approval by the Ghana EPA and the University.

All the activities will be done in conjunction with the Center of Excellence to ensure good practice and sustainability. A detailed Operation and Maintenance Plan shall be provided by the installation team for all aspects of the operation of the facility. This shall include all relevant health and safety measures. The Operation and Maintenance Plan will also be dependent on the Material Flow Analysis to be included in the detailed designs of the WTS.

Management of segregated waste

A sorting unit will be set up where pre-sorted (segregated) waste will be deposited. Segregated waste from the Municipalities will be directed to the sorting bay for further sorting. This will undergo additional sorting as may be required for various re-use activities. A plastic waste recycle unit will be set up for plastic recycling. A composting unit will also be set up. There will be a buffer between the Center of Excellence and the operational areas of the station.

Management of residual waste

Residual waste will be sent to the transfer bay to be hauled to the final disposal site. The transfer bay will function as a unit where disposal trucks will use a ramp and deposit waste through a hopper. The waste will be consolidated into waiting higher volume transfer vehicles for disposal at a final disposal site. The process to be followed for the transfer station is the unloading to storage without compaction option. There will be no long-term storage of waste at the Transfer Station. The main final disposal sites will be the Kpone Landfill Site and the Accra Compost and Recycling Plant (ACARP). An illustration of the transfer bay operational scheme is provided in **Figure 3-2**.

Figure 3-2: Illustration of transfer bay operational scheme

3.10 Transport of Wastes from the WTS to Final Disposal Sites

The WTS will have large capacity transfer trucks which will be loaded with residual waste from the transfer bay for haulage to Kpone Landfill site and ACARP. These trucks will be fully covered to prevent odour and windblown particles during transport. The drivers will also be well trained to observe road and traffic regulations. The WTS will have reserve transfer trucks for use during breakdown of any main transfer truck.

3.11 Due Diligence/Audits and Planned Expansion of Kpone Landfill and ACARP

Environmental and social due diligence/audit has been conducted for the Kpone landfill and ACARP as part of this ESIA to assess their operations and environmental and social management on site. Audits of the operations and maintenance management of the Kpone landfill are also carried out periodically. The latest audit was conducted in 2015. Recommendations and improvement measures from the environmental and social due diligence and 2015 audit of the Kpone landfill have been incorporated in this ESIA and construction of 2 new cells and improvement of the operation of the Kpone landfill will be supported by this project. The 2015 audit of the Kpone Landfill is being updated and any additional recommendations will be incorporated into the design and implementation of the WTS as well as in the operation of the Kpone landfill.

There are ongoing plans to expand the Kpone landfill and ACARP. The Kpone landfill has a design capacity of 500 metric tons per day and has four (4) cells. The Ghana Government plans to construct additional one or two cells at the Kpone landfill to extend the capacity of the facility by about 3-4 more years. ACARP has also initiated plans to expand the facility from its current capacity of 600 metric tons to about 1200-1500 metric tons per day. The expansion works will last for a year and is expected to be carried out in 2019. The planned expansions of the Kpone landfill and ACARP will provide adequate capacity to receive residual waste from the WTS.

There are possibilities of the establishment of other engineered landfill sites within GAMA by the government and private organizations to augment existing waste management facilities. The necessary environmental and social assessments will be carried out and approvals obtained from regulatory authorities and other relevant organizations prior to the implementation of these projects.

3.12 Labour and Related Issues

The Works Contractor for the construction of the WTS and the private company to be engaged for the operation of the WTS will abide by all existing labour laws and codes and will be strictly supervised by the management team accordingly.

The Contractor for the construction of the WTS will develop and implement a Code of Ethics/Conduct to guide workers (including sub-contractor workers) during construction of the WTS. The code of ethics will address issues including compliance with labour laws; exploitation; drugs and illegal substance use; bullying and harassment (including sexual harassment); discrimination; illegal/unethical behavior; zero tolerance to gender-based violence; child labour; theft; etc. A model code of ethics is provided in **Annex 2** to guide the contractor in developing a code of ethics for the project.

3.13 Knowledge sharing – Centre of Excellence for Waste Management

The transfer station and material recovery plant will be located on the University of Ghana campus. The Institute of Environmental Sanitation Studies (IESS) in the University will serve as the focal point and will be included on the management team. It will serve as a center of excellence for training students on various waste management technologies waste transfer and re-use options. The facility will serve as a research center and will be equipped with a laboratory, conferencing facilities etc. for the use of the Institute and other training centers. The research center will be located with a buffer zone and car park between the transfer station and the research center.

3.14 Management and Staffing of the Waste Transfer Station

The management of the WTS will be jointly undertaken by the Ministry of Sanitation and Water Resources, University of Ghana (IESS) and the Ga East Municipal Assembly.

It is expected that about 65 key personnel will be employed for the operations of the WTS. This will include management, administrative staff, scientists, technologists, environmental experts, public health experts, machine operators, drivers and their mates, sorters, etc. All skilled personnel employed at the WTS will have the necessary qualifications and experience. There will be an assigned driver with mate for each transfer truck to ensure effective waste haulage from the WTS. The drivers to be employed will be required to have the necessary license and experience for operating trucks.

Table 3-3: Personnel for the Waste Transfer Station

Category	Description of Personnel	Number of Personnel
Compost Plant	Senior Scientist	1
	Junior Scientist	3
	Sorters	4
	Labourers	2
Materials Recovery Facility	Senior Technologist	1
	Assistant Technologist	3
	Sorters	10
	Labourers	3
Transfer Station	Technician	3
	Mechanical Operators	6
	Drivers	5
	Driver Assistants	5
General Staff	Senior Management (Plant Manager, Process Engineer, Administrative and Other Staff)	5
	Security	5
	Cleaners	3
Environmental Quality/ Monitoring	Snr Environmental Monitoring & Compliance Officer	1
	Environmental Assistants	2
	Public Health Personnel	3
TOTAL		65

4.0 ANALYSIS/CONSIDERATION OF ALTERNATIVES

For the development of the proposed Project, a number of options are under consideration to present the most feasible alternatives. These options are being analyzed according to their suitability to meet the project objectives as well as minimize environmental and social impacts.

The alternatives under consideration are as follows and analyzed in **Table 4-1**:

5) Decision to immediately construct a waste transfer station (WTS) or new landfill site.
    - Waste Transfer Station at West Legon
    - New Landfill site
6) Site selection for the WTS
    - University of Ghana site
    - Ghana Atomic Energy Commission site
7) Transfer station unit process options.
    - Unloading to storage without compaction
    - Surge Pit Transfer Station
    - Direct Tip Transfer Station
8) No action option.

Table 4-1: Analysis of alternative project options

No.	Issues	Options	Analysis	Remarks
1	Decision to immediately construct a waste transfer station or landfill site	Waste Transfer Station at West Legon	***Economic feasibility/consideration*** • The operation of the WTS will help reduce the cost of haulage incurred by the local waste collection vehicles to transport waste over long distances to the final disposal points. ***Technical feasibility/considerations*** • The proposed site at West Legon will be suitable for the project as waste transfer stations don't require very large area of land. • The facility will minimize operational difficulties such as heavy day time traffic encountered by local waste collection vehicles when transporting waste to the final disposal points. • The transfer station will be constructed to hold waste temporally before it is transported to a final disposal point or landfill site. • The transfer station will also serve as a further sorting point for recyclable materials for processing and/ or for reuse. ***Environmental and social risks/considerations*** • The WTS will minimize the dumping of waste in open drains and other unauthorized places by smaller waste collection operators. • The facility will have a concrete floor and therefore eliminate/minimize any possibility of ground and surface water contamination through seepages. • The facility will be walled to prevent any nuisance to the public.	**A waste transfer station** has been considered as an urgent and necessary measure to address the current waste management challenges in the GAMA which includes long and uneconomical haulage distances, day-time traffic, operational challenges and dumping of refuse in open drains and other unauthorized places by small waste collection operators. The WTS will also provide opportunity for sorting recyclable materials from the waste for recycling and/or reuse prior to final disposal of the waste. The proposed engineered landfill site

			• Waste will only be temporarily stored at the facility and transferred to a final disposal point. This will minimize odour which will be a nuisance to the public.	at Ashaladza will be constructed in future.
		Developing a new Landfill site	***<u>Economic feasibility/consideration</u>*** • A landfill site is the most cost- efficient method of managing waste. ***<u>Technical feasibility/considerations</u>*** • A landfill site will serve as a final disposal point for waste. • Landfill sites require large tracks of land and must be located far from communities. • The proposed land at West Legon for the WTS will not be suitable for a landfill site as it is too small and located in an urban area. • There are plans for the construction of an engineered landfill site on a 50 ha land at Ashaladza in the Ga South Municipal. • The proposed landfill site will be beneficial as existing landfill sites are nearing their full capacity. • However, the construction of the landfill site without the waste transfer stations will not address the current waste management challenges including hauling over long distances, daytime traffic, high operational cost, dumping in drains and unauthorized places, etc. ***<u>Environmental and social risks/considerations</u>*** • Landfill sites are not suitable in urban areas or close to communities as they are visually undesirable, may generate odour and pose public health concerns. • Landfill sites, if not properly designed, may also pollute the soil and ground and surface water resources through seepages.	
2	Site selection for the WTS	University of Ghana Site	***<u>Economic feasibility/consideration</u>*** • The proposed project area belongs to the University of	The University of Ghana site is the preferred option as it will be a less

			Ghana. • Project implementation may be less costly as the University is partnering with the MSWR for the project. ***<u>Technical feasibility/considerations</u>*** • The MSWR is collaborating with the University through the IESS to develop and manage the project which will also serve as a learning and research centre for students. An MoU has been signed between the IESS and GEMA (operators of the WTS) to collaborate on the project. • Discussions between the MSWR and UG are advanced to acquire the site for the project. • The site is about 340 metres from a pilot Composting and Recycling Facility (CRF) for IESS. • The siting of the WTS at the proposed site is consistent with UG's planning and zoning of activities at the University campus. ***<u>Environmental and social risks/considerations</u>*** • Proposed area is adjacent to the university's stabilization ponds for sewage treatment and isolated from community/human activities. • Project will result in loss of common flora and fauna in the project area. No species of ecological value wil be affected. • There will not be any damage to property or any displacement/relocation of persons.	costly alternative and will have less environmental and social impacts, as well as the learning and research opportunities it will provide for students and the university.
		Ghana Atomic Energy Commission Site	***<u>Economic feasibility/consideration</u>*** • The proposed area belongs to the Ghana Atomic Energy Commission. • Project implementation may be more costly due to demolishing and compensation. ***<u>Technical feasibility/considerations</u>*** • May require demolishing of facilities and relocation of persons to obtain the required land size for the project.	

			• Project will require a longer time to implement. • The proposed area has been encroached upon by squatters and community members. ***Environmental and social risks/considerations*** • Project will lead to displacement of the encroachers. • Project will lead to damage of people's property. • Project will result in agitations from the affected persons.	
3	Transfer station unit processing options	Unloading to storage without compaction	***Economic feasibility/consideration*** • The unloading to storage without compaction technology is fairly cost effective to build. ***Technical feasibility/considerations*** • With this process option, the waste collection vehicles will dislodge waste through a hopper into transfer trucks/containers. • The waste will not be compacted prior to entering the transfer trailers/containers. • It is good for low and high volume facilities. • It can also be operated as an open air facility. ***Environmental and social risks/considerations*** • Waste tipped through hopper into the transfer truck/containers cannot be segregated before disposal.	**Unloading to storage without compaction** is considered as the preferred option to receive waste for temporary storage and transfer to final disposal sites. This option is also suitable for low and high volume facilities and is fairly cost effective.
		Surge Pit Transfer Station	***Economic feasibility/consideration*** • It is very expensive to build and operate. ***Technical feasibility/considerations*** • The surge pit is used for storage and compaction of the materials prior to loading the trailers for the landfill. • It creates the opportunity for several tipping locations. • This technology is only good for high volume facilities. • Waste collected are not sorted before transported to the final disposal sites.	

			Environmental and social risks/considerations • Safety can be a concern with tipping vehicles driving over the curb into the surge pit or tipping on top of the loader operator below.	
		Direct Tip Transfer Station	***Economic feasibility/consideration*** • It is fairly cost effective to build. ***Technical feasibility/considerations*** • The waste collection trucks tip waste directly into the transfer trailer in the pit area • The technology is only good for low volume facilities. • There is no tipping floor to mix waste together to get desired mix in transfer trailers in order to hit maximum weight capacities. • It typically uses a large mound to bring the waste collection trucks above the transfer trailer. ***Environmental and social risks/considerations*** • No opportunity for waste segregation for recycling before final disposal.	
4	No action option	-	***Economic feasibility/consideration*** • Current high operational cost and uneconomic haulage distances associated with waste management will continue to be experienced. • Job and economic opportunity for the youth and the country will be lost. • Improved livelihood to beneficiary youth or workers will be lost. ***Technical feasibility/considerations*** • Waste haulage trucks and smaller waste collection operators will continue to face operation difficulties such as long haulage distances to final disposal sites and	**This option is not preferred** due to the negative impacts on waste management, sanitation, public health and flooding in the GAMA as well as the negative socioeconomic impacts on the local and national economy. The ESIA has proposed measures to mitigate or reduce any negative impacts from the proposed WTS project.

			daytime traffic. ***<u>Environmental and social risks/considerations</u>*** • The proposed site will be left in its natural state. • The aesthetic view of the area will not be changed. • The impacts on vegetation, fauna, and air quality will be avoided. • Small waste collection operators may continue to dump refuse in open drains or unauthorized places and waste from overloaded communal waste containers will continue to spill over into drains and other water courses. • The risk of flooding from choked drains will continue to exist. • Improved waste management and environmental sanitation in the country will be lost.	

5.0 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS

5.1 Project location and description

The proposed project site is located at West Legon in the Ga East Municipality and can be accessed from the Haatso-Kwabenya Road. The land belongs to the University of Ghana. The proposed site is in the same location as the stabilization ponds for treatment of sewage from the University Campus.

Ga East Municipal is located at the northern part of Greater Accra Region. The capital of the Municipal is Abokobi. It shares boundaries with the Ga West Municipal to the west, the La-Nkwantanang Madina Municipal to the east, Accra Metropolitan to the south and the Akwapim South District to the north (see **Figure 5-1**). The Municipality is sub divided into two administrative offices as Zonal Councils; namely the Abokobi Zonal Council and the Dome Zonal Council.

MAP OF GA EAST MUNICIPAL

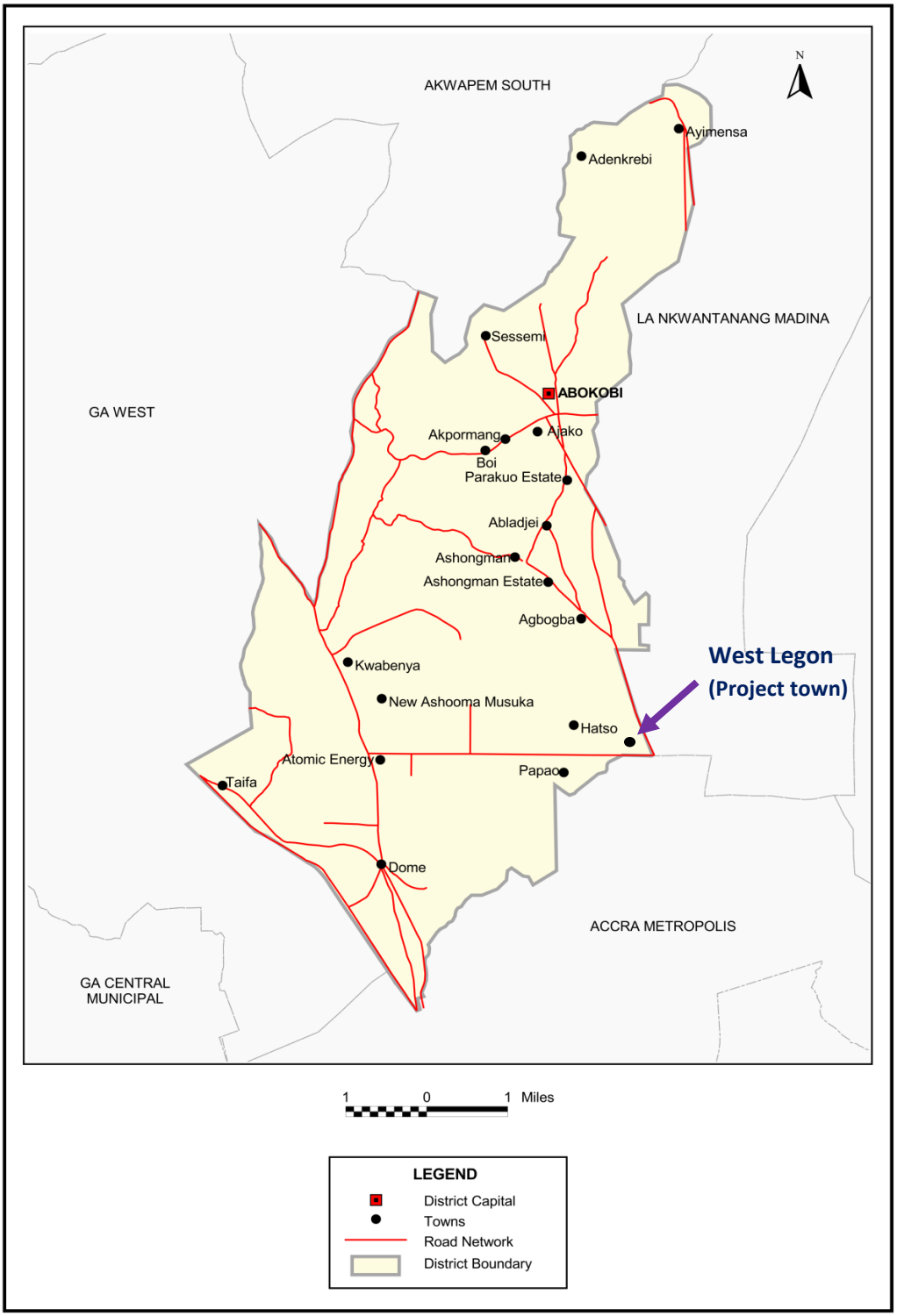

Figure 5-1: Map of Ga East Municipal Assembly (Source: Ghana Statistical Service, 2014)

5.2 Bio-Physical Environment

5.2.1 Climatic Conditions

The Municipality falls in the savannah agro-ecological zone. Rainfall pattern is bi-modal with the average annual temperature ranging between 25.1°C in August and 28.4°C in February and March. February and March are normally the hottest months.

The prevailing wind direction in the project area is south-south westerly (Meteoblue, 2018). This implies that wind blows predominantly in the project area from the south-south west direction to north-north east.

5.2.2 Vegetation

The Ga East Municipal is generally characterised by two main types of vegetation, namely shrub lands and grassland. The shrub lands occur mostly at the western outskirts and in the north towards the Aburi hills and consist of dense cluster of small trees and shrubs that grow to an average height of about five meters. The grassland, which occurs to the southern parts of the municipality, has now been encroached on by human activities including settlements. **Figure 5-2** shows the vegetation map of the Ga East Municipal.

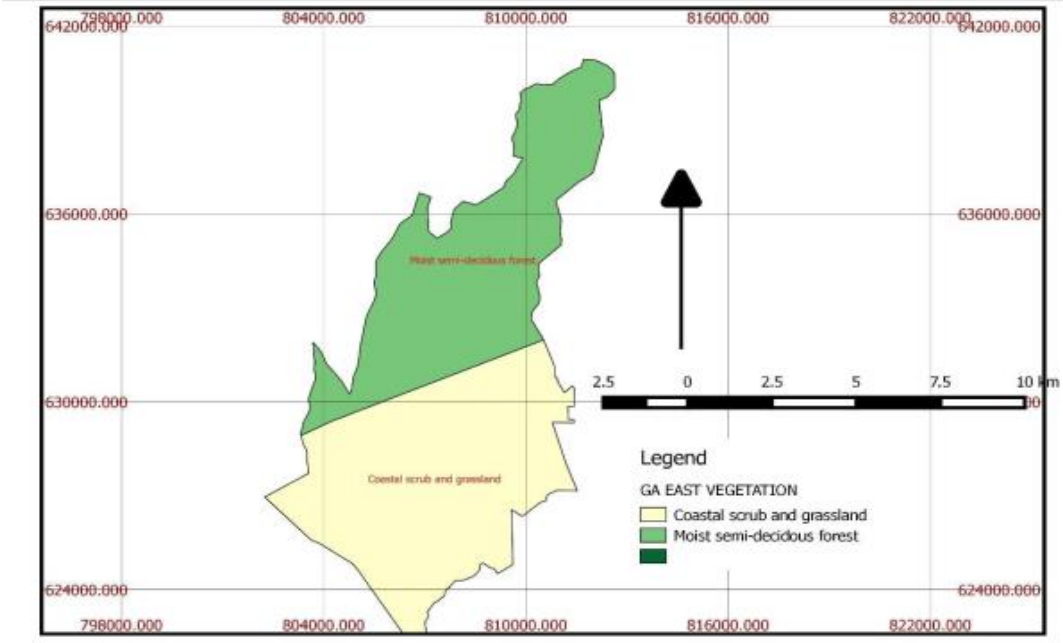

Figure 5-2: Vegetation Map of Ga East Municipal

The proposed project site has thickets and shrubs which is dense on portions of the site. The thickest consist mainly of *Azadirachta indica* (neem) trees. Where the thicket is not dense, patches of perennial grass can be found. The field inspections show that vegetation at the proposed project site is common in the project area and no species of conservation value was found. **Plate 5-1** shows thickets at the project site close to the stabilization ponds.

*Plate 5-1: **Thicket vegetation at the project site close to the stabilization ponds***

5.2.3 Geology and Soils

The Municipality is underlain by Precambrian rocks of the Dahomeyan formation. The soil types include but not limited to the Fete Association located at Abokobi, Adenkrabi and Akporman. It is very shallow and excessively well drained, pale coloured sandy loam and contains small pieces of rock on steep slopes. Nyigbenya-Haatso Complex Association is located at Agbogba, Haatso, Kwabenya, Taifa and Dome. It is well drained red, sandy clay loam to clay with abundant rough stone and quartz gravel. This soil types are suitable for permanent forest. However, Danfa-Dome Association and Fete-Bediesi Complex Association located at Danfa to Dome and Sesemi respectively are good for rice, sugarcane, vegetables and cotton production.

The soils at the project site can be categorized under the Haatso Association. They are well drained red, sandy clay loam to clay with abundant rough stone and quartz gravel. Infiltration is therefore high, which makes the project site at risk of any leakages of leachates from the WTS.

5.2.4 Topography and Drainage

The municipal has a gentle sloped landscape interspersed with plains in the west. The Akwapim range rises steeply above the western end and lies generally at 375 – 420 meters north of Aburi and falls to 300 meters southward.

The few rivers and seasonal streams in the municipal are threatened by human activities. They include the Sesemi stream at Sesemi and the Dakubi stream at Ajako. Other small ponds exist at Abloradjei, Sesemi and Old Ashongman.

The Municipal also has a lot of underground water which is well exploited to provide potable water for small towns and communities in the Municipality.

The project area is drained by the Onyasia River, which is a tributary of the Odaw River. **Figure 5-3** shows the drainage map of the project area. The Onyasia River is an urban stream which carries storm

water and wastewater. It drains into the Odaw River at Alajo in the Accra Metropolitan Area. The main use of the Onyasia River is for irrigation of urban farms.

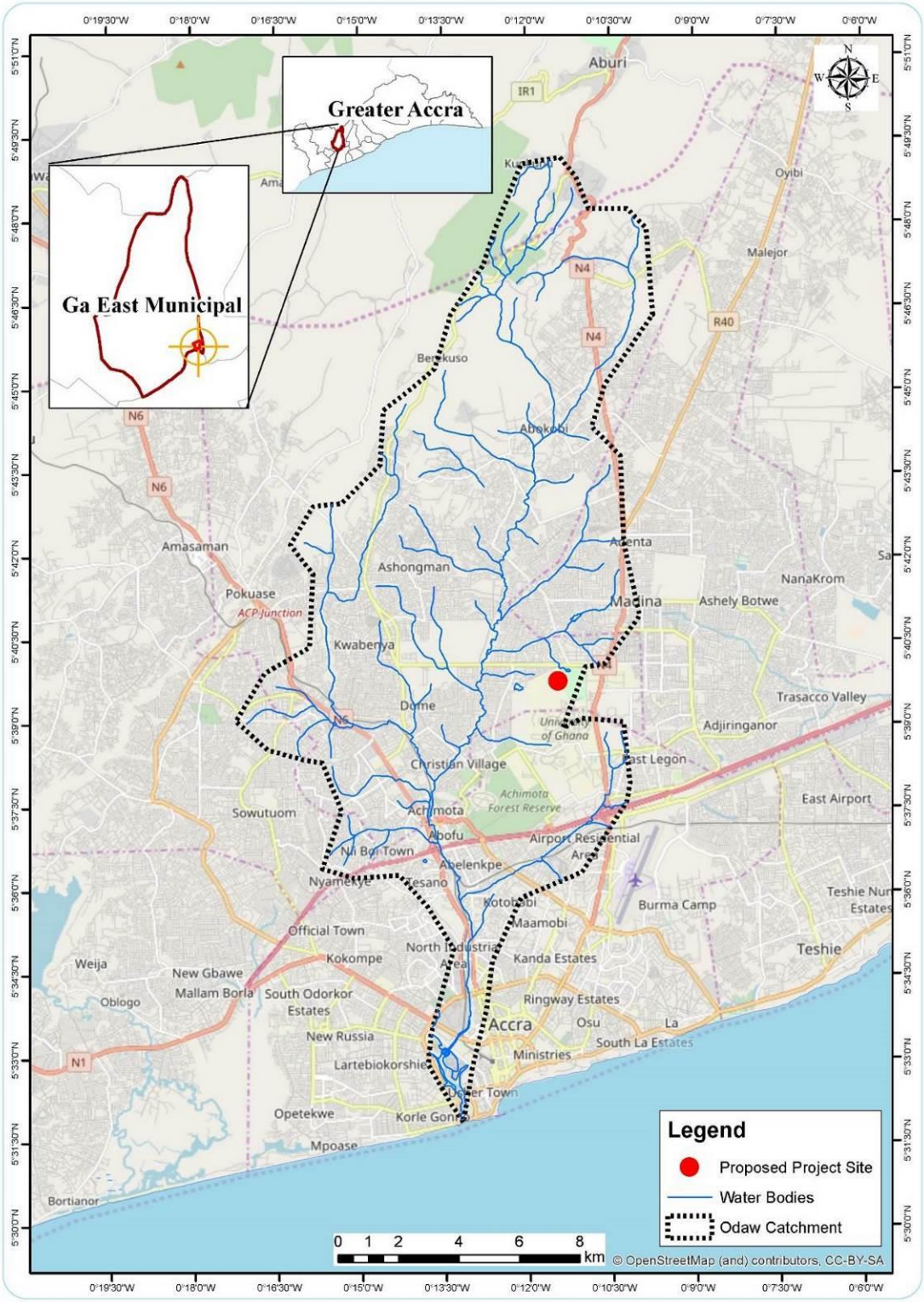

Figure 5-3: Drainage map of the project area in the Odaw basin.

5.2.5 Surface Water Quality

Water quality analysis of the tributary of the Onyasia river (about 400 metres from project site and is the closest tributary) was conducted for the WTS project. The tributary of the Onyasia River and the stabilization ponds (located about 30 metres from project site) will be the recipient of any run-off water from the construction and operation of the WTS. The water sampling was done on July 6, 2018. The Global Positioning System (GPS) coordinates of the sampling point is N 5.666375°; W 0.188937°. The water sample was analyzed at the Council for Scientific and Industrial Research (CSIR) Water Research Institute (WRI) to determine the water quality. The results are compared with the World Health Organization (WHO) Drinking Water Quality Guidelines and presented in **Table 5-1**. **Plate 5-2** shows a picture taken during water sampling from the tributary of the Onyasia River.

The water sampling for the baseline studies was conducted as a spot check. During project implementation, a water monitoring programme will be implemented to monitor the water quality of the tributary of the Onyasia River and the impacts of the WTS on the water quality.

Table 5-1: Results of surface water quality analysis

Sample ID/Unit	Value	WHO DWQG
Turbidity (NTU)	4.00	5
Apparent Color (Hz)	15.0	15
Odor	-	Inoffensive
pH (pH Units)	7.20	6.5 – 8.5
Conductivity (µS/cm)	1393	-
Total Suspended Solids (mg/l)	4.00	-
Total Dissolved Solids (mg/l)	766	1000
Sodium (mg/l)	127	200
Potassium (mg/l)	18.6	30
Calcium (mg/l)	48.1	200
Magnesium (mg/l)	58.3	150
Total Iron (mg/l)	<0.010	0.3
Ammonia – NH_4-N (mg/l)	0.673	0.00-1.5
Chloride (mg/l)	382	250
Sulphate – SO_4 (mg/l)	30.1	250
Phosphate – PO_4 (mg/l)	0.097	-
Manganese (mg/l)	3.58	0.4
Nitrite – NO_2-N (mg/l)	<0.001	1.0
Nitrate – NO_3-N (mg/l)	0.230	10
Total Hardness (as $CaCO_3$) (mg/l)	360	500
Total Alkalinity (as $CaCO_3$) (mg/l)	98.0	-
Calcium Hardness (as $CaCO_3$) (mg/l)	120	-
Mag. Hardness (as $CaCO_3$) (mg/l)	240	-
Fluoride (mg/l)	0.108	1.5
Bicarbonate (as $CaCO_3$) (mg/l)	120	-
Carbonate (mg/l)	0.00	-
Copper (mg/l)	<0.010	2.0

Sample ID/Unit	Value	WHO DWQG
Zinc (mg/l)	<0.005	2.0
Lead (mg/l)	<0.005	0.01
COD (mg/l)	32.6	-
BOD (mg/l)	5.20	-
Oil/Grease (mg/l)	1.45	-
Total Coliforms (cfu/100ml)	124×10^2	0
Faecal Coliforms (cfu/100ml)	13×10^2	0
E-Coli (cfu/100ml)	8×10^2	0

Plate 5-2: Picture showing surface water sampling

The results from the surface water quality analysis shows that chloride, manganese, total coliforms, faecal coliforms and E-coli exceed the WHO DWQG values. The high concentration of chloride may be attributed to fertilizer use from crop farming along the banks of the tributary of the Onyasia River (see **Plate 5-2**). High concentrations of manganese may be from wastewater discharges into the stream. The exceedance levels of total coliforms, faecal coliforms and E-coli may be due to faecal matter transported in run-off and drains into the stream.

5.2.6 Groundwater Quality

Previous groundwater quality assessment conducted at the Legon area in May 2016 showed the following results as presented in **Table 5-2**. The groundwater sample was analyzed at the CSIR Water Research Institute.

Table 5-2: Results of groundwater quality assessment

Sample ID/Unit	Value	WHO DWQG
Turbidity (NTU)	57.0	5
Apparent Color (Hz)	40.0	15
Odor	-	Inoffensive
pH (pH Units)	7.01	6.5 - 8.5
Conductivity (µS/cm)	2970	-
Total Suspended Solids (mg/l)	36.0	-
Total Dissolved Solids (mg/l)	1782	1000
Sodium (mg/l)	340	200
Potassium (mg/l)	15.6	30
Calcium (mg/l)	196	200
Magnesium (mg/l)	50.8	150
Total Iron (mg/l)	0.568	0.3
Ammonia – NH_4-N (mg/l)	1.11	0.00-1.5
Chloride (mg/l)	893	250
Sulphate – SO_4 (mg/l)	104	250
Phosphate – PO_4 (mg/l)	0.343	-
Manganese (mg/l)	0.438	0.4
Nitrite – NO_2-N (mg/l)	<0.001	1.0
Nitrate – NO_3-N (mg/l)	<0.001	10
Total Hardness (as $CaCO_3$) (mg/l)	700	500
Total Alkalinity (as $CaCO_3$) (mg/l)	154	-
Calcium Hardness (as $CaCO_3$) (mg/l)	491	-
Mag. Hardness (as $CaCO_3$) (mg/l)	209	-
Fluoride (mg/l)	0.121	1.5
Bicarbonate (as $CaCO_3$) (mg/l)	188	-
Carbonate (mg/l)	0.00	-

The results showed that chloride, total hardness, total iron, manganese, sodium, total dissolved solids, turbidity and colour exceeded the WHO guideline values. However, other physico-chemical constituents of the water sample were satisfactory. The water was therefore not suitable for potable use without treatment.

Another study conducted in 2015 by Bani (2015) determined heavy metals concentration in groundwater within the project area. The results are provided in **Table 5-3** and show that cadmium and lead had values exceeding the WHO guidelines. All the other heavy metals analyzed were within the WHO guideline values.

Table 5-3: Heavy metals concentration in groundwater within the project area (Source: Bani, 2015)

Parameter/Unit	Mean Value	WHO DWQG
Iron (mg/l)	0.250	0.300
Cadmium (mg/l)	0.011	0.003
Zinc (mg/l)	0.062	4.000
Lead (mg/l)	0.051	<0.005
Chromium (mg/l)	0.011	0.050
Copper (mg/l)	0.009	2.000
Nickel (mg/l)	0.011	0.070
Manganese (mg/l)	0.309	0.400
Arsenic (mg/l)	<0.001	0.010

5.2.7 Air Quality and Noise Level

The proposed project site is largely isolated from any human dwellings and activities in the area. The nearest facility is the pilot Compost and Recycling Facility of the IESS (about 340 metres west of the project site). The Haatso community is located about 400 metres north of the project site and the nearest students' residential facility/hostel is located about 800 metres east of the project site.

Air quality and noise level monitoring were conducted at the project site (N 5.66233°; W 0.19106°) and at Haatso, close to the Agbogba junction (N 5.667946°; W 0.188680°) between 14th and 15th September 2018 as part of the baseline environmental studies for the project. The results for the air quality parameters (CO, NO_2, SO_2, TSP and PM_{10}) and noise levels recorded were within the EPA guideline values as presented in **Tables 5-4, 5-5** and **5-6**. The full air quality and noise level monitoring report is attached as **Annex 3**.

Table 5-4: Ambient PM_{10} and TSP measured from 14th to 15th September, 2018

LOCATION	PM_{10} (µg/m³)	TSP (µg/m³)
West Legon project site	20.0	75.8
Nearby Community (Agbogba junction)	68.2	160.0
EPA's 24-hour ambient air quality guideline for PM_{10} and TSP	70	230

Table 5-5: Carbon monoxide, nitrogen dioxide and sulphur dioxide levels measured from 14th to 15th September, 2018

LOCATION	CO (µg/m³)	NO_2 (µg/m³)	SO_2 (µg/m³)
West Legon project site	2.0	45	20
Nearby community (Agbogba junction)	8.0	32	30
EPA guideline for NO_2 and SO_2.	10 (8hrs)	150 (24hrs)	150 (24hrs)

Table 5-6: Ambient noise levels (dBA) recorded on 14th September 2018

LOCATION	LEQ	L_{10}	L_{50}	L_{90}	L_{MAX}
West Legon project site	35.1	40.3	34.1	43.0	50.8
Nearby community (Agbogba junction)	64.7	73.6	66.8	50.0	86.9
EPA ambient noise guideline for all areas	70				

Plates 5-3 and **5-4** show pictures of the air quality and noise level monitoring.

Plate 5-3: Air quality monitoring device mounted at the project site

Plate 5-4: Air quality monitoring device mounted at Haatso

5.2.8 Seismic Activity

Ghana is a relatively stable continental region which is far away from the Earth's subductive zones but has experienced a number of earthquakes with some damaging effects. A compiled earthquake catalogue (Amponsah, 2004) with a number of events from 1615 to 2003 shows that tremors and earthquakes of magnitudes 3.7 to 6.5 (Richter scale) have been recorded around Accra, Axim, Winneba and Ho in the southern hemisphere. The design specifications for seismic parameters in Ghana are determined by the seismic zoning map (**Figure 5-4**). In the event of any earthquake or tremor, ground shaking/vibration may occur. Hence seismic factors must be considered in the design of the WTS.

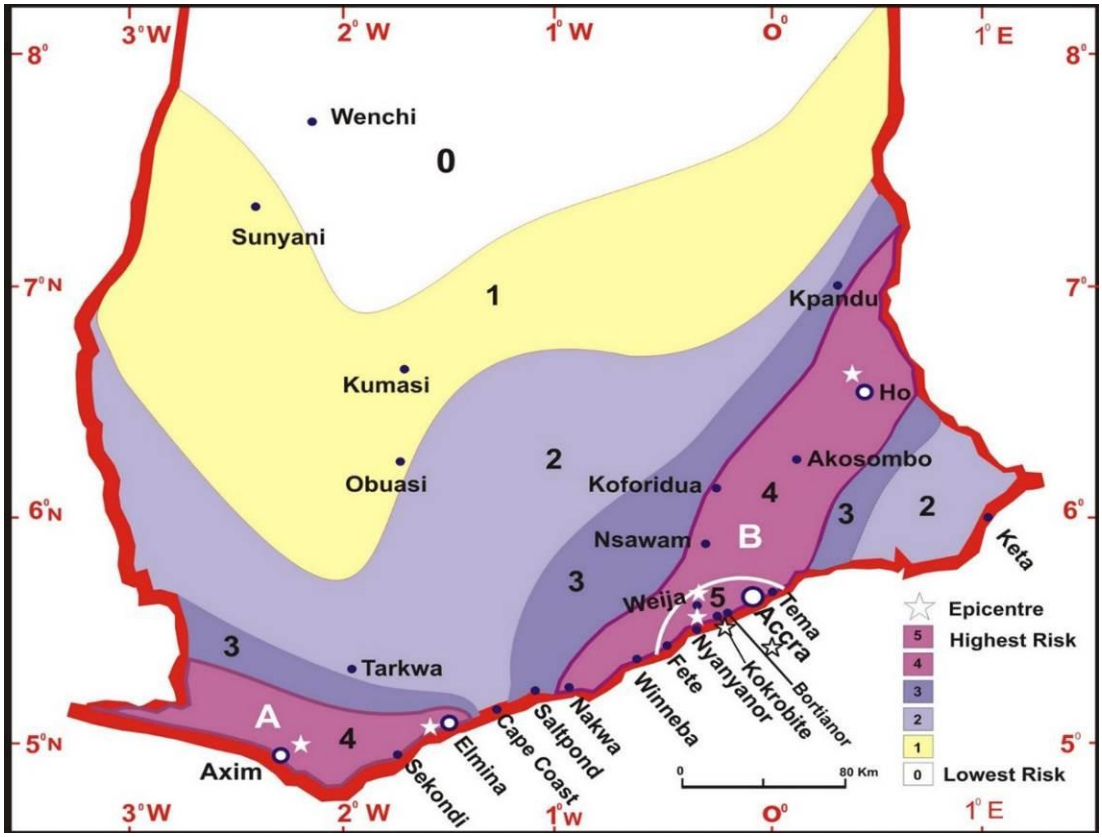

Figure 5-4: Seismic zoning map of Southern Ghana

5.3 Socio-Economic Environment

5.3.1 Population/Demographic characteristics

The Ga East Municipal has a population of 147,742 according to the 2010 PHC, out of which 72,987 (49%) are males and 74,755 (51%) are females. **Table 5-7** shows that the 0-4 age group constitutes the highest proportion of 12.2%, followed by the age groups 25-29 years with 11.7% and 20-24 years with a proportion of 11.2%. The lowest proportion of 0.1% of the population was reported for age group 95 years and older. The distribution of the population by sex and locality follows the same pattern as reported for both sexes. The table again shows that 90% of the population in the Municipality reside in urban areas whiles only 10% are in rural areas.

Table 5-7: Population by age, sex and type of locality

	Both Sexes		Male		Female		Sex ratio
Age Group	Number	Percent	Number	Percent	Number	Percent	
All Ages	147,742	100.0	72,987	100.0	14,557	100.0	97.6
0 – 4	18,015	100.0	9,121	11.9	1,672	11.5	102.6
5 – 9	14,440	100.0	7,245	9.6	1,454	10.0	100.7
10 – 14	13,868	100.0	6,606	9.7	1,403	9.6	91
15 – 19	13,148	100.0	6,080	9.5	1,329	9.1	86
20 – 24	16,611	100.0	7,869	11.7	1,540	10.6	90
25 – 29	17,278	100.0	8,266	12.1	1,663	11.4	91.7
30 – 34	14,282	100.0	7,163	9.5	1,366	9.4	100.6
35 – 39	11,181	100.0	5,806	7.2	1,080	7.4	108
40 – 44	8,324	100.0	4,416	5.2	799	5.5	113
45 – 49	5,953	100.0	3,141	3.8	640	4.4	111.7
50 – 54	4,797	100.0	2,412	3.2	496	3.4	101.1
55 – 59	3,195	100.0	1,669	2.0	349	2.4	109.4
60 – 64	2,328	100.0	1,192	1.5	235	1.6	104.9
65 – 69	1,521	100.0	740	1.0	192	1.3	94.8
70 – 74	1,193	100.0	563	0.8	153	1.1	89.4
75 – 79	656	100.0	299	0.5	87	0.6	83.8
80 – 84	456	100.0	203	0.3	50	0.3	80.2
85+	496	100.0	196	0.4	49	0.3	65.3

Source: Ghana Statistical Service, 2010 Population and Housing Census

Figure 5-5 indicates that the Municipal has a youthful population with the age cohorts 0 – 4, 5 – 9, 10 – 14, and 25 -29 having the majority of the population. The population pyramid for the Ga East Municipal reflects a typical feature in developing countries population with a broad based youthful population and a narrow apex suggesting fewer aged persons.

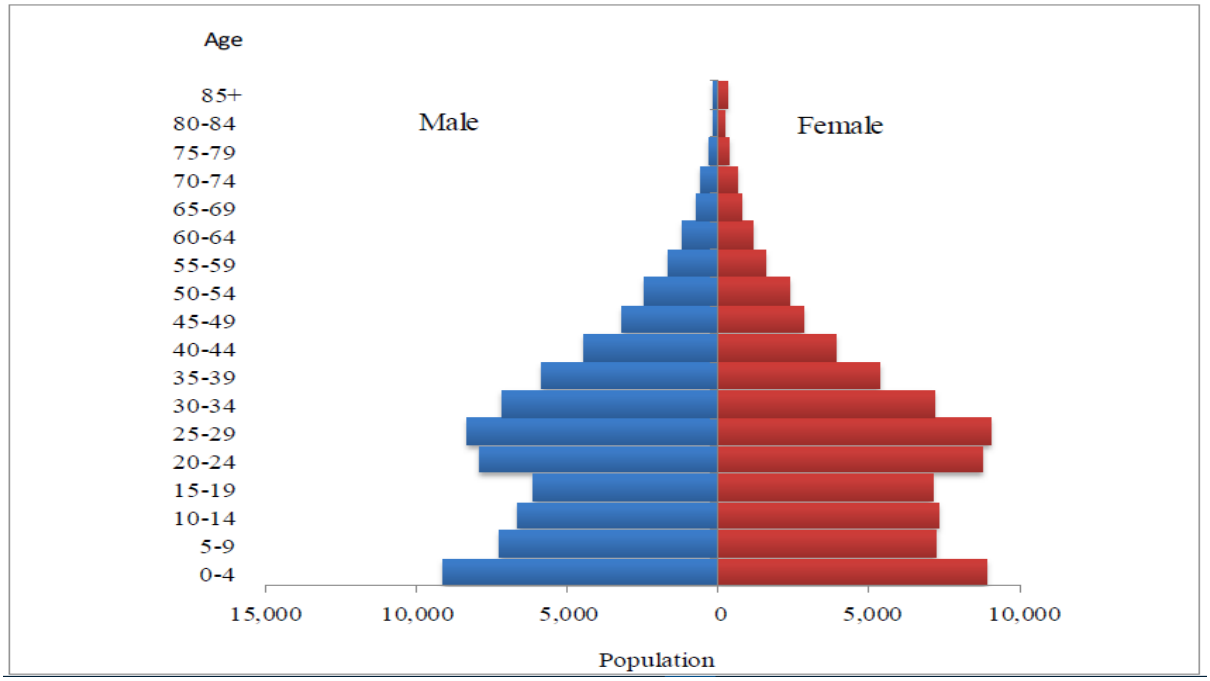

Figure 5-5: Population Pyramid

5.3.2 Economic Activities, Poverty & Employment

The municipal is characterized by four main economic activities, which include agriculture, industry, service and commerce.

The major economic activity in the municipal is farming which practiced by about 55% of the economically active population. The major agricultural activities are crop production and livestock production. Among the wide range of vegetables produced are pepper, tomatoes, cabbage, okra and garden eggs. Livestock production has a very good potential in the municipal. There are a number of poultry farmers in and around Abokobi, the Municipal capital. The major one is the Abokobi Agriculture Project. The women in the rural communities mostly farm and process cassava into Gari and Cassava dough.

Most of the agro processing industries are engaged in large scale bagging and packaging of yams for exportation. Pineapples are not produced in the district but brought from Nsawam and its surrounding communities and also processed into fruit juice to be sold in the local market. The Assembly's traditional market pattern has been towards the south in Dome, Haatso and Taifa through to the central business city of Accra. The rural areas to the north have no well-established markets. Dome is the major market center in the district with Haatso and Taifa playing complementary roles. The strategic location of these markets coupled with good accessibility has facilitated their growth leading to congestion and spill-offs onto the nearby roads although there are some uncompleted market facilities at Haatso and Taifa.

About 43.4% of the employed populations in the Municipal are self-employed without employees. Females (54.6%) are more likely to be self-employed without employee(s) than males (33.1%). Self-employed with employees constitute 9.9% while apprentices and casual workers form 2.6% each. The private informal sector is the largest employer in the Municipal, employing 70.9% of the employed persons.

5.3.3 Land Tenure System

Land in the municipality can be acquired through direct purchase, rented, leasehold and sharecropping because chiefs, as well as clan and family heads are the land owners, and they hold the land in trust for their subjects. The fact that these parcels of land could be inherited through parents or grandparents has led to a lot of sale and resale of land with its attendant land litigations and chieftaincy disputes. This situation has also contributed to the rapid loss of farmlands with its attendant unemployment and migration especially the youth to adjoining districts such as the Tema Metropolitan Assembly (TMA) and Accra Metropolitan Assembly (AMA).

The proposed project site is a property of the University of Ghana, Legon and discussions are currently ongoing between the MSWR and the university to acquire the site for the project.

5.3.4 Water Supply

The Assembly has no direct control over urban water supply hence, potable water supply in the urban/peri-urban areas of the municipality has been a major challenge to the Assembly. There is limited access to potable water in areas like Dome, Taifa, Agbogba, Ashongman and Musuko, causing others to depend on tanker services and a few hand-dug wells. In general, the price of water is fairly high in these urban communities.

However, the Municipal Assembly is responsible for water supply in some peri- urban areas and small towns. The Assembly is currently managing two small towns' piped schemes through Water and Sanitation Development Boards (WSDB). These are Abokobi-Oyarifa-Teiman-Sesemi scheme and the Pantang Area Pipe scheme. The two schemes cover 15 communities. This places an obligation on the Municipality to ensure that the facilities are managed in a sustainable manner.

5.4 Solid Waste Management in GAMA

It is estimated that about 2,476 metric tons of solid waste is produced within the GAMA on a daily basis. Of this quantity, more than three-quarters (76%) is collected, while the remaining 24% is disposed improperly either through burning, burial, open and indiscriminate dumping (MSWR, 2018). **Table 5-3** shows solid waste generation and collection within the various metropolitan areas and municipalities within GAMA.

Source segregation of waste in GAMA is generally low. However, segregation of waste has already been started in the Ga East municipality and in some of the nearby markets. GEMA has distributed separate labelled bins (organics, plastics and paper) to basic schools in the municipality which are used for waste segregation.

Table 5-8: Solid waste generation in GAMA (Source: MSWR, 2018)

MMA	Population estimate (2015)	Waste generated (tons/day)	Waste collected (%)	Waste collected (tons/day)	Waste not collected (%)	Waste not collected (tons/day)
ADMA	88,493	53	57	30	43	23
AMA	1,883,892	1130	91	1024	9	106
ASHMA	216,067	130	91	118	9	12
GCMA	132,624	80	44	35	56	45
GEMA	167,157	100	68	68	32	32
GSMA	465,435	279	35	99	65	180
GWMA	248,670	149	38	57	62	92
LADMA	207,706	125	93	116	7	9
LANMMA	126,634	76	68	52	32	24
LEKMA	257,884	155	77	119	23	36
TMA	331,246	199	78	155	22	44
GAMA	***4,125,808***	***2,476***	***76***	***1,873***	***24***	***603***

5.4.1 Methods of Solid Waste Disposal in GAMA

According to the 2010 PHC, more than half (52.8%) of households in GAMA have their waste collected directly from their dwellings, and about a quarter of households (25.7%) dump their waste at designated sites such as centralized containers. About 21.5% of households in GAMA do not dispose their solid waste in a proper manner. More than one-tenth of households (11.2%) burn their refuse, while 8.4% throw their refuse indiscriminately in open spaces, vacant lots, drains, water courses, etc. A small percentage of households bury their refuse (1.1%) or follow other improper disposal practices (0.9%). **Table 5-9** shows the methods of solid waste disposal by households in GAMA.

Door-to-door waste collection is most prevalent in La-Dade Kotopon Municipal (LADMA) (77.1%), La-Nkwantanang Madina Municipal (LANMMA) (67.9%), Accra Metropolitan Area (AMA) (59.4%) and Tema Metropolitan Area (56.2%). Door-to-door waste collection is least prevalent in Ga South Municipal (GSMA) (21.3%), Ledzokuku-Krowor Municipal (LEKMA) (27.4%) and Ga Central Municipal (GCMA) (33.9%). The use of public dump sites (centralized containers) is highest in LEKMA (49.8%), followed by AMA (31.2%) and ASHMA (28.5%). Household burning of waste is most prevalent in the GCMA.

Table 5-9: Methods of solid waste disposal by households in GAMA according to 2010 PHC

MMA	Collected (%)	Public dump (Container) (%)	Burned by household (%)	Public dump (open space) (%)	Dumped indiscriminately (%)	Buried by household (%)	Other (%)
ADMA	45.8	11.3	27.1	10.0	4.0	N/A	N/A
AMA	59.4	31.2	2.7	4.7	1.1	0.3	0.7
ASHMA	62.6	28.5	2.9	2.8	0.6	0.3	2.3
GCMA	33.9	9.6	42.3	7.3	1.8	4.7	0.4
GEMA	50.9	10.8	25.7	7.0	1.7	3.1	0.9
GSMA	21.3	14.8	37.8	17.2	4.3	4.2	0.5
GWMA	47.4	11.5	26.8	8.1	1.9	3.8	0.4
LADMA	77.1	15.6	4.1	1.3	0.3	0.3	1.3

MMA	Collected (%)	Public dump (Container) (%)	Burned by household (%)	Public dump (open space) (%)	Dumped indiscriminately (%)	Buried by household (%)	Other (%)
LANMMA	67.9	12.1	11.3	6.1	1.1	1.2	0.4
LEKMA	27.4	49.8	12.0	7.5	1.1	0.5	1.8
TMA	56.2	21.8	6.7	10.7	2.1	0.4	2.2
GAMA	***52.8***	***25.7***	***11.2***	***6.8***	***1.6***	***1.1***	***0.9***

5.4.2 Solid Waste Characterization in GAMA

The composition of solid waste generated in GAMA is presented in **Figure 5-6**. Organic waste is the major form of solid waste generated (60%) and recyclable materials (including plastics, paper and cardboard, metals and glass) together make up 21%. This provides great opportunities for composting and recycling for the organic waste and recyclables respectively. The proposed WTS at West Legon will have a plastic recycling station for recycling of plastics and a composting station for composting of decomposable waste.

Table 5-10 shows the composition of solid waste in the various metropolitan areas and municipalities in GAMA. Table 5-10 shows that in all the metropolitan areas and municipalities, organic waste is the highest with as high as 74% in ASHMA. The generation of organic waste is lowest in LADMA (10%). However, LADMA generates the highest percentage of plastics which accounts for 55% of the solid waste.

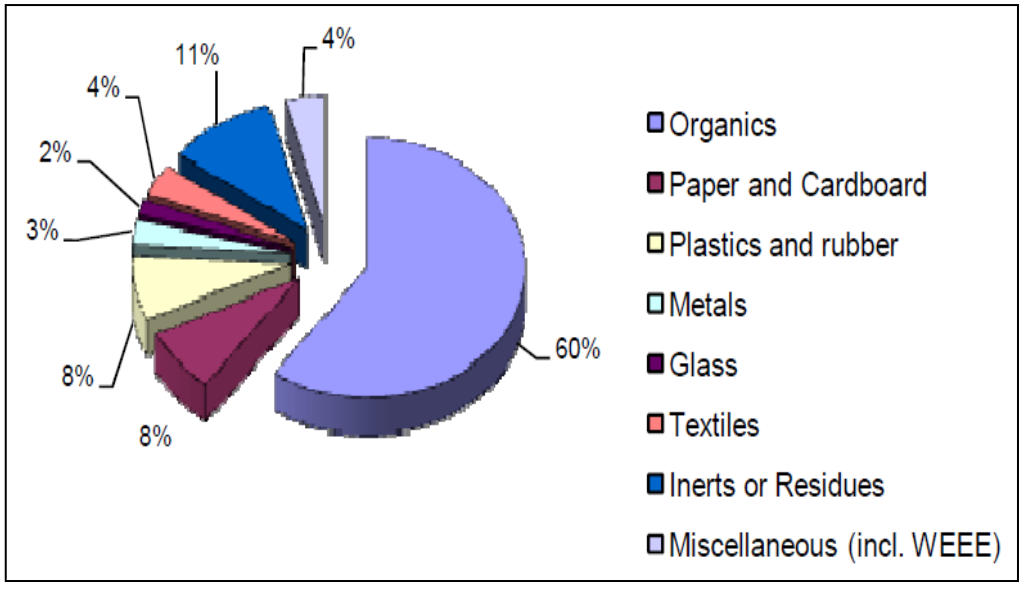

Figure 5-6: Solid waste composition in GAMA (source: MSWR, 2015)

Table 5-10: Composition of Municipal Solid Waste in metropolitan areas and municipalities in GAMA (Source: MSWR, 2018)

MMA	Organics (%)	Paper (%)	Plastics (%)	Metal (%)	Wood (%)	Glass (%)	Textiles (%)	Inert (%)	Other (%)
ADMA	50	7.7	24	3.9	1	4.8	1.2	7.4	-
AMA	65	6	10	3.5	-	3	1.7	10.8	-
ASHMA	74	4	10	1	1	2	5	3	-
GCMA	69.6	3.7	15.2	1.9	-	1.6	3.9	4.1	-
GEMA	48.8	9.6	17.9	9.1	-	7.4	2.5	-	-
GSMA	32	15	30	5	4	10	7	-	-
GWMA	63	5.3	8	5.7	-	1.7	3.7	10.3	3
LADMA	10	20	55	5	10	-	-	-	-
LANMMA	48.8	9.6	17.9	9.1	-	7.4	2.5	-	4.7
LEKMA	60	8	6	5	6	1	3	1	10
TMA	55.1	4.5	13.2	3.5	2.2	0.7	-	20.8	-

5.4.3 Challenges with Solid Waste Management

The current waste collection and transfer system in the GAMA has many challenges which hamper efficient and timely evacuation of house-to-house and the central communal container (collective container collection) systems. These challenges include:

- High cost of haulage – Due to long distances from the generation point to final dumping sites, capital investment and recurrent costs have increased for the service providers.
- Operational difficulties due to heavy daytime vehicular traffic along. Day time traffic congestion in Accra has increased travelling time of hauling the waste to the final dumping sites.

To address these challenges, waste transfer stations have been proposed to be constructed at strategic locations within the GAMA. This will also reduce the illegal dumping of waste in open drains and unauthorized places by small waste collection operators. The waste transfer station to be constructed in West Legon will receive waste from the Ga East, Adentan, La Nkwantanang Madina and Ayawaso West municipalities.

5.5 Environmental, Sanitation and Waste Management in the Project Area

The University of Ghana has a functional system in place to ensure environmental and sanitation management on the University's premises. Bins have been placed at vantage points for use and are regularly emptied. Workers sweep and clean the streets and other open spaces regularly to ensure a clean environment.

The proposed project site is isolated from the main campus and has very limited human activity. The access road to the project site is not used by students, staff or general public to the University Campus. It is a dedicated road to the stabilization ponds and it has a security post and gate. Only authorized vehicles/persons to the stabilization ponds are allowed access through the gate. The project site and surroundings, including the access road are clean and free of litter/solid waste. There are no open drains at the project site.

In the Haatso and West Legon communities close to the University's boundaries, solid waste management remains a challenge. Community members, mainly squatters in the area resort to dumping

of refuse in open areas, including portions of the University's land. These developments have gone on unchecked and dumpsites can be seen springing up on portions of the University's land, particularly along the new GIMPA to Haatso bypass.

5.6 Proposed Final Disposal Sites for the WTS

The following sub-sections describe the operations and environmental and social conditions at the Kpone landfill site and ACARP, which are the proposed final disposal sites of residual wastes from the WTS at West Legon.

5.6.1 Kpone Landfill Site

The Kpone landfill is located at Kpone, the capital of the Kpone Katamanso Municipality. The GPS coordinates of the site is N 5.704039°; W 0.028935°. The Kpone landfill can be accessed from the Kpone junction on the Accra-Aflao Highway. The landfill is located about 2km on the Kpone road. The Kpone landfill is located about 32km from the proposed WTS site. The Kpone landfill can be accessed from the WTS site by using the N4 highway to the Tetteh Quarshie roundabout and using the N1 (motorway) to Kpone Barrier. The landfill can then be accessed on the Kpone road from the Kpone barrier.

The Kpone landfill belongs to the Tema Metropolitan Assembly (TMA) and is operated by Waste Landfills Company Limited. The landfill was supported by a World Bank-financed project and started operations in January 2013 and receives municipal solid waste and industrial waste from MMDAs within GAMA and also the Ningo Prampram District. The facility operates 24 hours in a day and has 22 staff.

The Kpone landfill has four (4) cells and was designed to receive about 500 metric tons of waste per day to a maximum height of 25m. The main facilities at the Kpone landfill include:

- Separate entrance and exit points;
- Entrance control building;
- Weighing bridge;
- Administration building with car park;
- Maintenance and workshop building;
- Separators shed;
- Leachate treatment ponds (3no.);
- Special waste pond (1no.); and
- Waste dumping area.

Trucks conveying waste to the site go through the dedicated entrance and are weighed at the weighing bridge before driving through to dump their waste at the dumping area and leave through the exit point. Registered waste companies are billed monthly while unregistered companies are charged on the spot prior to dumping. The charge is Gh¢30 per ton. Bulldozers are used to push and spread the waste at the dumping area and compactors used to compress the waste. Compressed areas are covered with laterite. Leachate from the dumping area flows into the leachate ponds for treatment. The dumping area has vents (30no.) for the escape of natural gas which builds up through decomposition of the waste.

The landfill currently receives on the average about 1000 metric tons of waste per day and has reached a height of about 24m. According to Waste Landfills Company Limited, the Kpone landfill is technically full and will be unable to receive waste by the end of first quarter 2019 unless it is expanded. The total

acquired land for the landfill is 33ha with the current landfill site occupying about 15ha of the land. Most portions of the remaining 18ha which could have been used for expansion have been encroached on. Government has however secured portions of the available land and has plans to construct additional one or two cells to extend the capacity of the facility by about 3-4 more years.

Plate 5-5 shows a panoramic view of the Kpone landfill site with the dump site and the leachate ponds.

Plate 5-5: Panoramic view of Kpone landfill site

Environmental management and monitoring

Environmental Impact Assessment (EIA) was prepared for the Kpone landfill and environmental permit acquired prior to construction. Environmental management and monitoring measures carried out include:

- Dust control by dampening of the road surface;
- Leachate treatment and monitoring. Leachate sampling and analysis is done biannually;
- Periodic spraying/fumigation to control odor and vectors;
- Groundwater sampling (from 3no. groundwater monitoring wells) and analysis which is done biannually; and
- Samples of natural gas are occasionally collected and analyzed by researchers/students and they share the results with the management of the facility.

The environmental monitoring results are submitted to the Waste Management Department of TMA.

According to the 2015 Technical Audit Report of the Operations and Maintenance Management of the Kpone Landfill, the Ghana Landfill Guidelines Requirements prescribes the following monitoring frequency for leachates and groundwater:

- Weekly measurements on site of leachate flow, pH, temperature and conductivity and monthly analysis of leachate samples for chemical oxygen demand (COD), chloride, ammoniacal nitrogen, cyanide and heavy metals; and
- Monthly analysis of groundwater for pH, conductivity, COD, chloride, ammoniacal nitrogen, cyanide and heavy metal.

Security, health and safety

The Kpone landfill has a fencing around the entire facility, however some sections of the fence are damaged and no longer in place. A private security company has been contracted to provide security services day and night.

The leachate ponds have been fenced to prevent people from falling in them. However, the fencing is short and some portions are damaged. Warning and caution signs provided around the leachate ponds and other areas of the facility are also either damaged or faded and not legible. **Plate 5-6** shows the fencing and warning sign by the leachate ponds with the dump site at the background.

Workers and waste pickers at the Kpone landfill are sensitized on health and safety issues and fire prevention by the Site Supervisors. The waste pickers belong to the Tema Landfill Recyclable Waste Pickers Association and are educated by an NGO on health and safety issues and the use of personal protective equipment (PPE). The waste pickers and workers are however not always in PPE.

There are three (3) washrooms on site for use by workers and waste pickers. There is no water supply at the facility, hence water is purchased into water storage tanks for use in washrooms.

Plate 5-6: Fencing and warning sign by leachate pond, with dump site in the background

Fire safety

Waste collection companies/operators are sensitized not to collect hot ash and other hot materials for dumping at the landfill. Occasionally when hot materials are detected among the waste, it manually quenched using soil. Waste pickers are also sensitized not to smoke or engage in any activity that will generate heat/spark at the landfill.

The Kpone landfill has three (3no.) installed fire hydrants at the site. However, none is functional as they do not have water supply through them. There is a dedicated water tanker on site for use during fire emergencies. Fire extinguishers are available at the site but at the time of visit had expired and require servicing. The site does not have a demarcated fire assembly point. Emergency fire exit signs are provided in the administration building.

Traffic management

The Kpone landfill is reported to receive about 260 waste trucks per day. Currently, there is no significant traffic congestion on the access road to the site as a result of the operations of the landfill. Previously when the landfill operated from 7:00am to 5:00pm daily, traffic congestions were experienced around the entry point especially in the mornings before opening as waste trucks queued along the access road. However, since the landfill started operating 24 hours per day, traffic congestions are not experienced as waste trucks drive in and out at any time of the day or night. There are no speed limit signs within the facility to guide drivers.

5.6.1.1 Findings and Recommendations from 2015 Audit Report of Kpone Landfill

The 2015 audit of the operations and environmental and social management at the Kpone landfill identified a number of compliant measures and some areas which require improvement to ensure full compliance as provided in **Table 5-11**. Recommended improvement measures from the audit report, as provided in **Table 5-12**, have been incorporated in the mitigation measures of this ESIA report. Construction of 2 additional cells at the Kpone landfill as well as measures to improve its operations based on the 2015 audit report and the ongoing audit will be supported by the project. The audit of the Kpone landfill is being updated and the recommendations, including expansion of the landfill, will be supported by GARID under the Component 2 of the project (see Extracts of the 2015 Audit Report, which is currently being updated, in Annex 4).

Table 5-11: Compliant measures and areas requiring improvement from 2015 audit report of Kpone landfill

Compliant measures	Areas requiring improvement to ensure full compliance
Provision of PPE	Emergency procedures
Medical assistance (First Aid)	Health & Safety Training
Smoking restrictions	Medical examinations
Leachate monitoring	Accident records
Groundwater monitoring	Surface water monitoring
-	Landfill gas monitoring

Table 5-12: Summary of key recommendations from 2015 audit report of Kpone landfill

No.	Recommendations
Operational life of Kpone landfill	
1.	Extend the operational life of the site by increasing the final height of the landfill to a maximum of 24 meters above the formation level of each landfill cell.
2.	Construct additional cells to extend the operating life of the landfill to cater for increased waste flows from GAMA.
Environmental Monitoring	
3.	Testing for specified environmental parameters conducted by the Ghana Atomic Energy Commission (GAEC) should cover the entire spectrum of groundwater/surface water monitoring parameters outlined in the O&M Plan. This should include: - Total organic carbon; - Sulphate; and - Total Kjedahl nitrogen.
Health and Safety Systems	
4.	The following should be addressed by the operator (Waste Landfills Ltd) and TMA:

No.	Recommendations
	- Preparation of a site safety plan for all activities on the landfill site; - Preparation of an emergency response plan which delineates procedures for responding to fire explosions or any releases of harmful substances; - Appointment of a Health and Safety Officer to ensure its compliance of safety procedures by all the personnel, scavengers and users of the facility; and - A system for reporting and maintaining records of accidents, occupational injuries and illnesses.
Capacity Building	
5.	Capacity building programmes should be fashioned by the responsible Ministry for the following stakeholders: - Ghana EPA Built Environment Department – conducting periodic environmental audits to ensure compliance with Environmental Management Plans. - MMDA Waste Management Departments – preparation of contractual agreements for various privatization options, ensuring the appropriate oversight management structures. - Landfill Operators – landfill site management including working face operations, record keeping, occupational health and safety, environmental monitoring, special and hazardous waste handling. - Landfill design consultants – design of site facilities, airspace volume requirements, environmental management systems.

5.6.2 Accra Compost and Recycling Plant (ACARP)

ACARP is an integrated waste processing and recycling company established to receive, sort, process and recycle solid and liquid waste and produce organic manure for agronomic purposes in Ghana and West Africa. ACARP is located at Adjen Kotoku in the Ga West Municipal. The distance between the proposed WTS site and ACARP is about 34km. ACARP can be accessed from the WTS by using the Haatso-Atomic-Kwabenya Road to connect to the Accra-Kumasi Highway (N6) at ACP junction and then proceed along the N6 to Medie. Alternatively, the Legon by-pass road can be used to link to the N1 and then to Achimota Roundabout, and from there using the N6 to Medie. ACARP can accessed from Medie through the Adjen Kotoku Road.

ACARP commenced operations in July 2012 and receives municipal solid waste from within GAMA and other neighbouring municipalities and districts. The facility does not receive medical, construction and hazardous waste. ACARP has a contract with the government of Ghana to manage waste and does not charge for waste brought to the facility.

The facility has a design capacity of 600 metric tons per 16-hours. Hence, it processes 300 metric tons of waste per every 8-hour shift. Trucks delivery waste to the site are weighed at the weighing bridge before dumping their waste at the site. The unsorted waste is loaded onto a Material Recovery Facility which is a semi-automated machine where the waste is sorted out into organic materials and recyclables (plastics and metals). The organic materials are composted to produce organic compost for sale. The plastic materials are semi-processed and sold to plastic manufacturing companies in Ghana. The metals are also sold to steel and aluminum companies in Ghana.

ACARP currently processes around 250 metric tons of waste per 8-hour shift, which is around 80-90% of the Plant's design capacity. Plans are underway to expand the facility to about 1200-1500 metric tons per day. The expansion works will last for a year and is expected to be carried out in 2019.

Environmental and social management measures

An EIA was prepared for the ACARP and an environmental permit obtained from the EPA for the project. The permit is duly renewed by the company. Environmental and social management measures implemented at the facility include:

- Odour management;
- Leachate management and monitoring;
- Fumigation for pest and insect control; and
- Health assessment of nearby communities through community engagement.

Health, safety and security

ACARP has a Human Resource and Trainings Manager who schedules regular training for workers including on health and safety issues. This either carried out internally or external consultants are brought in to train workers. There is a Quality Control Department which is also in charge of ensuring environmental, health and safety management at the facility. The Quality Control Department ensures that environmental management and monitoring measures are effectively implemented. Workers are provided with PPE including safety boots, overalls, gloves, etc. and the use of PPEs is enforced to ensure health and safety management at the facility. The entire facility is fenced, has a security post and a private security firm has been contracted to ensure security at the site and prevent entry of unauthorized persons.

Fire safety

The management of ACARP collaborates with the Ghana National Fire Service (GNFS), particularly the Adjen Kotoku GNFS Station to provide regular trainings and fire drills for staff/workers. The facility also has a valid fire certificate from the GNFS. The entire ACARP is fire insured. The fire insurance company carries out independent fire audit at the facility prior to renewal of the fire insurance.

Fire safety equipment at ACARP include:

- Fire hydrants;
- Fire extinguishers (serviced);
- Smoke detectors;
- Fire alarms;
- Labelled emergency exits; and
- Demarcated fire assembly point.

6.0 STAKEHOLDER CONSULTATION AND ENGAGEMENT

Stakeholder consultation is a process and occurs from the project conception and design stage through the ESIA stage to the development/implementation phase. Key stakeholders of the proposed Waste Transfer Station have been identified for consultations and these include project proponents, operators of the facility, regulatory bodies, local government institutions and project affected persons.

6.1 Objectives

The main objective of the consultations with stakeholders is to discuss the proposed project environmental and social implications and to identify alternatives for consideration. Specifically, the consultations seek to achieve the following objectives:

- Provide information about the proposed WTS project to stakeholders;
- Provide opportunities for stakeholders to discuss their opinions and concerns;
- Provide and discuss with stakeholders the alternatives considered to reduce anticipated impacts;
- Identify and verify significance of environmental, social and health impacts; and
- Inform the process of developing appropriate mitigation and management options.

6.2 Stakeholders Identified

The stakeholder identification for the WTS project at West Legon was based on organizations/ institutions/communities/persons to be involved or affected or have interest in relation to the project. The stakeholders identified are as follows:

<u>Project Proponents and Engineers</u>
- Ministry of Sanitation and Water Resources;
- GARID Project Coordinating Unit

<u>Regulatory Authorities</u>
- Environmental Protection Agency;
- Ghana National Fire Service; and
- Factories Inspectorate Department.

<u>Other Government Authorities</u>
- Ministry of Works and Housing;
- Ministry of Local Government and Rural Development; and
- Department of Urban Roads (DUR).

<u>Local Government Authority/Operator of the WTS</u>
- GEMA, including:
    - Waste Management Department; and
    - Environmental Health and Sanitation Unit.

<u>Landowner</u>
- University of Ghana, Legon including:
    - Institute of Environment and Sanitation Studies (IESS); and
    - Students.

Waste Collection/Management Companies in GAMA

- Environmental Services Providers Association (ESPA). This comprises the large waste collection/ management companies in GAMA, including:
  - Zoomlion Ghana Limited;
  - Zoompak Ghana Limited;
  - Meskworld Limited;
  - Rural Waste Limited;
  - Daben Limited;
  - Zoom Alliance; and
  - J. Stanley-Owusu (JSO) Limited; and
- Some small waste management operators, including:
  - Operators of motorized tricycles; and
  - Operators of "borla" taxis.

Receiving facilities for sorted waste from the WTS

- Operators of Kpone Landfill (Waste Landfills Company Ltd); and
- Accra Compost and Recycling Plant (ACARP).

Beneficiary communities

- Communities within Ga East, Adentan, La Nkwantanang Madina and Ayawaso West Municipalities.

Communities along Onyasia River downstream of project site

- These include:
  - Haatso;
  - West legon, etc.

6.3 Outcome of Stakeholder Consultations

Stakeholder consultations carried out so far have centred on the following issues that are necessary to be resolved in order to have successful consultations with the remaining stakeholders:

- Obtaining project designs and documents, and getting a good understanding of the project;
- Specific site for the project; and
- Land acquisition and approval process from the University of Ghana for the proposed project.

The consultations commenced in July 2018 and have involved the following stakeholders:

Project Proponent

- Ministry of Sanitation and Water Resources; and
- GARID Project Coordinating Unit.

Other Government Authorities

- Department of Urban Roads

Local Government Authority/Operator of the WTS

- GEMA, including:
  - Waste Management Department; and
  - Environmental Health and Sanitation Unit.

Landowner

- University of Ghana, Legon (including IESS).

Waste Collection/Management Companies in GAMA

- ESPA
- Some small waste management operators, including:
  - Operators of motorized tricycles; and
  - Operators of “borla” taxis.

Receiving facilities for sorted waste from the WTS

- Management of Kpone Landfill (Waste Landfills Company Ltd); and
- Accra Compost and Recycling Plant (ACARP).

A summary of the outcome of the stakeholder consultations is provided in **Table 6-1** and the evidence of consultations is provided in **Annex 5**.

Table 6-1: Summary of stakeholder consultations

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
Project Proponent				
- MSWR -GARID Project Coordinating Unit (PCU).	-K. Ohene Sarfo -Frank Dei -Henrietta Osei-Tutu (0206021605)	GARID PCU	Ongoing	Provided the available information and documents on the description, scope and design of the WTS project. Specifically, this included the following: • Project scope and description captured in the terms of reference (ToR); and • Preliminary layout for the proposed Waste Transfer Station.
Other Government Authorities				
DUR	Ferdinand Yali (0244513583)	Head, Environment Unit	26/9/2018	• The proponent(s) must write officially to inform DUR about the project. • The design of the access roads to the WTS must be submitted to DUR for their inputs. • A representative from DUR must be on the project team to provide technical inputs during project meetings and also act as a liaison between DUR and the proponents. • The access road after construction will be a public road hence maintenance of the road will be transferred to government. • DUR has Road Units within MMDAs which are responsible for maintenance of roads within their jurisdictions. The Road Unit within GEMA will therefore be responsible for maintaining the access road to the WTS. • DUR is mindful of the environmental and social impacts of the project, particularly traffic impacts and safety issues from moving of construction materials and equipment to site. Traffic impact assessment and traffic management plan should be prepared for the project.
Local Government Authority				
GEMA	Derrick Tata-Anku (0244016563)	Municipal Environmental Health Officer (MEHO)	13/7/2018	• The Environmental Health Unit is responsible for waste management in the municipality. It has two (2) zonal offices in Dome and Abokobi. Schedule Officers are in charge of bins and the operations of refuse trucks belonging to the Assembly. • Private waste management companies manage waste in most parts of the Municipality. • GEMA has sixty (60) bylaws for waste management. • The Assembly has budget provision for waste management though it is inadequate.

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				• GEMA is in the process of registering small waste management operators in the Municipality. • The Assembly had a successful meeting with the University of Ghana (UG) on acquiring the proposed site for the project. The UG authorities requested for the following documents/information: - Size of land; - Architectural drawings of the project; - ESIA report; and - Feasibility study report. • The Assembly should be empowered to manage the WTS facility. • Segregated organic waste from the WTS can be sent to the ACARP. • GEMA has distributed dustbins to 33 basic schools in the Municipality for waste segregation. The bins are labelled as organics, plastics and paper. Waste segregation is ongoing in these schools. • The Assembly intends to construct a paper factory under the 1D1F to recycle waste paper. • There should be good public education and sensitization on the project.
Land Owner				
University of Ghana	Charles Kofi Nti (0260759919)	Director (Physical Dev't and Municipal Services Dept.)	27/7/2018	• Confirmed that the Ga East Municipal Assembly has had initial discussions with the Vice Chancellor on the project. The University requested detailed information on the project to be able to make an informed decision. The University requires such information as: - Detailed project designs including land size needed; - Description of the operation of the waste transfer station; - End use of the sorted plastics and organic materials; - Copy of environmental assessment reports; and - Design of main and ancillary facilities such as access roads; etc. to study prior to any further discussions and decision. • After reviewing the project designs, the University may wish to schedule a meeting with all stakeholders including the Institute for Environment and Sanitation Studies (IESS) to further

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				discuss the project. • Confirmed that the proposed WTS may be sited near the Sewage Ponds as indeed some students from the IESS are already carrying out recycling project activities in the proposed area. This makes it prudent to involve the IESS in the project discussions.
Institute for Environment and Sanitation Studies (IESS) -See **Plate 6-1** for picture of meeting with IESS	Dr. Tedd Annan (0204336677)	Coordinator, IESS	--	• Confirmed that GEMA has had preliminary discussions with the university authorities earlier but follow up actions by the Assembly has been lacking. • It is envisaged that, the proposed Plastic Recycling and Compost Plant by IIESS and the proposed WTS would complement each other and further provide learning opportunities for IESS students. • The land size required by the WTS alone is estimated to be about 10 acres. Together with the IESS pilot projects, a total land area of up to 15 acres will be needed. • The parties will later have formal meetings to discuss and agree on the design concepts and relative locations of the various facilities on the available land. These must complement each other. • The IESS has ongoing initiative to segregate waste prior to collection at market places and market women have been trained to be at the forefront. GEMA also has similar programmes which involves national service personnel. Some good work is therefore being done already within the Assembly. • The IESS is happy with the prospects of partnering MSWR to implement the project. Their involvement should provide some comfort to all stakeholders especially the university authorities that best practices will be followed with minimal impact on the physical and social environment hence, there should be little or no inconvenience to life on the university campus. • This may be assured because the facilities will be rightly located at areas properly identified for both solid and liquid waste facilities on the campus. The proposed site is far from active areas on campus and aesthetic nuisances will be minimal. • The MSWR would immediately submit a formal request to the University through the IESS for urgent attention. The IESS will provide the required support to the request to receive swift approval from the University authorities.

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				• A formal response will be received from the university authorities within a week which should lead to the signing of a memorandum of understanding (MoU) between all parties. • The meeting was mindful of the urgent time constraints and expected that the formal approval from the university authorities will be received by 16 August 2018. • It is worth noting that the IESS has a MoU with the GEMA to jointly cooperate and partner to improve waste management in the Assembly.
Further consultation with IESS -See **Plate 6-2** for picture of further meeting with IESS	Dr. Tedd Annan (0204336677)	Coordinator, IESS	10/9/2018	• Concerns from IESS included the following: - Size of land required for the project; - Technology to be used; - Volumes of waste to be received at the WTS; - risk management of the WTS; - Role of the University in the construction and operation of the facility; and - Sustainability of the project. • The MSWR requested the IESS to partner the Ministry in the design of the project and assured the IESS of the sustainability of the project.
Waste Collection/Management Companies in GAMA				
ESPA	Ama Ofori Antwi (0208154588)	Executive Secretary	20/9/2018	• ESPA is an association of private waste companies handling waste for MMDAs. The solid waste members of the association include Zoomlion Ghana Ltd, Zoompak Ghana Limited, Meskworld Limited, Rural Waste Limited, Daben Limited, Zoom Alliance, J. Stanley-Owusu (JSO) Limited, ACARP, Waste Landfills Co. Ltd, etc. • MMDAs are responsible for providing disposal sites for waste within their jurisdictions. • Current disposal sites within GAMA include the Kpone landfill, Weija, Nsumia and Pantang dump sites. The Kpone, Weija and Nsumia are approved dumpsites. • For efficient waste management, the turnaround distance should be 40km. The current turnaround distance is 80-90km. • About 4000 small waste collectors (users of motorized tricycles and "borla taxis") have been registered. Out of this number, only about 800 are under ESPA with about 500 being active members.

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				• Recommends that a private company is made to operate the WTS to ensure effective management and the sustainability of the project. • ESPA has competent Environmental Engineers and should be consulted by the Design Engineer/Consultant to provide useful inputs into the project design. • ESPA has had meetings with MSWR and provided recommendations to the Ministry on effective waste management which should be considered for the project. • The communities around the proposed project site will be the key recipients of any environmental and social impacts from the project and hence should be the key stakeholders considered for the ESIA.
Small waste management operators: -Operators of motorized tricycles -Operators of "borla" taxis. (See **Plate 6-3** for picture taken during consultations with some small waste management operators.	-Clement Forson -Ayi Aryeetey -Odartey Lamptey -Odartey Lawson	Small waste management operators	6/7/2018	• Refuse/waste is collected from various sites within GAMA including Spintex, Avenor, Alajo, Mallam, La Paz, etc. • The current operations at the temporary transfer station involves loading boys transferring waste directly from the "borla" taxis and motorized tricycles into transfer trucks belonging to Zoomlion. • The transfer trucks are inadequate, hence operators who are unable to offload their refuse have to park and wait till the next day or move to a dumping site to dump their refuse. This is partly the reason why some small waste management operators dump in unauthorized places so they can be able to go round to collect more waste from households and make money. • Small waste management operators are charged between Gh₵35 and Gh₵45 for their load (depending on the size of the truck) and they also pay Gh₵10 for the services of the loading boys. They consider the charges to be expensive and want it reduced for the operation of the new WTS to be constructed by this project. • The dumping of refuse by some small waste management operators at unauthorized places may also be attributed to the high charges/fees. • Employment opportunities should be created for the small waste management operators and the loading boys at the temporary transfer sites. • The loading boys at the current temporary transfer sites may lose their source of livelihoods

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				as the new WTS may not require loading boys. • The advantages and disadvantages of the project should be thoroughly considered.
Receiving facilities for sorted waste from WTS				
Waste Landfill Company Ltd (Operators of Kpone Landfill)	Kwei Dagadu (0208630954)	General Manager	14/9/2018	• The Kpone Landfill is owned by Tema Metropolitan Assembly (TMA) and operated by Waste Landfills Company Ltd. • The Kpone Landfill is designed to receive about 500 metric tons of waste per day, and receives only municipal solid waste and industrial waste. It does not receive liquid waste and hazardous waste. • An EIA was prepared for the Kpone Landfill. • The landfill site is technically full. By end of first quarter of 2019, the site will not be able to receive any waste unless it is expanded. • Most of the available lands around the site which were earmarked for expansion of the landfill have been encroached on. • Government has secured portions of the available land and has plans to construct additional one or two cells to extend the capacity of the facility by about 3-4 more years. • Environmental management and monitoring conducted at the site include the following: - Groundwater analysis; - Leachate; - Gas; - Dust control; - Vector control; and - Odour. • Environmental monitoring reports are submitted to TMA. • Environmental monitoring reports, copies of the EIA, permit and other environmental reports/ documents should be obtained from TMA. • Fire control measures at the station include fire hydrants, fire extinguishers and a dedicated water tanker for emergency cases. • The project should consider other approved landfill sites such as Nsumia landfill (around

Stakeholder	Contact Person (s)	Role	Date	Concerns Raised/ Information Received
				Nsawam) and Adepa Landfill for the disposal of sorted waste. • Other waste transfer stations such as those at Achimota and Teshie should be consulted. They are currently underutilized due to the current charges at the stations. Waste collectors claim the charges at those stations are unaffordable, hence do not patronize them. • According to the Site Supervisors, receiving decomposable waste from the WTS will be preferable.
ACARP	Mawutor Attah	Project Manager	2/10/2018	• ACARP has a design capacity of 600 metric tons per 16-hours and thus processes 300 metric tons of municipal solid waste per every 8-hour shift. • The facility receives and processes municipal solid waste. It does not receive medical, construction and hazardous waste. • ACARP has a contract with the government of Ghana to manage waste and does not charge waste collection operators for the waste brought to the facility. • ACARP currently processes around 250 metric tons of waste per 8-hour shift, which is around 80-90% of the Plant's design capacity. • ACARP has unlimited capacity to receive sorted waste material from the WTS, i.e. sorted recyclable materials or sorted organic materials. This is because sorted materials will be readily processed without going through the material recovery facility which is limited by its design capacity. • ACARP will be currently limited in receiving unsorted waste from the WTS due to the plant's current capacity. However, plans have commenced to expand the facility to about 1200-1500 metric tons per day. When this is done, the plant will be able to receive and process more unsorted waste. • According to the Project Manager of ACARP, the planned expansion is expected to be carried out in 2019. • The project proponents must officially inform ACARP about the WTS project, including the project timelines so ACARP can factor it in their plans. • Effective collaboration between the project proponents and ACARP will contribute to effective implementation of the WTS project.

Plate 6-1: Picture of stakeholder meeting between officials of MSWR, GEMA, IESS and Safeguard Consultant

Plate 6-2: Picture of further consultation between officials of IESS, MSWR, GEMA, World Bank and Safeguard Consultant

Plate 6-3: Picture of consultation with some small waste management operators

6.4 Further Stakeholder Consultations

Stakeholder consultation is an ongoing process and will be carried out throughout the project's life cycle. Further consultations will be carried out by MSWR, GEMA and the private operator of the WTS throughout the project implementation. GEMA has been engaging communities within the Ga East Municipality including Haatso and West Legon, as well as schools on waste segregation as part of the planning for improved waste management projects within the Municipality, including the WTS project. A stakeholder engagement plan which will be followed to ensure further engagement with stakeholder communities of the WTS project is provided in **Table 6-2**.

Table 6-2: Stakeholder engagement plan for further engagement with beneficiary communities

Stakeholder	Information to be shared	Method of engagement	Responsibility for engagement
University community (including students)	***Preparatory Phase*** • Project designs • Project schedules and timelines • ESIA report • Grievance redress process	-Formal meetings -Submission and joint review of project designs -Disclosure of ESIA documents at Library	-MSWR -Design consultants -IESS
	Construction Phase • Project schedules and timelines • Grievance redress process	-Project meetings including representatives from UG on the management team. -Posters on notice boards	-Supervising Engineer -Contractor -MSWR/GEMA
	Operational Phase • Grievance redress process • Solicit views and opinions on the project.	-Project meetings including representatives from UG on the management team. -Posters on notice boards	-WTS Management Team -Private operator of WTS
Beneficiary communities (Ga East, Adentan, La Nkwantanang Madina and Ayawaso West Municipalities) *NB: This includes communities along Onyasia River, downstream of the WTS site.*	***Preparatory Phase*** • Project schedules and timelines • ESIA report • Project impacts and benefits • Grievance redress process	-Formal meetings with Municipal Assemblies and waste management operators -Disclosure of ESIA report at Municipal Assemblies -Municipal Information Service Department (ISD) information vans. -Posters on public notice boards.	-MSWR -GEMA
	Construction Phase • Project schedules and timelines • Project impacts and benefits • Grievance redress process	-Municipal Information Service Department (ISD) information vans. -Posters on public notice boards.	-Supervising Engineer -Contractor -MSWR -GEMA in collaboration with the beneficiary Municipal Assemblies
	Operational Phase • Grievance redress process	-Municipal Information Service Department (ISD)	-WTS Management Team

Stakeholder	Information to be shared	Method of engagement	Responsibility for engagement
	• Solicit views and opinions on the project.	information vans. -Community public address systems	-Private operator of WTS

7.0 IMPACTS IDENTIFICATION AND SIGNIFICANCE

7.1 Project Area of Influence

The project area of influence has been discussed under the following headings:

- Geographical;
- Physical Environmental;
- Community and Vulnerable Groups; and
- Institutional.

7.1.1 Geographical/Project Area of Influence

The geographical area of influence for the project will cover West Legon and the haulage routes to be used by incoming collection trucks to the WTS and outgoing transfer trucks from the WTS to the final disposal sites. Specifically, the project area of influence will include:

- Household sources and pick up points (skip/public container sites);
- Haulage/transport routes to the WTS;
- WTS;
- Haulage/transport route from WTS to final disposal sites (Kpone landfill and ACARP); and
- Kpone landfill site and ACARP, and other ancillary facilities (if any).

The larger geographical/project area of influence includes the municipalities within 5-7 km radius of the WTS which are the Ga East, Adentan, La Nkwantanang Madina and Ayawaso West municipalities.

7.1.2 Physical Environmental Media Influence

The physical environmental media to be potentially influenced by the activities of the WTS are the landscape of the project site, air quality, groundwater, Onyasia River, communities along the transport routes, Kpone landfill, ACARP, pick up points for solid wastes and other ancillary facilities. The landscape features include soil, flora and fauna at the project site which will be impacted by the project activities. The Onyasia River will be the recipient of any runoff from the project site. Any percolation of fuels during construction works and leachates from the operation of the WTS through the soil may impact on local groundwater resources. The air quality may also be impacted by dust and gaseous emissions from construction and operation of the WTS.

7.1.3 Community Influence and Vulnerable Groups

Communities to be affected

The implementation of the project would improve waste management for households and communities within 5-7 km radius of the WTS which are the Ga East, Adentan, La Nkwantanang Madina and Ayawaso West municipalities. Road users may experience some traffic impacts close to the project site due to the movement of vehicles/trucks. The project will also have public health and other socio economic concerns for the University of Ghana and West Legon communities during construction and operation.

Vulnerable groups

Vulnerable groups are those at risk of becoming more vulnerable due to impacts from the proposed project. Vulnerable people include, but not limited to:

- Disabled persons, whether mentally or physically;
- Elderly, usually from 70 years and above;
- Very sick and or physically weak individuals;
- Pregnant women;
- Children; and
- Waste pickers/scavengers.

7.1.4 Institutional Influence

The major institutions to be influenced or involved in the proposed project include:

- Ministry of Sanitation and Water Resources;
- Ministry of Works and Housing;
- Ministry of Local Government and Rural Development;
- GARID Project Coordinating Unit;
- Environmental Protection Agency;
- Ghana National Fire Service;
- Factories Inspectorate Department;
- Department of Urban Roads;
- Ga East Municipal Assembly;
- Waste Landfills Company Ltd (operators of Kpone Landfill);
- ACARP; and
- Other waste management companies and operators.

7.2 Project Activities of Environmental and Social Concern

7.2.1 Preparatory Phase

Preparatory phase activities to be carried out prior to the implementation of the proposed project include:

- Feasibility studies and survey works to determine suitable location for WTS;
- Environmental and social impact assessment of the WTS;
- Stakeholder consultations;
- Engineering designing;
- Approval process from University of Ghana to acquire land;
- Due diligence of the Kpone landfill and ACARP; and
- Permit and license acquisition.

7.2.2 Construction Phase

Construction phase activities include among others:

- Site clearing (clearing of vegetation);
- Sourcing and transportation of construction materials and equipment;
- Excavation and civil works;
- Construction of WTS main buildings and foundation;
- Construction of gate control buildings and foundation;
- Construction of support buildings and foundation (supervisors' offices, canteen, washing/changing rooms, etc.);
- Construction of workshops for repair and maintenance of trucks;

- Construction of washing facilities for trucks and other ancillary works;
- Installation of fire protection systems (including water supply and extinguishers);
- Electrical works;
- Construction of asphalt access road from main road/highway;
- Construction of site roads and parking areas;
- Construction of drainage systems, leachate and waste water and sanitary systems;
- Walling/fencing the boundaries of the WTS; and
- Disposal of construction debris/waste, etc.

7.2.3 Operational Phase

The main operational phase activities will be:

- Transportation of domestic and commercial waste from neighborhoods within Ga East, Adentan, La Nkwantanang Madina and Ayawaso West municipalities to WTS;
- Sorting of recyclable materials at WTS;
- Recycling of plastics;
- Composting of organic fraction;
- Transportation of residual waste from WTS to final disposal sites;
- Washing of transfer and collection trucks;
- Maintenance and repair of trucks;
- General maintenance of equipment and facilities;
- Leachate and waste water/effluent management; and
- Housekeeping.

7.3 Criteria of Impact Evaluation

7.3.1 Duration of the Impact

- A temporary impact can last days, weeks or months, but must be associated to the notion of reversibility.
- A permanent impact is often irreversible. It is observed permanently or may last for a very long term.

7.3.2 Extent/magnitude of the Impact

- The extent is regional if an impact on a component is felt over a vast territory or affects a large portion of its population.
- The extent is local if the impact is felt on a limited portion of the zone of study or by a small group of its population.
- The extent is site-specific if the impact is felt in a small and well defined space or by only some individuals.

7.3.3 Intensity of the Impact

- The intensity of an impact is qualified as strong when it is linked to very significant modifications of a component.
- An impact is considered of average intensity when it generates perceptible disturbance in the use of a component or of its characteristics, but not in a way to reduce them completely and irreversible.

- A weak intensity is associated with an impact generating only weak modifications to the component considered, without putting at risk some its utilization or its characteristics.

7.4 Determination of significance of impacts

The impact significance rating depends upon the impact evaluation and other factors such as:

- Sensitivity and value of the receptor;
- Compliance with relevant laws, regulations and standards;
- Concerns and views of stakeholders;
- Overall worker comfort; and
- Likelihood of an occurrence.

The impacts are rated according to the following categories:

- An impact of ***Low Significance*** referred to as a '**Minor Impact**' is one where an effect is experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value and is temporary;
- An impact of Medium Significance referred to as a '**Moderate Impact'**, is one which is within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching an established (legal) limit and is of longer duration; and
- An impact of High Significance referred to as a '**Major Impact'** is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resources/receptors.

7.5 Evaluation of Potential Positive Impacts

The potential positive impacts of the proposed project are stated below.

- Improved waste management and sanitation;
  - Shorter distance and time to evacuate refuse from generation point.
  - Reduced haulage cost.
  - Reduced operational difficulties from daytime traffic.
  - Recycling of plastics and composting of organic fraction.
- Cleaner city and improved health of citizens;
  - Timely evacuation of refuse from generation points.
  - Reduced over-spillage of refuse leading to unsightly and insanitary conditions.
  - Reduced dumping of refuse in unauthorized places by smaller waste collection operators.
  - Less breeding of disease vectors and spread of communicable diseases.
- Improved drainage system and flood resilience;
  - Reduced indiscriminate dumping of refuse into drains by households and smaller waste collection operators.
  - Reduce spillage/overflow of refuse which may end up in drains, water courses and streams.
  - Reduced blockage of drains by solid waste.
- Collaboration and research/learning opportunities for the University of Ghana in the following areas:
  - Solid waste segregation and management;
  - Composting; and
  - Recycling.
- Employment generation during construction and operation phases;

    - Engagement of skilled and unskilled labour during construction phase.
    - Engagement of skilled labour during the operation phase.
- Improved revenue generation and economy;
    - Efficient and effective waste collection and management.
    - Increased tourism potential from cleaner and beautiful city.
    - Reduced health spending on communicable diseases.
    - Reduced flood losses and spending on flood disaster relief.

7.6 Evaluation of Potential Adverse Impacts

The potential adverse environmental and social impacts of the proposed project are grouped under the following:

- Preparatory Phase Impacts;
- Construction Phase Impacts; and
- Operational Phase Impacts.

7.6.1 Potential Preparatory Phase Impacts

The adverse environmental and social issues which could possibly arise from preparatory phase activities may include:

- Loss of 10 acres (4ha) of undeveloped land by UG.
- Injury and animal bites to surveyors and design engineers; and
- Disturbance of flora and fauna.

7.6.2 Potential Construction Phase Impacts

The adverse environmental and social issues which could possibly arise from construction phase activities may include the following;

- Loss of common vegetation and disturbance of fauna at project site;
- Soil impacts (soil erosion and contamination);
- Increase in turbidity and silting of the stabilization ponds and Onyasia River;
- Air quality deterioration (airborne particulates, exhaust fumes – NO_2, SO_2) around the project site and haulage routes;
- Vibration and noise nuisance in the vicinity of the project site;
- Alteration to the physical landscape and view of the project site;
- Occupational Health and Safety issues (accidents, injury/ailments to workers);
- Traffic disruption and risk of accidents at WTS site and along haulage routes;
- Generation and disposal of waste;
- Sanitation and public health issues (unsightly conditions, cholera and malaria infestation) in communities around project site;
- Destruction of cultural heritage or archaeological site;
- Unwanted pregnancies and transmission of HIV/AIDS and other sexually transmitted diseases (STDs); and
- Child labour and abuse of construction workers.

7.6.3 Potential Operational Phase Impacts

The adverse environmental and social issues which could possibly arise from operational phase activities may include the following:

- Nuisance from odour at the University and Haatso community;
- Noise and vibration at the WTS and from operation of collection and transfer trucks;
- Alteration to the physical landscape and aesthetic view of the project site;
- Surface and groundwater pollution;
- Breeding of disease vectors and risk of vector borne diseases;
- Public nuisance from windblown solid waste, broken down waste collection vehicles and clandestine dumping;
- Occupational Health and Safety issues (accidents, injury/ailments to workers);
- Traffic disruption and risk of road accidents on WTS access roads and along haulage routes;
- Sanitation and public health issues (unsightly conditions, cholera infestation) in communities around project site;
- Risk of fire at WTS from combustible waste; and
- Hiring of minors and abuse of workers at the WTS.

7.6.4 Evaluation of Adverse Impacts

The potential adverse environmental and social impacts identified for the various phases of the project are evaluated in **Table 7-1.**

Table 7-1: Evaluation of Adverse Impacts

No.	Potential Impact	Receptor(s)	Description of Potential Impact	Impact Evaluation			Impact Significance
				Extent	Duration	Intensity	
Preparatory Phase							
1	Loss of 10 acres (4ha) of undeveloped land by UG	-	The proposed site for the construction of the WTS at West Legon belongs to University of Ghana and is currently undeveloped. By committing the land to this project, the university will lose the prospects and gains from utilizing the land for other ventures. The MSWR and the GARID Project Coordinating Unit must follow due processes in engaging the University authorities to release the land for the project. The land acquisition process must also be in accordance with OP 4.12.	Site-specific	Permanent	Strong	Major
2.	Injury and animal bites to surveyors and design engineers	Surveyors, Consultants	Field workers including surveyors and design engineers may be exposed to hazards (e.g. trips and falls, danger from possible contact with dangerous reptiles like snakes) during feasibility/field studies and during pegging and demarcation of project construction site. This effect can be prevented or minimized by wearing appropriate personal protective equipment such as safety boots and gloves.	Site-specific	Temporary	Weak	Minor
3.	Disturbance of flora and fauna	Soil, flora and fauna	Movement of personnel and vehicles during feasibility studies and survey works may result in trampling of flora and disturbance of fauna.	Site-specific	Temporary	Weak	Minor
Construction Phase							
1.	Loss of common vegetation and disturbance of fauna at project site	Soil, flora and fauna	Vegetation clearance for construction works at the proposed project site will result in loss of flora and disturbance and/or loss of fauna at the site. Field inspections show that the vegetation to be lost are common in the project area and no species of ecological value will be lost.	Site-specific	Permanent	Weak	Minor
2.	Soil impacts (soil erosion and contamination)	Soil	Vegetation removal, excavation and other land preparation works will expose and loosen the soil making it susceptible to erosion. There is also possibility of soil contamination from fuel/oil spills during construction works.	Local	Temporary	Average	Moderate

No.	Potential Impact	Receptor(s)	Description of Potential Impact	Impact Evaluation			Impact Significance
				Extent	Duration	Intensity	
3.	Increase in turbidity and silting of the stabilization ponds and Onyasia River	Stabilization ponds. Onyasia River	Storm water run-off at the project site after vegetation removal will transport loose soil sediments which may end up in the stabilization ponds and the Onyasia River. Windblown soil sediments may also end up in the stabilization ponds and the Onyasia River. This will increase the turbidity and sediment build up in the stabilization pond and Onyasia River. The physical disturbance of the Onyasia River will negatively affect its biology. Vegetated land between the project site and the tributary of the Onyasia River will act as a buffer and screen soil sediments from entering the river. The Onyasia River is an urban stream which transports storm water and rain water, and does not have significant aquatic life.	Local	Temporary	Weak	Minor
4.	Air quality deterioration (airborne particulates, exhaust fumes – NO_2, SO_2) around the project site and haulage routes	Air, workers, public	Loose and exposed soils from land preparation works and tipping of soil by trucks at the site during windy conditions will increase airborne particulates affecting the air quality. Trucks conveying soil to the site which are uncovered may also increase airborne particulate matter along the haulage routes. Exhaust fumes from construction machinery and trucks will also affect the air quality	Local	Temporary	Weak	Minor
5.	Vibration and noise nuisance in the vicinity of the project site	Air, workers, public	The operation of construction machinery (graders, excavators, concrete mixing machines, etc.), carpentry works and the movement and tooting of trucks will increase the noise level at the project site and immediate surroundings. The project site is however largely isolated from human dwellings or human activities.	Local	Temporary	Weak	Minor
6.	Alteration to the physical landscape and view of the project site	Public	Construction works at the site will alter the landscape character and view of the area for road users. There will be movement of vehicles and trucks to and from the site during construction. Hoarding of the site will screen off the construction works from public view. The site is	Local	Temporary	Weak	Minor

No.	Potential Impact	Receptor(s)	Description of Potential Impact	Impact Evaluation			Impact Significance
				Extent	Duration	Intensity	
			also largely isolated from human dwellings or human activities.				
7.	Occupational Health and Safety issues (accidents, injury/ailments to workers)	Construction Workers	Occupational health and safety issues associated with the construction works include: • Exposure of workers to noise, vibration and dust; • Accidents in the use and handling of equipment and machinery; and • Injury to the body during the use and handling of equipment and machinery.	Local	Temporary	Strong	Major
8.	Traffic disruption and risk of accidents at WTS site and along haulage routes	Road users	The transportation of construction materials to the site may pose safety risk to road users along the haulage route and may induce traffic congestion. Breakdown of trucks carrying materials to the site may also cause traffic and induce road traffic accidents. There may also be disturbance/blocking of access roads/routes to the University of Ghana sewage treatment plant and botanical garden.	Local	Temporary	Average	Moderate
9.	Generation and disposal of waste	Land, Onyasia River, stabilization ponds	Vegetative material and excavated soil will form the bulk of construction waste generated at the project site. Other construction spoil will include used nails, wood chippings, plastics and pieces of iron rods, etc. Construction workers may also generate human and domestic wastes such as used polythene bags, food wastes, used water sachets and bottles which need to be properly managed and disposed.	Site-specific	Temporary	Average	Moderate
10.	Sanitation and public health issues (unsightly conditions, cholera and malaria infestation) in communities around project site	Soil, workers, public	Poor housekeeping at the project site and improper disposal of waste (construction waste, food waste, polythene bags, drinking water sachets, etc.) will create sanitation problems. Open defecation around the site may be promoted if adequate toilet facilities are not provided for the construction workers. Open or improperly covered trenches may also result in stagnant water and breeding of mosquitoes, leading to malaria infestation.	Local	Temporary	Average	Moderate

No.	Potential Impact	Receptor(s)	Description of Potential Impact	Impact Evaluation			Impact Significance
				Extent	Duration	Intensity	
11.	Destruction of a cultural heritage or archaeological site	Cultural heritage/ archaeological site	No culturally sensitive sites were identified by the consultant at the project site during the field inspections. However, in the unlikely event of a chance find during construction works, the procedure to follow will be as follows: • All construction activity in the area will cease immediately; • The find location will be recorded and necessary steps taken to secure/protect the area; and • The Supervising Engineer for the construction works will inform the MSWR to engage an archaeologist/cultural heritage expert to assess the finding and advise on the necessary steps.	Site-specific	Permanent	Weak	Minor
12.	Unwanted pregnancies and transmission of HIV/AIDS and other STDs	Haatso community, University students	Irresponsible sexual behaviour from construction workers could lead to HIV/AIDS infections, other sexually transmitted diseases and teenage/unwanted pregnancies particularly among the youth within the Haatso community and students of the University.	Local	Temporary	Strong	Major
13.	Child labour and abuse of construction workers	Construction workers, children	Improper conduct by the Works Contractor may result in agitations with workers. There is also a possibility of the Contractor hiring minors (child labour) for the construction works, or engaging in acts of sexual exploitation and other forms of exploitation of workers if proper checks and monitoring are not enforced.	Site-specific	Temporary	Strong	Major
Operational Phase							
1.	Nuisance from odour at the University and Haatso community	University community, Haatso community	Organic waste is the major constituent of waste generated in GAMA. Where waste is not evacuated from the collection point on time, the organic components will start decomposing and produce a foul smell which gets stronger with time. This may cause nuisance to the public when being transported to the WTS and from the WTS to the final disposal point. Strong foul smell from the WTS site may also impact on the university community.	Local	Permanent	Strong	Major

No.	Potential Impact	Receptor(s)	Description of Potential Impact	Impact Evaluation			Impact Significance
				Extent	Duration	Intensity	
2.	Noise and vibration at the WTS and from operation of collection and transfer trucks	Workers, University community, public	Noise and vibration from the operations of the WTS will largely arise from operations of machines such as the plastic recycling plant, loading equipment and conveyance systems. Empty waste collection and transfer trucks on damaged roads may also vibrate and generate some noise. The proposed buffer area to be constructed around the facility will screen/absorb and minimize noise impacts. The use of acoustic screens, silencers and appropriate PPE (ear plugs) around noise generating machines will minimize the impacts on workers. The proposed project site is also isolated from human dwellings.	Local	Permanent	Weak	Minor
3.	Alteration to the physical landscape and aesthetic view of the project site	Landscape, University community, public	The operation of the WTS will affect the aesthetic view of the project area particularly through the movement of trucks to and from the WTS and the activities of workers at the WTS. Poor housekeeping at the WTS will also affect the aesthetic view. The proposed project site is isolated from human dwellings/activities as indicated in section 3.2. The nearest students' residential facility/hostel is located about 800 metres from the site. The area between the students' residential facility/hostel and the project site is largely vegetated with shrubs and trees which will help screen the WTS from students' view. The project designs also include walling/fencing of the WTS and the creation of a vegetated buffer area around the WTS. This will screen the WTS from public view and minimize the visual impacts. A dedicated access road will also be created for the WTS which will be different from the access points used by students, staff and the public to the university.	Local	Permanent	Weak	Minor
4.	Surface and groundwater pollution	Soil, Onyasia River, stabilization ponds	Wet solid waste brought to the WTS will generate leachate which could result in surface and groundwater pollution if not managed properly. Washing of collection and transfer trucks at the WTS will also generate wastewater which must be managed properly to	Regional	Permanent	Strong	Major

No.	Potential Impact	Receptor(s)	Description of Potential Impact	Impact Evaluation			Impact Significance
				Extent	Duration	Intensity	
			prevent water pollution. This may be worsened during periods of rainfall. Leachate may also be generated from storing and processing areas. Clandestine dumping by recalcitrant waste management operators in open areas and drains will lead to surface water pollution.				
5.	Breeding of disease vectors and risk of vector borne diseases	University community, public	Decomposing organic waste, together with poor housekeeping and insanitary conditions at the WTS will provide suitable conditions to attract rodents, flies, cockroaches and other disease vectors. This can result in the spread of vector-borne diseases. Congestion at the WTS will lead to delays in waste evacuation from households and public dump sites, and may lead to breeding of disease vectors and risk of vector borne diseases.	Local	Permanent	Strong	Major
6.	Public nuisance from windblown solid waste, broken down waste collection vehicles and clandestine dumping	Road users, communities along haulage routes	Solid waste, especially polythene, could be blown off from waste collection trucks during transport, particularly "borla taxis" and motorized tricycles which are not covered, causing public nuisance. Unserviced waste collection vehicles transporting waste to the WTS may develop faults and breakdown along the road. If these are not quickly fixed and removed, they will produce foul smell in the vicinity and cause a nuisance in the area. Clandestine dumping by recalcitrant waste management operators, particularly operators of motorized tricycles and "borla taxis" in open areas, drains, streets, etc. or at the vicinity of the WTS will cause public nuisance.	Local	Temporary	Average	Moderate
7.	Occupational Health and Safety issues (accidents, injury/ailments to workers)	Workers at WTS	Workers/operators at the WTS will be exposed to odour and insanitary conditions at the WTS which could affect their health. Injuries may also occur from sharp objects at the WTS especially during sorting of recyclable materials. Operators/drivers of collection and transfer trucks and other machinery such as the plastic recycling plant at the sight will also be at risk of accidents.	Local	Permanent	Strong	Major

No.	Potential Impact	Receptor(s)	Description of Potential Impact	Impact Evaluation			Impact Significance
				Extent	Duration	Intensity	
8.	Traffic disruption and risk of road accidents on WTS access roads and along haulage routes	Road users, Public	The movement of collection and transfer trucks to and from the WTS may pose safety risk to road users along the haulage route and may induce traffic congestion. Breakdown of trucks carrying materials to the site may also cause traffic and induce road traffic accidents. Delays in transferring waste from the WTS to final disposal points may cause the WTS to be congested. Waste collection trucks may have to wait for hours/days to dump their waste which will lead to congestion at the WTS and could trickle onto access roads to the site. This will cause traffic impacts, compromise public safety	Local	Permanent	Strong	Major
9.	Sanitation and public health issues (unsightly conditions, cholera infestation) in communities around project site	Public	Garbage may fall off or get blown by wind from overloaded and improperly covered small waste collection vehicles such as motorized tricycles and "borla" taxis during transport to the WTS. There may also be leakages from waste collection trucks which are in bad condition during transport of wet weather solid waste to the WTS. These may cause insanitary conditions along the road and may get washed off into drains and nearby water courses.	Local	Permanent	Average	Moderate
10.	Risk of fire at WTS from combustible waste	Workers at the WTS	Waste to be transported to the WTS is mainly organic and also paper/ cardboard, plastic materials and rubber. These are combustible waste and pose fire risks. Any fire outbreak at the WTS may cause significant harm/damage to workers, property and the environment.	Site-specific	Permanent	Strong	Major
11.	Hiring of minors and abuse of workers at the WTS	WTS workers	There is a possibility of the private operator hiring minors at the WTS or engaging in acts of sexual exploitation, physical abuse and other forms of exploitation of workers if proper checks and monitoring are not enforced.	Site-specific	Permanent	Strong	Major

8.0 MITIGATION AND ENHANCEMENT MEASURES

Mitigation and enhancement measures for the significant potential adverse impacts have been proposed in **Table 8-1** to ensure that the project impacts are managed within reasonable and acceptable limits. Table 8-1 is structured according to the Ghana EPA format for ESIA. The general rules followed in designing the mitigation measures are listed below:

a) Avoidance of major impacts: major impacts are impacts where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resources/receptors;
b) Reduction of major and moderate impacts: moderate impacts are impacts within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching an established (legal) limit; and
c) Minor impacts occur where effects are experienced, but the impact magnitudes are sufficiently small and well within accepted standards, and/or the receptors are of low sensitivity/value.

In addition to the mitigation and enhancement measures for significant potential adverse impacts, design considerations have been proposed in **Table 8-1** to be incorporated during the project design (preparatory phase), as well as environmental, health and safety recommendations for the final disposal sites.

8.1 Type of Mitigation Measures

The mitigation measures adopted may be grouped under three major types which comprise:

- Preventive measures;
- Control measures; and
- Compensatory measures.

8.1.1 Preventive Measures

These are measures adopted during the design and pre-construction phase. The measures are aimed at avoiding or minimising potential major impacts at source. Avoiding or reducing an impact at source is essentially 'designing' the project so that a feature causing an impact is designed out (e.g. site selection to avoid sensitive areas) or altered (e.g. working at night where necessary) or avoided (e.g. community sensitisation programmes to avoid conflicts or confrontations).

8.1.2 Control Measures

These are measures adopted to abate or remedy the impacts occurring during construction and operation/maintenance phases. Impacts can be abated on site or at receptor end. Where there is unavoidable damage to a resource, repair or remedy of impacts may be applied, e.g. vegetation clearing during land preparation. In this case repair essentially involves re-vegetation of the affected parts.

8.1.3 Compensatory Measures

Where other mitigation measures are not possible or fully effective, compensation, when required, will be provided in accordance with the local standards as set forth by the relevant entities such as the Water Resources Commission.

8.2 Summary of Significant Potential Adverse Impacts

The significant adverse impacts (rated as moderate or major) identified from the analysis and evaluation of the potential impacts from the proposed project in the preceding Chapter are summarized below.

Preparatory Phase

- Loss of 10 acres (4ha) of undeveloped land by UG.

Construction Phase

- Soil impacts (soil erosion and contamination);
- Occupational Health and Safety issues (accidents, injury/ailments to workers);
- Traffic disruption and risk of accidents at WTS site and along haulage routes;
- Generation and disposal of waste;
- Sanitation and public health issues (unsightly conditions, cholera and malaria infestation) in communities around project site;
- Unwanted pregnancies and transmission of HIV/AIDS and other sexually transmitted diseases (STDs); and
- Child labour and abuse of construction workers.

Operational Phase

- Nuisance from odour at the University and Haatso community;
- Surface and groundwater pollution;
- Breeding of disease vectors and risk of vector borne diseases;
- Public nuisance from windblown solid waste, broken down waste collection vehicles and clandestine dumping;
- Occupational Health and Safety issues (accidents, injury/ailments to workers);
- Traffic disruption and risk of road accidents on WTS access roads and along haulage routes;
- Sanitation and public health issues (unsightly conditions, cholera infestation) in communities around project site;
- Risk of fire at WTS from combustible waste; and
- Hiring of minors and abuse of workers at the WTS.

8.3 Mitigation Measures for Significant Potential Adverse Impacts

The mitigation measures for the identified adverse impacts are summarized in **Table 8-1**.

Table 8-1: Proposed mitigation and enhancement measures for potential impacts

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
Preparatory Phase Impacts		
Loss of 10 acres (4ha) of undeveloped land by UG	University of Ghana	• The UG authorities will be adequately consulted on the project to obtain their free, prior and informed consent on the project. • The IESS (UG) is desirous of partnering the MSWR to implement the project and therefore will assist to acquire the land for mutual benefit. • The MSWR will follow all due processes as maybe spelt out by UG to obtain official approval or acquire the land for the project and obtain all necessary documentation. • Land acquisition will be in accordance with OP 4.12. • The concept note and draft MoU under consideration between MSWR, GEMA and UG is attached as **Annex 6**.
Design considerations for the WTS	Project	The design of the WTS will incorporate the following: • Constant (24-hour) water supply; • Leachate and wastewater treatment system; • Proper drainage system to channel out leachates and wastewater to the leachate and wastewater treatment system. • Fencing and/or construction of wall and green buffers on the WTS boundary. • Industrial odour control fans or ventilation system to capture and control odour at the WTS. • A misting system and exhaust for neutralizing odour at the WTS when necessary. The air exhaust will have a biofilter to further reduce the odour before entering the external environment. • The layout of the WTS will take into consideration the predominant wind direction (south-south westerly) and the facility will have adequate ventilation to ensure it is well aerated, especially the sorting and storage area. • Proper and extended roofing to prevent rain from getting inside. • An Operations & Maintenance Plan which should include specific schedule for the operations of the facility (waste collection, hauling, sorting and transfer to Kpone landfill and ACARP) based on Material Flow Analysis.
Construction Phase Impacts		
Soil impacts (soil erosion and	Soil	• Vegetation at the proposed WTS site will only be cleared when actual

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
contamination)		construction work begins and will be limited to the demarcated site. This will minimize the period of exposure of the soil to reduce erosion and sediment transport into the into stabilization ponds and tributary of Onyasia River. • Excavated soil material will be immediately used for backfilling and any excess material immediately collected from site for disposal at approved dump sites. This will ensure loose soil materials are not left on site for long periods. • The contractor will reduce the quantity of heaped sand at the project site by delivering quantities required for construction over a specified period and ensure that any heaped sand for construction works will be covered with tarpaulin to prevent wind and water transport of soil particles. • No fueling or oil change of machinery/trucks/vehicles will be carried out on site.
Occupational Health and Safety issues (accidents, injury/ailments to workers);	Construction workers	• The Contractor will be required have a Health & Safety Policy to guide the construction activities. The Health & Safety Policy will at least have the following outline: o General policy statement o Commitments for the following: - Training - Carrying out risk assessment - First aid - Welfare facilities - Personal protective equipment (PPE) - Hazardous chemicals - Accident reporting - Dust - Noise o Responsibilities (for what and who reports to who). • Health and safety induction will be provided for all workers. • Only well-trained and experienced personnel will be engaged for the construction works, especially for the operation of heavy machine or equipment. Only drivers and operators with the requisite licenses will be allowed to handle vehicles and machinery. • Initial training and testing in machine/equipment handling and safe working procedures will be given to all new drivers and machine operators to help

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
		minimise the occurrence of accidents on site. • The contractor will ensure that machinery used for construction works are in good condition and are well serviced. Good conditioned and well maintained equipment will reduce frequent breakdowns, noise nuisance and smoke emissions which could affect the operators' and other workers' health and safety. • Proper supervision and monitoring will be ensured during the construction works. Supervisors will be trained and tasked to ensure all safety rules and procedures, including the use of PPE, are adhered to at all times by all workers. They will apply appropriate sanctions where these procedures are not followed. • The contractor will provide and enforce the use of appropriate personal protective equipment (PPE) such as safety boots, rain coats, hand gloves, earplugs and nose masks. Sanctions will be implemented where this is not followed. • First aid kits will be provided on site and supervisors trained to administer first aid for minor ailments/injuries on site. Major cases will be referred to the UG Hospital (nearest hospital or health post to the project site).
Traffic disruption and risk of accidents at WTS site and along haulage routes	Road users (including pedestrians), UG community, communities along haulage routes	• The Contractor will prepare and implement a Traffic Management Plan during the construction of the WTS. The Plan will be approved by the Supervising Engineer/MSWR prior to implementation. • The project site will be cordoned off and strict security measures enforced to prevent entry of unauthorized persons to the site. • Warning signs will be used at vantage points to warn the public against dangers. • Drivers will be trained on safe driving and vehicle procedures. • The contractor will ensure that all haulage trucks comply with an approved speed limit of 30-50km/hr[1] within the communities along the haulage road. • Any broken down vehicles will be immediately removed off the road. • The contractor will adjust material/equipment delivery times to avoid peak traffic periods. • Officials of the Motor Traffic and Transport Directorate (MTTD) of the Ghana

[1] http://www.mrh.gov.gh/files/publications/Drivers_Guide.pdf

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
		Police Service will be engaged where necessary to direct traffic at the junction on the Haatso-Atomic Road (which leads to the project site, sewage treatment plant and botanical gardens) to reduce traffic congestions. • Awareness creation and sensitization will be organized for workers and the public on prevention of HIV/AIDS and other sexually transmitted diseases.
Generation and disposal of waste	Land, water bodies	• The contractor will develop and implement a waste management plan for the construction works. The construction waste management plan will provide details on the following: o Who will be responsible for resource management. o What types of waste will be generated. o How the waste will be managed (reduced, reused, recycled). o Which contractors will be used to ensure the waste is correctly recycled or disposed of responsibly and legally. o How the quantity of waste generated by the project will be measured. • The contractor will adopt efficient construction methods and re-use of construction materials to minimize the waste to be generated from the construction works. Excavated soil material will be re-used in backfilling and levelling as much as possible. • The contractor will ensure waste segregation at the site. Different bins/skips will be provided for the different types of waste generated such as scrap metals, plastic materials, etc. • Recyclable waste such as plastics/polythene and scrap metals will be sold to authorized recyclers for recycling. • Vegetative and excavated material which cannot be re-used as well as other construction waste such as wood chippings will be frequently collected and disposed at the nearest GEMA approved dumpsite. These will form the bulk of waste generated at the construction site.
Sanitation and public health issues (unsightly conditions, cholera and malaria infestation) in communities	UG community, communities along haulage routes	• The contractor will ensure proper housekeeping at the project site. • The contractor will provide adequate waste bins at the project site for use to minimize indiscriminate disposal of plastic and polythene material, cans and food waste by the workers. These bins will be frequently transported and emptied at approved dump sites. This will prevent the littering of the project site with cans and bottles which could collect water and breed mosquitoes.

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
around project site		• The contractor will provide temporary toilet facilities for the construction period for use by workers. Workers will be educated against open defecation and any person found engaging in it will be sanctioned. • Excavations will be immediately covered and properly levelled after they have served their purpose to prevent collection of water which can breed disease borne vectors such as mosquitoes.
Unwanted pregnancies and transmission of HIV/AIDS and other STDs	Construction workers, public	• The Works Contractor, in collaboration with relevant stakeholders such as the Ga East Municipal Health Directorate, will organize awareness creation and educational programmes for all construction workers and the general public on behavioural changes required to prevent teenage/unwanted pregnancies and the spread of HIV/AIDS and other STDs.
Child labour and abuse of construction workers	Construction workers	• The Works Contractor will develop a Code of Conduct/Ethics to be vetted and approved by MSWR prior to engagement. This will include transparency with workers, working conditions, not engaging trafficked persons, etc. • The Works Contractor will thoroughly check the background of any person to be hired to ensure they are of the right age (above 18 years). • The Works Contractor would ensure that there will not be any form of exploitation of workers including forced labour or services, sexual exploitation, prostitution etc.
Operational Phase Impacts		
Nuisance from odour at the University and Haatso community	University community, Public	**<u>Waste Collection and Transfer</u>** • A weekly schedule for waste collection from each of the Municipalities will be drawn and strictly followed to ensure regular waste collection. • Only good conditioned trucks (leak-free) will be used for waste collection and transfer to prevent leakages during transport. Any private company/individual registering to provide waste collection/transfer services will have their trucks thoroughly inspected before getting approval. Regular inspections of trucks will also be conducted by the management of the WTS and any trucks found to be in poor condition will be suspended. • All open trucks for waste collection will be covered with tarpaulin when transporting waste to the WTS. • Only enclosed trailers will be used for waste transfer.

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
		Operations of the WTS • Good housekeeping will be practiced at the WTS including regular cleaning/ washing and disinfecting of sorting and storage areas, equipment, drains and other surfaces which come into contact with waste. • Waste collection and transfer trucks will be regularly washed and disinfected. • The organic fraction of the waste will be composted at the composting station. • Residual waste will be regularly collected (daily) from the WTS and transferred to the Kpone landfill or ACARP.
Surface and groundwater pollution	Soil, Onyasia River, stabilization ponds	• The WTS design will include a drainage system for collecting, storing and treating leachate and wastewater from the operations of the WTS. • Leachate and wastewater treatment system will be included in the design of the WTS. • The sorting and storage floors, and the washing area for trucks will be gently sloped to channel leachate and wastewater through the drainage system for treatment. • All operational areas of the WTS including composting, sorting area, storage area, washing area for trucks, etc. will be concreted to prevent ground seepages. The concrete floor will be regularly inspected and maintained. • Ideal composting condition as recommended by the US EPA (1995) will be maintained. This includes: o Carbon: nitrogen (C:N) ratio between 25:1 and 35:1; o Moisture content of 50 to 60% of total weight during treatment (and less than 50% for marketing following screening); o Balance between particle size and void space to promote rapid decomposition. Void space will be sufficient to achieve a 10 to 15% oxygen level within the pile in aerobic systems; o Optimum temperature levels which can range between 32 and 60 °C. Pathogen destruction will be achieved by attaining and maintaining a temperature of 55 °C for 15 days in a windrow system. o pH of between 6 and 8.
Breeding of disease vectors and risk of vector	University community,	• The WTS will be regularly disinfected, particularly the working areas (sorting floor, storage area, etc.) and the entire facility regularly fumigated.

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
borne diseases	public	• Good housekeeping will be practiced at the WTS. • Residual waste will be collected daily and transferred from the WTS to the Kpone landfill or ACARP to reduce the storage time at the facility. • The tipping, sorting and storage areas will be washed and disinfected at the end of every operational day after the decomposable waste has been collected from the WTS. • Other potential breeding areas such as the drains will be regularly cleaned and disinfected. The drains and washing areas will be well sloped to prevent collection of stagnant water. • The WTS facility will be regularly inspected to seal/screen any openings that will allow rodents and insects into the facility.
Public nuisance from windblown solid waste, broken down waste collection vehicles and clandestine dumping	Road users, communities along haulage routes	• All open waste collection trucks including motorized tricycles and "borla" taxis will be covered with tarpaulin during transport of waste to the WTS. • The WTS will have a vehicle maintenance team equipped with all the necessary logistics who will be called upon to immediately fix any broken down collection/transfer truck on the road. Any truck with a major fault which cannot be fixed immediately will be towed off the road to the WTS for fixing. Alternatively, Management of the WTS will contract a licensed vehicle maintenance company to provide the above services. • Standby trucks will be readily available to offload the waste from broken down trucks where necessary. • All waste management operators, including operators of motorized tricycles and "borla" taxis within GAMA will be registered. • Management of the WTS will enforce strict monitoring procedures to strictly monitor the activities of waste management operators in and out of the WTS. • Contact numbers of the WTS will be made known to the public to report all recalcitrant drivers found dumping waste in unauthorized places. • Punitive measures will be taken against any driver found/reported to be have dumped refuse in unauthorized places. Punitive measures will include a life-time ban from engaging in waste management operations. • Fees to be charged at the WTS will be set in consultation with stakeholders, including the waste management operators to ensure all parties are in agreement. This will prevent setting of charges which may be perceived by

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
		some waste management operators as unduly high, and thus force recalcitrant operators to dump in unauthorized places. • MMDAs will provide adequate bins along walkways and in public areas within their jurisdictions and ensure the bins are always emptied on time to avoid spillage into the surrounding environment. • The public will be continuously sensitized against irresponsible behavior such as littering and indiscriminate dumping.
Occupational Health and Safety issues (accidents, injury/ailments to workers)	Workers at WTS	• The private company contracted to operate the WTS will develop environmental, health & safety (EHS) policy for the operations of the WTS which will be implemented. • The contracted company will also develop and implement standards of procedures (SoP) which will include supervision, monitoring and maintenance of the WTS. • All workers at the WTS and waste management operators will be trained on the SoP and EHS policy. Induction will be carried out for all new employees. • Continuous training on SoP, EHS policy and toolbox sessions will be organized for staff and waste management operators. • Appropriate PPE including safety boots, nose masks, rubber gloves and coveralls will be provided for workers and waste management operators and its use enforced. • First aid kits will be provided at the WTS and supervisors trained in administering first aid for minor ailments /injuries. Major cases will be referred to the UG Hospital. • All staff of the WTS will be registered on the National Health Insurance Scheme/any registered private health insurance scheme and regular health checkup/screening organized for all staff. • Emergency response plan will be developed for the operation of the WTS.
Traffic disruption and risk of road accidents on WTS access roads and along haulage routes	Road users, Public	• The operator of the WTS will prepare and implement a Traffic Management Plan for the operation of the WTS. The Plan will be approved by the Management Team of the WTS. • Only drivers/waste management operators with the requisite driving licenses will be engaged for the project. • All waste collection and transfer trucks will comply with the approved speed

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
		limit of 30-50 km/hr within communities along the haulage route. Punitive actions will be taken for any driver who is found to be non-compliant. • All drivers will be trained on road safety regulations and defensive driving. • The vehicle maintenance services (as explained above) will be extended to all waste collection/ transfer operators (mandatory) registered to operate at the WTS at a fee. This will ensure any broken down trucks are quickly moved off the road. • Appropriate warning signs will be used around broken down vehicles on the road to warn other road users prior to be being fixed/towed off the road. • The WTS will be designed to have a large parking area to accommodate waste collection, transfer and reserve transfer trucks. • Incoming waste collection trucks will not be allowed to queue/wait on public streets. In the event of temporary congestion at the WTS, waste collection trucks will be directed to park at a designated temporary waiting area to be determined by the management of the WTS. • Management of the WTS will identify alternative approved landfill sites and recycling companies where residual waste can be transported to in the event of a closure or inability of the Kpone landfill or ACARP to accept waste from the WTS.
Sanitation and public health issues (unsightly conditions, cholera infestation) in communities around project site	UG community, public	• Only good conditioned trucks which are leak-free will be used/approved for collection and transfer of waste to avoid leakage spills during transport. Trucks will be regularly inspected and anyone found with holes/openings in the bucket will be suspended until it is fixed. • All open waste collection trucks including motorized tricycles and “borla” taxis will be covered with tarpaulin to prevent wind-blown garbage during transport of waste to the WTS. • A weekly schedule for waste collection from each of the Municipalities will be drawn and strictly followed to ensure regular waste collection to prevent/minimize over-spillage of household and communal containers. • GEMA as well as other MMAs in GAMA put a premium on enforcement of their bye-laws on waste management within the communities that will ensure proper organization of waste collection in their Municipalities. • A grievance redress process will be established to address any grievances/

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
		concerns regarding the operation of the WTS and registered waste management operators and made known to the public.
Disease outbreak in the WTS neighbouring communities/ facilities	Public, workers at the WTS	• Disease vectors will be controlled at the WTS as explained above (including regular disinfection/fumigation). • Regular inspection/monitoring will be carried out in and around the WTS to ensure proper housekeeping.
Risk of fire at WTS from combustible waste	Workers at the WTS, WTS facility	• A Fire Management Program will be developed and implemented. This will include: - Training on fire prevention, firefighting and rescue; - Fire drills; and - Emergency response plan; etc. • Management of the WTS will obtain a fire permit from the Ghana National Fire Service for the facility which will be renewed annually. • Firefighting equipment such as fire hydrants, sprinkler system and fire extinguishers will be installed at vantage points. • Automatic fire and smoke detection equipment will be installed at the WTS including the offices. • An Emergency Assembly Point will be demarcated at the WTS. • Management of the WTS will collaborate with the University of Ghana and Abokobi Fire Service to develop training programs for workers at the facility. • Emergency drills will be regularly conducted for workers to always prepare them for an emergency. • Emergency contact numbers of the University of Ghana and Abokobi Fire Service, and the National Disaster Management Organization (NADMO) will be visibly displayed at the WTS.
Hiring of minors and abuse of workers at the WTS	WTS workers	• The private operator of the WTS will develop a Code of Conduct/Ethics to be vetted and approved by MSWR prior to engagement. This will include transparency with workers, working conditions, not engaging minors, etc. • Management of the WTS will adhere to all applicable policies and laws including the Labour Law, Children's Act, Persons with Disability Act, Human Trafficking Act and Gender Policy. • The private operator will thoroughly check the background of any person to be hired to ensure they are of the right age (above 18 years).

POTENTIAL IMPACT	RECEPTOR(S)	PROPOSED MITIGATION MEASURES
		• The private operator would ensure that there will not be any form of exploitation of workers including forced labour or services, sexual exploitation, etc. • A grievance redress process will be established to address any grievances/ concerns of the WTS workers and waste management operators.
Environmental, health and safety measures at final disposal sites	Kpone landfill, ACARP	• Environmental and social audit of the Kpone landfill was conducted and measures to improve and expand its operation will be supported by the project. • Environmental, health and safety management and monitoring measures will be in accordance with the EPA's directives in the environmental permit. This will also include environmental reporting to EPA. • Leachate and groundwater monitoring will be conducted at Kpone landfill according to the Ghana Landfills Guidelines Requirements as follows: o Weekly measurements on site of leachate flow, pH, temperature and conductivity and monthly analysis of leachate samples for chemical oxygen demand (COD), chloride, ammoniacal nitrogen, cyanide and heavy metals; and o Monthly analysis of groundwater for pH, conductivity, COD, chloride, ammoniacal nitrogen, cyanide and heavy metal. • Management of Kpone landfill and ACARP will continue to provide adequate PPE for workers and use will be strictly enforced. • The following specific environmental, health and safety measures will be implemented at the Kpone landfill: o Provision of 24-hour water supply; o Fire hydrants and extinguishers will be serviced; o Improve security fencing around the entire facility and around the leachate points; o Replace damaged and illegible warning/caution signs; and o Provide/demarcate emergency assembly point. • Two (2) additional cells will be constructed at Kpone landfill to accommodate residual wastes from the WTS. • Implement the recommended improvements of the Kpone landfill operation based on the 2015 audit report and the ongoing audit of the Kpone landfill.

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

An Environmental and Social Management Plan (ESMP) is developed for the project in accordance with the Environmental Assessment Regulations of 1999, LI 1652 to ensure that the project activities are carried out in an environmentally safe and sustainable manner. The ESMP outlines management commitment and measures, action plan for implementation of mitigation measures and a monitoring plan to ensure the sustainable implementation of the proposed project. An estimated budget for the ESMP is included in this section.

The construction phase material measures and E&S clauses will be included in the bidding document for the WTS project prior to its advertisement. This ESIA will serve as a guide to the Works Contractor to develop a Health and Safety Plan and Waste Management Plan for review and approval by MSWR prior to commencement of works. The operator for the WTS will also develop and implement an Environmental and Social Management System (ESMS).

9.1 Objectives of the ESMP

The implementation of the ESMP is expected to meet the following objectives:

- provide the platform to accommodate changes and uncertainties during project implementation;
- manage actual impacts during project implementation phase;
- ensure proper implementation of project permitting conditions;
- ensure satisfactory environmental performance; and
- serve as a source of background information for future projects.

9.2 Programme to meet Requirements

The programmes proposed to meet the mitigation measures and monitoring programmes will include the following:

- Adoption of Environmental, Health and Safety Policies and Operational Procedures;
- Environmental, Health and Safety Management Structuring;
- Environmental, Health and Safety Committee;
- Workers' information and training;
- Environmental and social monitoring programmes;
- Audits and Reviews; and
- Environmental and social management budgeting.

9.2.1 Adoption of Environmental, Health and Safety Policies and Operational Procedures

GEMA shall engage the services of a Consultant to assist the Assembly develop environmental, health and safety policies to guide the sustainable implementation of the project. The Consultant shall also assist in formulating standard operational procedures for all the operations of the project. The standard operational procedures will serve to guide the workers in their daily activities and also serve as a training manual for in-service training as well as induction of new workers engaged on the project.

9.2.2 Environmental, Health and Safety (EHS) Management Structuring

The management of the WTS will be jointly undertaken by the Ministry of Sanitation and Water Resources, University of Ghana (IESS) and the Ga East Municipal Assembly. The operation of the facility will to be handled by the private sector.

The private company which will be contracted to operate the WTS shall appoint a qualified Senior Environmental Monitoring & Compliance Officer (SEMCO) who will be responsible for the overall management of the environment, health and safety of the project. The SEMCO shall report directly to the Plant Manager of the company. The company shall also appoint two (2) Environmental Assistants who will assist the SEMCO in the day-to-day implementation of EHS policies and procedures. There shall be an Environmental Assistant (EA) responsible for EHS implementation within the WTS facility (internal operations) and an EA in charge of monitoring all the waste collection and transfer trucks (external operations) to ensure they abide by EHS procedures in and out of the WTS facility, including at the waste collection points within communities, during transport to and from the facility and at final disposal points. **Figure 9-1** shows the organizational structure for EHS Management of the project. **Table 9-1** shows the main functions of the EHS Officer and EHS Supervisors.

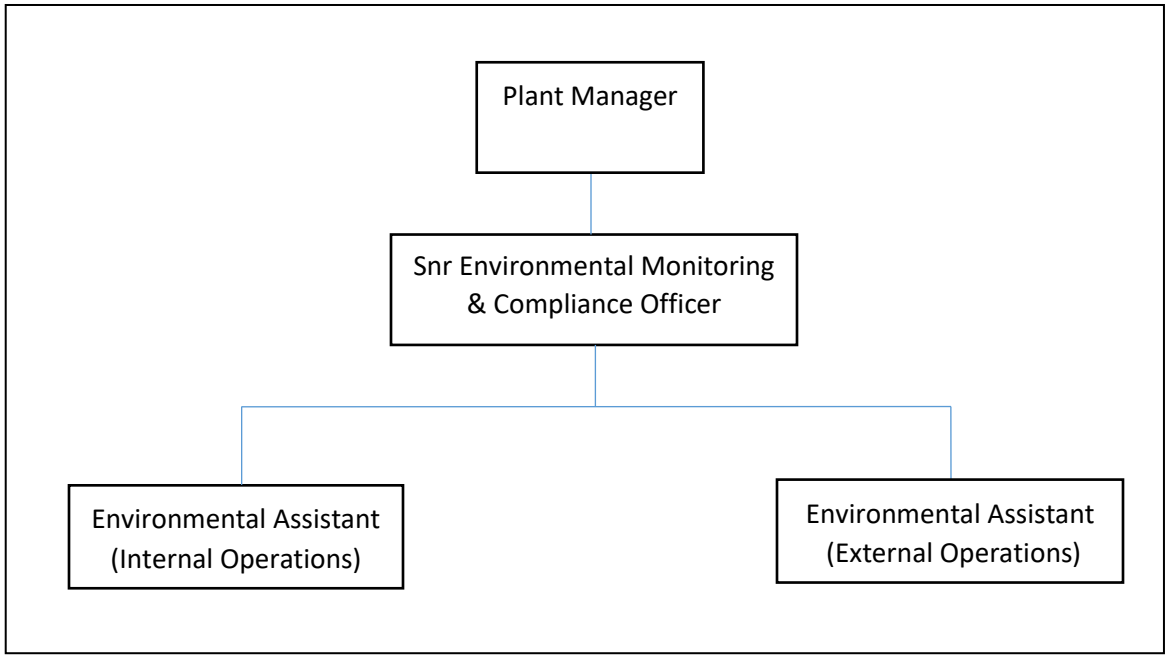

Figure 9-1: Organizational Structure for EHS Management of the WTS Operation

Table 9-1: Key functions of the SEMCO and EAs

Snr Environmental Monitoring & Compliance Officer	**Environmental Assistant**
1. Lead the formulation and implementation of environmental, health and safety policies of the project, as well implementation of environmental permit conditions.	1. Liaise with the SEMCO to ensure implementation of environmental, health and safety policies and procedures.
2. Ensure adequate training is provided for the EAs and	2. Ensure all machinery/equipment and waste

Snr Environmental Monitoring & Compliance Officer	Environmental Assistant
all staff, including EHS induction for new employees.	collection and transfer trucks are in good condition and well serviced, and the operators adhere to environmental, health and safety procedures.
3. Liaise with Management to ensure all required PPE, first aid and other logistics are provided for the project.	3. Ensure adherence to environmental, health and safety procedures and the correct use of PPE provided for staff.
4. Liaise with regulatory institutions such as EPA and GNFS.	4. Keep records and report all incidents/accidents and illnesses to the SEMCO.
5. Work closely with all Contractors and Consultants engaged in carrying out their work to ensure they adhere to EHS policies and procedures.	5. Record and report all grievances/complaints on environmental, health and safety to the SEMCO.
6. Supervise the EAs to ensure implementation of environmental, health and safety procedures.	6. Report all non-compliances on environmental, health and safety procedures to the SEMCO for appropriate action.

9.2.3 Environment, Health and Safety Committee

The Plant Manager of the contracted company to operate the WTS, the SEMCO and EAs shall constitute the EHS Committee for the project. The EHS Committee shall have monthly meetings to discuss and deliberate on environmental, health and safety issues. The Plant Manager shall head the EHS Committee and chair all meetings.

The functions of the Environmental, Health and Safety Committee shall among other things include:

- Implementing Environmental, Health and Safety Policies formulated for the Project;
- Implementing the environmental permit conditions and mitigation, monitoring and management measures in the ESIS;
- Engaging the services of Consultant(s) where necessary to assist with the preparation and implementation of Environmental, Health and Safety Policies and environmental permit conditions;
- Identifying appropriate training programmes for staff;
- Reviewing monthly data collated on environmental management and workers' health and safety issues;
- Addressing environmental, health and safety complaints and concerns of staff and communities; and
- Undertaking disciplinary actions against staff who don't comply with health and safety procedures.

9.2.4 Environmental and Social Management System (ESMS)

The private operator for the WTS will develop and implement an ESMS for the operation of the WTS. The ESMS will include management measures to ensure cordial relationship between employees and surrounding communities; as well issues regarding gender-based violence; discrimination; sexual harassment; etc. The ESMS will have at the minimum the following outline:

- Introduction;
- Environmental and Social Management Policy;
- Identification of risks and impacts;
- Management programmes;
- Organizational capacity and competency;
- Emergency preparedness and response;
- Stakeholder engagement;
- External communications and grievance mechanism;
- Ongoing reporting to affected communities; and
- Monitoring and review.

9.2.5 Archaeological and Cultural Heritage Chance Find Procedure

In the unlikely event of an archaeological or cultural heritage chance find during construction works, the procedure to follow will be as follows:

- All construction activity in the area will cease immediately;
- The find location will be recorded and necessary steps taken to secure/protect the area;
- The Supervising Engineer for the construction works will inform the MSWR; and
- MSWR will engage an archaeologist/cultural heritage expert to assess the finding and advise on the necessary steps.

9.2.6 Workers Training and Awareness Creation

The contracted company will ensure effective dissemination of information to all staff, workers, waste collectors and drivers. Training programmes will be regularly organized for staff, workers, collectors, drivers, etc. on environmental, health and safety. These will include formal in-service trainings, practical trainings and induction for new staff. The trainings will include the following:

- EHS policies and procedures;
- Standard operational procedures;
- Machine/equipment handling and operation;
- Road safety and traffic regulations;
- Defensive driving;
- Public health and sanitation;
- Fire safety and emergency response; and
- First aid.

The SEMCO and EAs will be trained on the environmental permit conditions and mitigation and management measures in this ESIS as well as adequately trained to administer first aid.

9.2.7 Environmental and Social Monitoring Programmes

Comprehensive monitoring programmes will be developed based on the monitoring plan provided in **section 9.5** for relevant environmental and social monitoring parameters. The monitoring programme shall also be in accordance with the directives of the EPA in the environmental permit conditions.

9.2.8 Audits and Reviews

Annual environmental, health and safety audits and reviews will be conducted to assess the performance of the environmental, health and safety policies and operational procedures implemented. The monitoring programme will form the basis for effective auditing and reviews. The outcome of the annual audits and reviews will underpin the periodic update of the ESMP of the proposed project.

9.2.9 Public and Community Participation

The offices of the SEMCO and EAs for the WTS at West Legon will welcome any complaints, constructive suggestions and advice on environmental, health and safety issues of concern during project implementation.

Local hotline numbers will be available to the general public for communicating all grievances and complains related to the operation of the WTS and collection and transfer trucks. Aggrieved individuals or communities can also make or submit all complaints or concerns to their respective Assemblymen, the Environmental Health and Sanitation Unit (EHSU) at GEMA or at the Client Service/Front Desk of GEMA for redress. It is envisaged that public involvement will help reduce conflict through early identification of grievances.

9.3 Grievance Redress Mechanism

A grievance is any query, call for clarification, problems, and concerns raised by individuals or groups related to activities undertaken or processes applied by the project. Grievances can be an indication of growing stakeholder concerns and can escalate if unidentified and resolved. The management of grievances is therefore a vital component of stakeholder management in ensuring the sustainability of the project. The proposed Grievance Redress Mechanism (GRM) will respond to all queries or clarifications about the project during both the construction and operation stages, and the implementation problems that may arise will be resolved and grievances addressed efficiently and effectively. An effective and efficient GRM should have multiple avenues or channels for lodging complaints, transparency, promptness and timeliness of responses and clear procedures.

The general steps of the grievance process comprise:

- Registration of complaints;
- Determining and implementing the redress action;
- Verifying the redress action; and
- Monitoring and Evaluation.

9.3.1 Construction Phase Grievance Redress Process

Registration of complaints

Complaints can be lodged verbally or in writing or through phone calls to the Municipal Environmental Health Officer (MEHO) of GEMA or Assembly member. The elected local Assembly member is eligible to receive complaints and ensure that such complaints reach the MEHO at the Assembly. The MEHO shall receive all complaints and officially log the complaints in a log book. The MEHO will inform the Team Leader for the Grievance Redress Committee (see below for composition of the committee) within 24 hours on any complaint received. A sample grievance redress form to guide the logging and resolution of complaints is provided in **Annex 7.**

Determining and implementing the redress action

When a grievance/dispute is recorded as per above-mentioned registration procedures, the grievance redress team will be called into action, and mediation meetings will be organized with interested parties. Minutes of meetings will be recorded.

The grievance redress team will determine the redress action in consultation with the complainant if necessary. The proposed redress action and the timeframe in which it is to be implemented will be discussed within 3 working days of receipt of the grievance. The grievance issue will be resolved within 5 working days of receipt of complaints.

Verifying the redress action

The grievance redress team will contact the complainant to confirm that the redress action is carried out. If the complainant is not satisfied with the outcome of the redress action, additional steps will be taken to resolve the issue or reach an amicable agreement. Verification will be completed within 7 days of the execution of the redress action.

Monitoring and Evaluation

The GARID Project Office will monitor the activities of the Grievance Redress Team to ensure that complaints and grievances lodged by complainants are followed-up and resolved amicably as much as possible during the construction period. The GEMA will take up this activity when the project is completed and handed over to the Municipal Assembly to operate.

Additional Steps and Court of Law

If the complainant is not satisfied with the decision of the grievance redress team, he/she can bring it to the attention of the Director for EHSD at MSWR or the GARID Project Coordinator will inform the Director for EHSD about the unresolved grievance. The Director will mediate on the issue within 5 days from the date of receipt of the issue at the Ministry. If such a timeline is not possible, the Director should inform the GARID Project Office accordingly giving reasons and possible new date.

If the complainant remains dissatisfied with the mediation effort of the MSWR, the complainant has the option to pursue appropriate recourse via judicial process in Ghana. The Constitution allows any aggrieved person the right of access to Court of law. However, noting that court cases can be cumbersome and time consuming, all effort must be made to reach amicable settlement with the affected person(s).

9.3.1.1 Membership and functions of the Grievance Redress Committee during Construction Phase

The Grievance Redress Committee shall include the following:

- The Safeguard Specialist, GARID Project;
- The GARID Project Coordinator, MSWR;
- The Supervising Engineer;
- The Contractor;
- The elected local Assembly member; and
- A representative of the Complainant.

In addition to the main function of resolving grievances, disputes, complaints and conflicts, the Grievance Redress Committee will also:

- assist to ensure smooth implementation of the project;
- establish dialogue with the Complainants; and
- ensure that their concerns and suggestions are incorporated and implemented during the project.

9.3.2 Operational Phase Grievance Redress Process

During the operational phase of the project, the SEMCO of the WTS (refer to **section 9.2.2**) will be officially responsible for receiving grievances on the operations of the WTS and all registered waste management operators. The grievances may be channeled to him/her directly through face-to-face communication, phone calls, letters, e-mail, text messages, etc. Aggrieved individuals or community members may also submit their complaints/concerns to their respective Assemblymen, the EHSU at GEMA or at the Client Service/Front Desk of GEMA which will be channeled to the SEMCO for redress.

All grievances, presented in writing or verbally, will be logged by the SEMCO by filling a grievance redress form. It will be ensured that each complaint has an individual reference number and is appropriately tracked and recorded actions are completed. A sample of a Grievance Redress Form is provided in **Annex 7**.

There will be a log book for keeping records of all grievances received and copies of the records kept with all the relevant authorities. A review of grievances will be conducted at least every three months during implementation in order to detect and correct systemic problems. The log book should take into account the following: date the complaint was reported; date on which the grievance form was submitted to the grievance committee, date information on proposed corrective action was sent to complainant (if appropriate); the date the complaint was closed out and the date response was sent to complainant.

Redress decision, feedback and implementation

The Grievance Redress Committee (see composition below) will make a decision on all matters received, in consultation with the complainant, if necessary, in not more than two working days. The agreed redress action should be implemented within an agreed timeframe of not more than five days, depending on the nature of the complaint.

If field verification is required, the redress committee, in the company of the complainant, will visit the complaint area to verify that satisfactory redress action is carried out. When the complainant is satisfied with the redress action, the complaint will be closed and logged in the grievance log book and endorsed by the complainant.

Dissatisfaction and alternative action

4. If no understanding or amicable solution is reached, or the affected person does not receive a response from the redress committee within 5 working days, the affected person may appeal to the MEHO of GEMA. Grievances involving community members will be resolved in consultation with the community leadership and complainant, as necessary.
5. If the grievance remains unresolved, the affected person can appeal to the Municipal Chief Executive of GEMA who, in consultation with the grievance redress committee, should act on the complaint/grievance within 5 working days of its filing.
6. If a resolution is not reached from the first three steps, the complainant may appeal to the Director for EHSD at the MSWR. Subsequently, the complainant may seek legal action for redress. However, noting that court cases can be cumbersome and time consuming, it is of high opinion that Court cases should be the last 'resort' and all effort must be made to reach amicable settlement at the very early stages of complaints by affected persons.

Monitoring and Evaluation

Monitoring and evaluation activities will be conducted by the GEMA to ensure complaints and grievances lodged by the affected persons are followed-up and amicably resolved.

9.4 Action Plan for Implementation of Mitigation Measures

An action plan detailing the mitigation actions, objectives, budget, timeframe and responsibility for implementing the mitigation and enhancement measures at all phases of the project is provided in **Table 9-2**. The action plan is structured according to the Ghana EPA format for ESIA.

*Table 9-2: **Action plan for implementation of mitigation actions***

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
Preparatory Phase					
Loss of 10 acres (4ha) of undeveloped land by UG	• The UG authorities will be adequately consulted on the project to obtain their free, prior and informed consent on the project. • The IESS (UG) is desirous of partnering the MSWR to implement the project and therefore will assist to acquire the land. • The MSWR will follow all due processes as maybe spelt out by UG to obtain official approval or agreement or acquire the land for the project and obtain all necessary documentation. • Land acquisition should be in accordance with OP 4.12. • The concept note and draft MoU under consideration between MSWR, GEMA and UG is attached as **Annex 6**.	-Written consent/approval for project from UG. -Land acquisition documents/Memorandum of Understanding (MoU) between MSWR and UG on project site	Design and planning phase of project	GARID Project Office/MSWR	To be determined through negotiation with UG
Design considerations for the WTS	The design of the WTS should incorporate the following: • Constant (24-hour) water supply; • Leachate and wastewater treatment system; • Proper drainage system to channel out leachates and wastewater to the leachate and wastewater treatment system. • Fencing and/or construction of wall and green buffers	Designs provided for the following: -24-hour water supply system -Leachate and wastewater system -Fencing and/or construction of wall and green buffers on the WTS boundary	Design and planning phase of project	GARID Project Office/MSWR/ Design Consultant	As part of cost of project designs

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	on the WTS boundary. • Industrial odour control fans or ventilation system to capture and control odour at the WTS. • A misting system and exhaust for neutralizing odour at the WTS when necessary. The air exhaust should have a biofilter to further reduce the odour before entering the external environment. • The layout of the WTS should take into consideration the predominant wind direction (south-south westerly) and the facility should have adequate ventilation to ensure it is well aerated, especially the sorting and storage area. • Proper and extended roofing to prevent rain from getting inside. • An Operations & Maintenance Plan which should include specific schedule for the operations of the facility (waste collection, hauling, sorting and transfer to Kpone landfill and ACARP) based on Material Flow Analysis.	-Fencing and/or construction of wall and green buffers on the WTS boundary -Misting system and exhaust for neutralizing odour. -Operations & Maintenance Plan for the WTS			
Sub-Total 1:					--
Construction Phase					
Soil impacts (soil erosion and	• Clear vegetation at project site only on commencement of construction works and limit the clearance to the	-Observable change in turbidity of water in	Duration of construction works	Supervising Engineer/	As part of contractor's

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
contamination)	demarcated site. • Reuse excavated soil for backfilling and immediately collect any excess soil material for disposal at approved dump site. • Deliver only required quantities of sand for a specified period at the project site. Cover any heaped sand for construction works with tarpaulin. • Prohibit fueling or oil change of machinery/trucks/vehicles at the project site.	stabilization ponds and tributary of Onyasia River - Observable oil sheen in stabilization ponds and tributary of Onyasia River -Observation of rills/gullies at project site		Contractor	work
Occupational Health and Safety Issues (accidents, injury/ailments to workers)	• Develop and implement a Health & Safety Policy for the project construction. The Health & Safety Policy should at least have the following outline: o General policy statement o Commitments for the following: - Training - Carrying out risk assessment - First aid - Welfare facilities - Personal protective equipment (PPE) - Hazardous chemicals - Accident reporting - Dust - Noise	-Workers' awareness of Contractor's health and safety policy -Availability and proper use of PPEs -Availability and proper use of warning signs -Availability of first aid kit -Adherence to health and safety procedures -Records on frequency, type and source of illness/accident/injury -Records on non-compliances -Training and induction records	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	○ Responsibilities (for what and who reports to who). • Conduct health and safety induction for all workers. • Employ only well-trained and experienced personnel for the construction works. Ensure only drivers and operators with the requisite licenses are allowed to handle vehicles and machinery. • Provide initial training and testing in machine/equipment handling and safe working procedures for all new drivers and machine operators. • Utilize only good conditioned and well serviced machines for the project construction. • Ensure proper supervision and monitoring during construction works. • Provide and strictly enforce the use of appropriate PPEs such as safety boots, rain coats, hand gloves, earplugs and nose masks. Implement sanctions where this is not followed. • Provide first aid kits on site and train supervisors to administer first aid for minor ailments/injuries on site. Refer major cases to the UG Hospital.				
Traffic disruption and risk of accidents at WTS site and along	• Prepare and implement a Traffic Management Plan for the construction activities. The Plan must be approved by the Supervising Engineer/MSWR prior to	-Traffic Management Plan prepared. -Absence of unauthorized persons at project site	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
haulage routes	implementation. • Cordon off the project site and enforce strict security measures prevent entry of unauthorized persons to the site. • Use warning signs at vantage points to warn the public against dangers. • Train drivers on safe driving and vehicle procedures. • Haulage trucks should comply with the approved speed limit of 30-50km/hr within communities along the haulage road. • Immediately remove any broken down vehicles/trucks from the road. • Adjust material/equipment delivery times to avoid peak traffic periods. • Engage officials of the MTTD of the Ghana Police Service where necessary to direct traffic at the junction on the Haatso-Atomic Road (which leads to the project site, sewage treatment plant and botanical gardens). • Create awareness and sensitize workers and the public on prevention of HIV/AIDS and other sexually transmitted diseases.	-Availability and use of warning signs and cautionary tapes at project site -Records on frequency and type of incident/accidents involving public -Records on awareness creation/sensitization programmes.			
Generation and disposal of waste	• Develop and implement a waste management plan for the construction works. The construction waste	-Workers awareness of waste management plan	Duration of construction works	Supervising Engineer/	To be captured in contractor's

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	management plan should address the following: o Who will be responsible for resource management. o What types of waste will be generated. o How the waste will be managed (reduced, reused, recycled). o Which contractors will be used to ensure the waste is correctly recycled or disposed of responsibly and legally. o How the quantity of waste generated by the project will be measured. • Adopt efficient construction methods and re-use construction materials to minimize waste generated. Excavated soil material should be re-used in backfilling and levelling as much as possible. • Ensure waste segregation at the site. Provide different bins/skips for different types of waste generated such as scrap metals, plastic materials, etc. • Sell recyclable waste such as plastics/polythene and scrap metals to authorized recyclers for recycling. • Frequently collect and dispose vegetative and excavated material which cannot be re-used as well as other construction waste such as wood chippings at the nearest GEMA approved dumpsite.	-Absence of piled excavated material -Availability and use of bins -Records on frequency and location of waste disposal site of domestic and construction waste		Contractor	BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
Sanitation and public health issues (unsightly conditions, cholera and malaria infestation) in communities around project site	• Ensure proper housekeeping at the project site. • Provide adequate waste bins at the project site for use to prevent littering of the project site with cans and bottles which can collect water and breed mosquitoes. • Provide temporary toilet facilities for the construction period for use by workers. Educate workers against open defecation and sanction any person found engaging in it. • Cover and level excavations properly to prevent collection of water (pools).	-Absence of pools of water at construction site -Availability and use of mobile toilet at project site -Records on public complaints related sanitation and public health issues	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ
Unwanted pregnancies and transmission of HIV/AIDS and other STDs	• The Works Contractor, in collaboration with relevant stakeholders such as the Ga East Municipal Health Directorate, will organize awareness creation and educational programmes for all construction workers and the general public on behavioural changes required to prevent teenage/unwanted pregnancies and the spread of HIV/AIDS and other STDs.	-Records on sensitization of construction workers on irresponsible sexual behavior and STDs. -Public complaints against irresponsible sexual behavior by construction workers. -Health records on pregnancy, HIV/AIDS and other STDs	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ
Child labour and abuse of construction workers	• The Works Contractor will develop a Code of Conduct/Ethics to be vetted and approved by MSWR prior to engagement. This will include transparency with workers, working conditions, not engaging	-Minors hired for construction work -Complaints from construction workers on abuse	Duration of construction works	Supervising Engineer/ Contractor	To be captured in contractor's BoQ

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	trafficked persons, etc. • The Works Contractor will thoroughly check the background of any person to be hired to ensure they are of the right age (above 18 years). • The Works Contractor would ensure that there will not be any form of exploitation of workers including forced labour or services, sexual exploitation, prostitution etc.				
Sub-Total 2:					--
Operational Phase					
Nuisance from odour at the University and Haatso community	**<u>Waste Collection and Transfer</u>** • Design and strictly implement a weekly schedule for waste collection from each of the Municipalities. • Utilize only good conditioned trucks (leak-free) for waste collection and transfer. Thoroughly inspect the trucks of any private company/individual registering to provide waste collection/transfer services before granting approval. Regularly inspect trucks and suspend any truck in poor condition. • All open trucks for waste collection should be covered with tarpaulin when transporting waste to the WTS. • Utilize only enclosed trailers for waste transfer. **<u>Operations of the WTS</u>**	-Availability and use of odour control fans/ ventilation system. -Availability and use of misting system with biofilter exhaust. -Records on conditions of trucks -Schedule for waste collection and transfer. -Records on cleaning and disinfection at WTS -Records on washing and disinfection of trucks -Public complaints related to nuisance from odour.	-Operational phase	-EHS Committee, SEMCO and EAs	-4,000 per annum (p.a)

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Practice good housekeeping at the WTS including regular cleaning/ washing and disinfecting of sorting and storage areas, equipment, drains and other surfaces which come into contact with waste. • Regularly wash and disinfect waste collection and transfer trucks. • The organic fraction of the waste will be composted at the composting station. • Residual waste should be regularly collected (daily) from the WTS and transferred to the Kpone landfill or ACARP.				
Surface and groundwater pollution	• Incorporate a drainage system in the design of the WTS for collecting, storing and treating leachate and wastewater from the operations of the WTS. • Design of the WTS will include leachate and wastewater treatment system. • The design of the WTS should gently slope the sorting and storage floors, and the washing area for trucks to channel leachate and wastewater through the drainage system for treatment at the leachate and wastewater treatment system. • All operational areas of the WTS including composting area, sorting area, storage area, washing area for	-Functional drainage system. -Records on leachate treatment and disposal. -Records on maintenance of concrete floor. -Environmental monitoring results (refer to **Table 9-3**)	-Design measures to be incorporated during construction phase -Operational phase	- Design Consultant/ MSWR/ Contractor (to ensure design measures are incorporated during construction) -EHS Committee, SEMCO and EAs	-Part of Contractor's BoQ -2,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	trucks, etc. should be concreted to prevent ground seepages. Regularly inspect and maintain the concrete floor. • Maintain ideal composting condition as recommended by the US EPA (1995). This includes: ○ Carbon: nitrogen (C:N) ratio between 25:1 and 35:1; ○ Moisture content of 50 to 60% of total weight during treatment (and less than 50% for marketing following screening); ○ Balance between particle size and void space to promote rapid decomposition. Void space should be sufficient to achieve a 10 to 15% oxygen level within the pile in aerobic systems; ○ Optimum temperature levels which can range between 32 and 60 °C. Pathogen destruction can be achieved by attaining and maintaining a temperature of 55 °C for 15 days in a windrow system; and ○ pH of between 6 and 8.				
Breeding of disease vectors and risk of vector borne diseases	• The WTS should be regularly disinfected, particularly the working areas (sorting floor, storage area, etc.) and the entire facility regularly fumigated. • Practice good housekeeping at the WTS. • Collect and transfer residual waste daily from the WTS	-Observation of rodents and other pests -Records on disinfection and fumigation at the WTS	Operational phase	SEMCO and EAs	2,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	to the Kpone landfill or ACARP. • Regularly wash and disinfect the tipping, sorting and storage areas after the decomposable waste has been collected from the WTS. • Clean and disinfect other potential breeding areas such as drains. The design should slope the drains and washing areas to prevent collection of stagnant water. • The WTS facility should be regularly inspected to seal/screen any openings that will allow rodents and insects into the facility.				
Public nuisance from windblown solid waste, broken down waste collection vehicles and clandestine dumping	• All open waste collection trucks including motorized tricycles and "borla" taxis should be covered with tarpaulin during transport of waste to the WTS. • The WTS should have a vehicle maintenance team equipped with all the necessary logistics to immediately fix any broken down collection/transfer truck on the road. Any truck with a major fault which cannot be fixed immediately should be towed off the road to the WTS for fixing. Alternatively, Management of the WTS should contract a licensed vehicle maintenance company to provide the above services. • Standby trucks should be readily available to offload the waste from broken down trucks where necessary.	-Records of services of vehicle maintenance team -Availability of standby trucks. -Public complaints on windblown solid waste, broken down trucks and clandestine dumping. -Observation and reports on dumping of refuse in unauthorized places (streets, drains, vicinity of WTS, streams, open spaces, etc. -Public awareness/sensitization	Operational phase	Management of the WTS/ SEMCO and EAs	20,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Establish a grievance redress process to address any grievances/ concerns regarding the operation of the WTS and registered waste management operators and made known to the public. • Register all waste management operators, including operators of motorized tricycles and "borla" taxis within GAMA will be registered. • Enforce strict monitoring procedures to strictly monitor the activities of waste management operators in and out of the WTS. • Contact numbers of the WTS should be made known to the public to report all recalcitrant drivers found dumping waste in unauthorized places. • Take punitive measures against any driver found/reported to be have dumped refuse in unauthorized places. Punitive measures should include a life-time ban from engaging in waste management operations. • Consult stakeholders including waste management operators on fees to be charged at the WTS to ensure all parties are in agreement. • MMDAs should provide adequate bins along walkways and in public areas within their jurisdictions and ensure	campaigns against littering and indiscriminate dumping of waste. -Provision of adequate bins along walkways and public areas. -Absence of full and overflowing dustbins along walkways and public areas.			

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	the bins are always emptied on time to avoid spillage into the surrounding environment. • Continuously sensitize the public against irresponsible behavior such as littering and indiscriminate dumping.				
Occupational Health and Safety issues (accidents, injury/ailments to workers)	• Develop and implement an EHS policy for the operations of the WTS. • Develop and implement SoP which should include supervision, monitoring and maintenance of the WTS. • Train all workers at the WTS and all waste management operators on the SoP and EHS policy. Induction should be carried out for all new employees. • Organize continuous training on the SoP, EHS policy and toolbox sessions for staff and waste management operators. • Provide and strictly enforce the use of appropriate PPE including safety boots, nose masks, rubber gloves and coveralls for workers and waste management operators. • Provide first aid kits at the WTS and train supervisors in administering first aid for minor ailments/injuries. Major cases should be referred to the UG Hospital. • Register all staff of the WTS on the National Health Insurance Scheme/any registered private health	-Workers' awareness of EHS policy and SoP -Availability and proper use of PPEs -Availability of first aid kit -Adherence to health and safety procedures -Records on frequency, type and source of accidents -Records on non-compliances -Training and induction records -Health insurance for staff -Health screening/checkup records	Operational phase	EHS Committee, SEMCO and EAs	6,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	insurance scheme and regularly organize health checkup/screening for all staff. • Develop emergency response plan for the operation of the WTS.				
Traffic disruption and risk of road accidents on WTS access roads and along haulage routes	• Prepare and implement a Traffic Management Plan for the operation of the WTS. The Plan must be approved by the Management Team of the WTS prior to implementation. • Engage only drivers/waste management operators with the requisite driving licenses for the project. • All waste collection and transfer trucks should comply with the approved speed limit of 30-50 km/hr within communities along the haulage route. Take punitive actions against any driver found to be non-compliant. • Train all drivers on road safety regulations and defensive driving. • Extend the vehicle maintenance services (as explained above) to all waste collection/ transfer operators (mandatory) registered to operate at the WTS at a fee to ensure broken down trucks are quickly moved off the road. • Use appropriate warning signs around broken down vehicles on the road to warn other road users prior to	-Traffic Management Plan prepared. -Absence of unauthorized persons at the WTS -Records on frequency and type of incident/accidents involving public at the WTS and from operations of waste collection and transfer trucks. -Training records for drivers on road safety regulations and defensive driving. -Availability of valid driving licenses for all drivers and waste management operators. -Use of warning signs (triangles) around broken down trucks on roads. -Records of public	Operational phase	Management of the WTS/EHS Committee, SEMCO and EAs	5,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	be being fixed/towed off the road. • Design the WTS to have a large parking area to accommodate waste collection, transfer and reserve transfer trucks. • Prohibit queuing/waiting of incoming waste collection trucks on public streets. In the event of temporary congestion at the WTS, waste collection trucks should be directed to park at a designated temporary waiting area to be determined by the management of the WTS. • Identify alternative approved landfill sites and recycling companies where residual waste can be transported to in the event of a closure or inability of the Kpone landfill or ACARP to accept waste from the WTS.	complaints/grievances relating to public safety and traffic issues			
Sanitation and public health issues (unsightly conditions, cholera infestation) in communities around project site	• Utilize/approve only good conditioned trucks which are leak-free for collection and transfer of waste. Regularly inspect trucks and anyone found with holes/openings in the bucket should be suspended until it is fixed. • All open waste collection trucks including motorized tricycles and "borla" taxis should be covered with tarpaulin to prevent wind-blown garbage during transport of waste to the WTS. • Draw a weekly schedule for waste collection from each of the Municipalities and strictly follow it to ensure	-Condition of waste collection and transfer trucks -Vehicle inspection records -Use of tarpaulin to cover open waste collection trucks -Schedule for waste collection -Records of public complaints/grievances	Operational phase	Management of the WTS/EHS Committee, SEMCO and EAs/ MEHOs in GEMA and other MMAs	-As part of job functions of Management of the WTS/EHS Committee, SEMCO and EAs/ MEHOs in GEMA and other MMAs

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	regular waste collection from households and communal containers. • GEMA and other MMAs in GAMA should strictly enforce their bye-laws on waste management to ensure proper organization of waste collection in the Municipalities.	related to sanitation and public health issues			
Disease outbreak in the WTS neighbouring communities/ facilities	• Strictly implement the mitigation measures described above for preventing/minimizing breeding of disease vectors in and around the WTS. • Regularly inspect/monitor the WTS environment to ensure proper housekeeping.	-Observation of rodents and other pests. -Records on disinfection and fumigation at the WTS -Public complaints on disease outbreak	Operational phase	SEMCO and EAs	As part of duties of SEMCO and EAs
Risk of fire at WTS from combustible waste	• Develop and implement a Fire Management Program which should include: - Training on fire prevention, firefighting and rescue; - Fire drills; and - Emergency response plan; etc. • Obtain a fire permit from the Ghana National Fire Service for the WTS which should be renewed annually. • Install firefighting equipment such as fire hydrants, sprinkler systems and fire extinguishers at vantage points at the WTS. • Install automatic fire and smoke detection equipment at the WTS including the offices.	-Installation of smoke detectors, fire alarms, sprinkler system, fire hydrant and fire extinguishers at the WTS including offices. -Availability of fire extinguishers at vantage points at the WTS -Availability of Emergency Assembly Points and emergency contact numbers at vantage points. -Records on servicing of	-Design measures to be incorporated during construction -Operational phase	- Design Consultant/ MSWR/ Contractor (to ensure design measures are incorporated during construction) -Management of the WTS/EHS Committee, SEMCO and EAs	-Part of Contractor's BoQ -10,000 p.a

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Demarcate an Emergency Assembly Point at the WTS. • Collaborate with the University of Ghana and Abokobi Fire Service to develop training programs for workers at the facility. • Conduct regular emergency drills for workers to always prepare them for an emergency. • Visibly display emergency contact numbers of the University of Ghana and Abokobi Fire Service, and the National Disaster Management Organization (NADMO) at the WTS.	firefighting equipment. -Records of training on fire and explosion prevention and control. -Records on fire and explosion incidents/accidents and investigation reports.			
Hiring of minors and abuse of workers at the WTS	• Develop a Code of Conduct/Ethics to be vetted and approved by MSWR prior to engagement. This will include transparency with workers, working conditions, not engaging minors, etc. • Adhere to all applicable policies and laws including the Labour Law, Children's Act, Persons with Disability Act, Human Trafficking Act and Gender Policy. • Thoroughly check the background of any person to be hired to ensure they are of the right age (above 18 years). • Ensure that there is no form of exploitation of workers including forced labour or services, sexual exploitation, physical abuse, etc.	-Minors hired at WTS -Complaints from WTS workers on abuse	Operational phase	-Management of the WTS/EHS Committee, SEMCO and EAs	As part of duties of Management of WTS/ SEMCO and EAs

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	• Establish a grievance redress process for WTS workers and waste management operators to address their grievances/ concerns.				
Environmental, health and safety measures at final disposal sites	• Environmental and social audit of the Kpone landfill was conducted and measures to improve and expand its operation will be supported by the project. • Environmental, health and safety management and monitoring measures should be in accordance with the EPA's directives in the environmental permit. This should also include environmental reporting to EPA. • Leachate and groundwater monitoring should be conducted at Kpone landfill according to the Ghana Landfills Guidelines Requirements as follows: o Weekly measurements on site of leachate flow, pH, temperature and conductivity and monthly analysis of leachate samples for chemical oxygen demand (COD), chloride, ammoniacal nitrogen, cyanide and heavy metals; and o Monthly analysis of groundwater for pH, conductivity, COD, chloride, ammoniacal nitrogen, cyanide and heavy metal. • Management of Kpone landfill and ACARP should continue to provide adequate PPE for workers and use	-Environmental management, monitoring and reporting in accordance to environmental permit. -Leachate and groundwater monitoring reporting at Kpone landfill according to Ghana Landfills Guidelines Requirements. -Provision and use of appropriate PPE. -24-hour water supply at Kpone landfill. -Functional fire hydrant and serviced fire extinguishers at Kpone landfill. -Fencing restored around entire Kpone landfill site and around leachate ponds. -Demarcated emergency assembly point.	Operational phase	MSWR/ GARID Project Coordinating Unit/ Waste Landfills Company Ltd/ ACARP	-To be incorporated into WTS project implementation cost. -Environmental management, monitoring and reporting measures are part of responsibilities of Waste Landfills Co. Ltd and ACARP

Impact	Measures	Key Performance Indicators	Timeframe/Deadline	Responsibility	Cost (GH₵)
	strictly enforced. • The following specific environmental, health and safety measures should be implemented at the Kpone landfill: o Provision of 24-hour water supply; o Fire hydrants and extinguishers should be serviced; o Improve security fencing around the entire facility and around the leachate points; o Replace damaged and illegible warning/caution signs; and o Provide/demarcate emergency assembly point. • Construct two (2) additional cells at Kpone landfill to accommodate residual wastes from the WTS. • Implement the recommended improvements of the Kpone landfill operation based on the 2015 audit report and the ongoing audit of the Kpone landfill.	-Availability of legible warning/caution signs. -Two (2) additional cells constructed at Kpone landfill. -Recommendations in 2015 audit report of Kpone landfill implemented.			
Sub-Total 3:					***49,000 p.a***
GRAND TOTAL (Sub-Total 1 + Sub-Total 2 + Sub-Total 3):					**49,000 p.a**

9.5 Environmental and Social Monitoring and Evaluation Plan

Environmental and social monitoring is an essential component of a post project review phase following Environmental and Social Assessment. The monitoring of various environmental and social parameters will also help to confirm any predicted impact or otherwise and address the effectiveness of the implementation of the mitigation measures.

An environmental monitoring plan is provided in **Table 9-3** for environmental parameters which require monitoring throughout the project implementation. The monitoring plan includes the responsible institutions or persons and estimated budget/cost requirements. In addition to the environmental parameters, the monitoring plan includes monitoring of environmental compliance which will be carried out during the operational phase.

Table 9-3: Environmental Monitoring Plan

No.	Environmental Media/ Compliance Measure	Monitoring Parameters/ Indicators	Measurements/ Methodology	Frequency/ Period	Responsibility	Budget (GH₵)
Operational Phase						
1.	Effluent/wastewater	Refer to **Annex 8** for National Effluent Quality Guidelines for Discharge into Natural Water Bodies (includes parameters to monitor).	-Effluent/ wastewater sampling and laboratory analysis	-Monitor monthly/ quarterly or as specified by EPA in permit schedule	SEMCO and EAs	12,000 per annum (p.a)
2.	Surface and groundwater	Refer to **Annex 8** for National Effluent Quality Guidelines for Discharge into Natural Water Bodies (includes parameters to monitor).	-Surface and groundwater sampling and laboratory analysis	-Establish comprehensive baseline water quality data by carrying out surface water and groundwater sampling at onset of operations to compliment baseline water quality information in this ESIA. Refer to **Annex 8** for parameters. -Subsequently, Monitor monthly/ quarterly or as specified by EPA in permit schedule.	SEMCO and EAs	-20,000 p.a
3.	Environmental compliance	-Annual environmental, health and safety audits -Quarterly returns of Monitoring Reports to EPA (in line with LI 1652) -Preparation of Annual Environmental Reports (in line with LI 1652) -Preparation of Environmental and Social Management Plan (in line with LI 1652)	Analysis of monitoring reports/ Environmental Assessment Regulations, LI 1652	Quarterly/ Annually	SEMCO and EAs	As part of duties of SEMCO and EAs
TOTAL:						**32,000 p.a**

10.0 INSTITUTIONAL ARRANGEMENT

10.1 Institutional Arrangement

The institutional roles and responsibilities to ensure the successful implementation of environmental and social management measures for project activities are outlined in **Table 10-1**.

Table 10-1: Institutional roles/responsibilities

Institution	Responsibility	Phase of Implementation
GARID Project Coordinating Unit (PCU)/ MSWR	-Overall responsibility for the design and implementation of the WTS project. -Enter into contract with Consultants including the ESIA Consultant and Design Consultant. -Lead the land acquisition process with the University of Ghana. -Ensure all design measures proposed in the ESIA are incorporated in the project design and implemented. -Ensure all necessary environmental reports, permits and approvals such as ESIA, environmental permits, etc. are prepared/ obtained for the project. - Ensure that all measures during preparatory phase are addressed by the PCU and design consultants. - Ensure that all measures related to construction of the WTS are included in the bidding documents; - Ensure that all measures for O & M of the WTS are included in the contract with the Private Operator of the WTS. - GARID PCU will hire Environmental Specialist and Social Development Specialist.	Project lifespan (design and implementation)
Civil Works Contractor	-Ensure all environmental and social management measures in the project designs and ESIA are implemented during construction. -Responsible for environmental and social management of the project during construction. -Responsible for health and safety and welfare of workers and communities during construction.	Construction phase
Supervising Engineer	-Responsible for the overall supervision of construction works and conduct of the contractor. -Ensure environmental and social management considerations in the project design are implemented during construction.	Construction Phase
Contracted Company to operate the WTS	-Responsible for the operations of the WTS. -Overall responsibility for environmental and social management of the operations of the WTS. -Manage and supervise the operations/activities of waste collection companies for the WTS.	Operations phase
GEMA	-Collaborate and partner with the MSWR/GARID Project	Entire project

Institution	Responsibility	Phase of Implementation
	Coordinating Unit and IESS/UG in the design and management of the WTS. -Play role in grievance resolution.	duration
IESS/UG	-Partner with the MSWR/GARID Project Coordinating Unit and GEMA in the design and management of the WTS.	Entire project duration

10.2 Training/Capacity Building for Environmental, Health and Safety Management

The training and capacity building requirements to ensure successful environmental, health and safety management of the WTS project is provided in **Table 10-2**.

Table 10-2: Training/capacity requirements

No.	Activity	Target Group/ Participants	Timeline/Duration	Proposed Facilitator	Estimated Cost/(Gh₵)
1.	Training Workshop on ESIA/ESMP, grievance redress mechanism, code of conduct for contractor and his workers, public health and safety issues, Permit Schedule, Triggered World Bank Safeguards Policy and and environmental management	-GARID Project Coordinating Unit -Supervising Engineer -Civil Works Contractor -GEMA -IESS	Prior to commencement of construction works	MSWR/ GARID Project Coordinating Unit/ ESIA Consultant	15,000
2.	Induction on occupational and public health and safety requirements of the construction works and environmental management	All construction workers	Prior to commencement of construction works	Civil Works Contractor/ Supervising Engineer	10,000.00
3.	Training on operations of the WTS, road and public safety regulations, occupational and public health and safety, environmental management, etc. during operations of the WTS	-Workers of WTS -Waste collection operators/ drivers	During operations of the WTS	SEMCO and EAs	As part of duties of SEMCO and EAs
4.	Public sensitization on GRM	-General public	Throughout operation of the WTS	SEMCO and EAs	As part of duties of SEMCO and EAs
TOTAL COST					**25,000.00**

11.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT BUDGET

The environmental and social management plans, as well as capacity building requirements described above require detailed cost analysis after project development to determine the budget needed for implementation. Management has however earmarked **One Hundred and Sixty-Five Thousand Ghana Cedis (GH¢165,000.00)** annually on environmental and social monitoring, and training and awareness creation programmes as well as reporting as shown in **Table 11-1**. This figure is subject to review following confirmation from cost studies to be carried out after project development phase.

Table 11-1: Environmental and Social Management Budget

No.	Programme	Cost/year (GH₵)
7.	Implementation of mitigation and enhancement measures (refer to **Table 9-2**)	49,000
8.	Environmental monitoring (refer to **Table 9-3**)	32,000
9.	Environmental, Health and Safety Training/Capacity Requirement (**Table 10-2**)	25,000
10.	Implementation of the operator ESMS (annual budget line)	30,000
11.	Environmental Auditing and Reporting • Annual environmental, health and safety audits • Returns of Monitoring Reports to EPA (in line with LI 1652) • Preparation of Annual Environmental Reports (in line with LI 1652) • Preparation of Environmental and Social Management Plan (in line with LI 1652)	25,000
12.	Grievance Redress Management and Stakeholder Meetings	4,000
Total		**165,000.00**

12.0 DECOMMISSIONING

A decommissioning plan will be required should it become necessary at any point in time to end or decommission the project.

12.1 Decommissioning Plan

In the event that the project has to be decommissioned, the principles of Reduce, Reuse, Recycle and Recover (4 R's) will be applied in all decommissioning phase activities.

The scope of decommissioning is categorised below under the post-construction and post-operational phase. Post-construction decommissioning involves construction facilities and equipment, while post-operational phase decommissioning will involve the WTS and ancillary infrastructure and site restoration.

12.2 Post-Construction Decommissioning

The construction facilities will be dismantled and relocated for use at other project sites of the Contractor. Excavators, trucks/vehicles, fabrication machines, generators, etc. and other equipment used for the construction works will be relocated to new or other project sites managed by the Contractor.

Any waste to be generated from the post-construction decommissioning process will be properly disposed of. Recyclable waste such as machinery and equipment parts will be sold to scrap dealers for recycling. Non-recyclable waste will be collected and dumped at GEMA approved dump site.

12.3 Post-Operational Phase Decommissioning

It is unlikely that the proposed WTS will be decommissioned at any time soon. In the future event that any large scale modification works have to carried out at the WTS or it is to be converted into another facility for alternative use, a new ESIA study will be carried out in accordance with the Environmental Assessment Regulations 1999, LI 1652. The EPA will be notified through registration of the undertaking. Stakeholders will be informed prior to the commencement of such a project.

12.3.1 Potential Post-Operational Phase Decommissioning Activities

In the event that the WTS at West Legon has to be decommissioned, the likely activities to be carried out include the following:

Decommissioning Audit

A decommissioning audit will be carried out by experts prior to the decommissioning activities. The objective of the decommissioning audit will be to assess the effectiveness of the decommissioning activities and provide recommendations for any necessary improvement.

Stakeholder Engagement

GEMA and the MSWR will extensively consult all the relevant stakeholders of the project including the regulatory agencies such as the EPA; other government agencies such as the Ministry of Local

Government and Rural Development (MLGRD) and other MMDAs within GAMA; and the University of Ghana authorities on the decision to discontinue the WTS project or modify it. GEMA will also make known its programme to the stakeholders.

Evacuation of Workers

Decommissioning procedures will ensure that workers' welfare and rights are well protected in accordance with labour laws and they be made to leave the site if required.

Removal/Transfer of Property

Moveable property including office equipment, machinery, trucks, weighing bridges, etc. will be removed and sent to new project sites for use or sold to potential users or donated. Non-moveable property such as the WTS structure including offices will be retained and used by the GEMA or handed over to the University of Ghana.

Waste Management

Any waste to be generated from the decommissioning process will be properly disposed of. Recyclable waste such as machinery and equipment parts will be sold to scrap dealers for recycling. Non-recyclable waste will be collected and dumped at GEMA approved dump site.

Site Restoration

Disturbed surfaces at the project site will be leveled and re-vegetated with the native species in the area. Any affected property in the decommissioning process will be reinstated.

13.0 CONCLUSION

The MSWR and GEMA are committed to ensuring sustainable environmental management and safeguarding the health and safety of workers as well as the general public in the construction and operation of the WTS at West Legon. MSWR and GEMA are also committed to ensuring that the construction and operation of the WTS complies with good international industry practice in environment and social sustainability as well as national environmental laws and regulations of Ghana.

Stakeholder engagement and consultations will be a continuous activity at all stages of the WTS. This will ensure inputs, issues, concerns and grievances of affected persons and communities are properly documented and addressed.

An environmental monitoring plan to help monitor environmental changes arising from the potential adverse impacts, as well as environmental monitoring has also been prepared and presented in this ESIA report to ensure a high level of environmental protection is maintained.

The construction phase material measures and E&S clauses will be included in the bidding document for the WTS project prior to its advertisement. This ESIA will serve as a guide to the Works Contractor to develop a Health and Safety Plan and Waste Management Plan for review and approval by MSWR prior to commencement of works. The private operator of the WTS will also develop and implement an Environmental and Social Management System.

The proposed project has the potential to provide numerous health and economic benefits to GEMA, entire GAMA and the country. These include improvement in solid waste management and sanitation, improved drainage system and flood resilience, employment opportunities, improvement in revenue generation among others. The project will also benefit the University of Ghana through collaboration and learning/research opportunities in solid waste segregation and management, composting and recycling.

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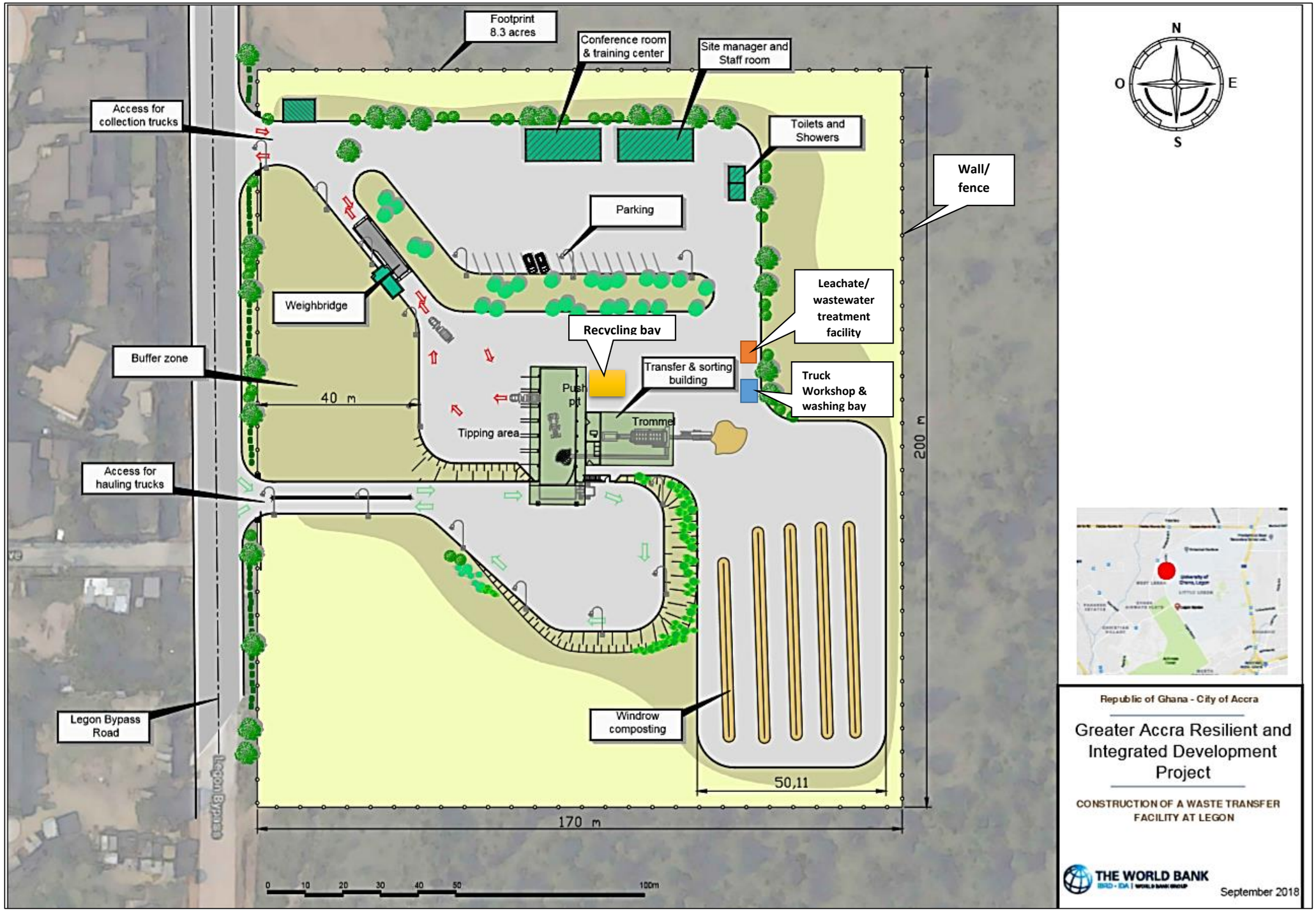
ANNEXES

Annex 1: Preliminary Layout of Proposed Waste Transfer Station

CONCEPT DESIGN AND LAYOUT OF WASTE TRANSFER STATION



Republic of Ghana - City of Accra

Greater Accra Resilient and Integrated Development Project

CONSTRUCTION OF A WASTE TRANSFER FACILITY AT LEGON

THE WORLD BANK

September 2018

Annex 2: Code of Ethics

MODEL CODE OF ETHICS

1. STANDARD OF CONDUCT

All workers (contractors and subcontractors) are expected to

- Act in accordance with honesty, integrity and fairness to foster a business climate that maintains such standards.
- Adhere to all the measures provided in the Environmental and Social Impact Assessment (ESIA) report related to the Construction Phase.
- Adhere to the code of conduct.

2. COMPLIANCE WITH LAWS, RULES AND REGULATIONS

Workers should comply with the laws, rules and regulations applicable to the construction works. These include the requirement of the provisions in the ESIA report, Factories Inspectorate Department of Ghana, International Labour Organisation (ILO) Code of Practice for Safety and Health in Construction, as well as the code of practice on HIV/AIDS and the World of Work.

3. ACCURATE RECORD KEEPING AND REPORTING

Workers should accurately reflect transactions of material use i.e. cement, wood, water etc. in its records and reports. The contractor must maintain an adequate system of internal controls to promote compliance with applicable to workers. Falsification of records is prohibited. All reports, documents legally mandated for disclosure to the public should be accurate and understandable.

4. EXPLOITATION

The Contractor aims to allocate sufficient resources to manage the business effectively and to meet daily demands. The organizational structure, normal duties and expected working hours for employees are defined. All local official public and site holidays are observed and we comply with all laws governing minimum wages and minimum number of days of holidays.

Site supervisors and other officers with authority may vary duties from time to time within reasonable limits. Working hours may also be adjusted, subject to compliance with Company guidelines, to suit project working schedules and to meet deadlines and such working hours are monitored and controlled to ensure employees are treated fairly and efforts are recognized. At no time shall excessive or prolonged periods of overtime work be encouraged. Should employees consider their workload to be excessive or their position is being exploited they are encouraged to discuss the matter with their Manager or follow the grievance procedure.

Employees are also allowed the freedom to join any union and the Company will not interfere in this regard.

5. GIFTS AND BENEFITS

A gift or benefit is anything that is offered to any worker in the course of their work, apart from the normal employment entitlements.

Gifts and benefits, including hospitality, should not be accepted if they are given with the intention of making them change how they do their work or if other people could reasonably believe they were intended for that purpose. Soliciting personal gifts and benefits is strictly prohibited in all circumstances.

6. DRUGS, ALCOHOL AND TOBACCO

While at work, workers must not be in possession of drugs, alcohol or any substance that is illegal to possess or distribute. Workers are not permitted to be in the work area if under the influence of alcohol or other drugs that are likely to adversely affect their ability to work effectively or may pose a risk to themselves, colleagues and the public.

“Under the influence” is defined as an obvious state of disturbance to one’s physical and /or mental faculties and impairs performance or that may pose risk to workers or the general public

7. WORK, HEALTH AND SAFETY

While at work, workers must take care of their health and safety and health and safety of others within the working environment.

Workers at all levels have a responsibility to promote and maintain the health and safety of all persons in the workplace. All employees must comply with any reasonable direction from management and cooperate to ensure resolution of work, health and safety issues. Any real or perceived hazards must be reported to a manager.

8. BULLYING AND HARASSMENT

Ensure that the working environment promotes a healthy and safe work environment that is free from bullying and harassment. All workers have a right to be treated with courtesy and respect. It does not include reasonable management action carried out in a responsible manner

Bullying is repeated and unreasonable behavior directed towards a worker or a person that creates a risk to health and safety to those who experience it. Examples include offensive language or comments, unjustified criticism, deliberately excluding a worker from workplace activities.

Harassment is defined as any unwelcome behavior that offends, humiliates or intimidates a person because of their age, race, disability, etc.

9. DISCRIMINATION

Workers must ensure there is no discrimination on the grounds of their sex, gender identity, age, disability, political or religious beliefs.

10. REPORTING OF ILLEGAL OR UNETHICAL BEHAVIOUR

Workers should promote ethical behavior and should encourage other workers to talk to supervisors or managers or appropriate personnel when in doubt about the best course of action in a particular situation.

The company may adopt a *Whistleblower Policy* that provides comprehensive procedures to report any suspected criminal or unethical conduct among workers

11. DISCIPLINARY ACTIONS

Our company may have to take disciplinary action against employees who repeatedly or intentionally fail to follow our code of conduct. Disciplinary actions will vary depending on the violation.

Possible consequences include:

- Demotion.
- Reprimand.
- Suspension or termination for more serious offences.
- Detraction of benefits for a definite or indefinite time.

We may take legal action in cases of corruption, theft, embezzlement, sexual harassment, drugs or other unlawful behavior.

Annex 3: Air Quality and Noise Level Monitoring Results

REPORT ON ENVIRONMENTAL QUALITY MONITORING

AT

GREATER ACCRA RESILIENT AND INTEGRATED DEVELOPMENT (GARID) PROJECT

WEST LEGON

GREATER ACCRA REGION

September, 2018

Prepared by:

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ACRONYMS

ESIA -Environmental and Social Impact Assessment

GAMA - Greater Accra Metropolitan Area

NO_2 - Nitrogen dioxide

SO_2 - Sulphur dioxide

TSP - Total Suspended Particulate Matter

PM_{10} - Particulate Matter of ten microns and below

1.0 INTRODUCTION

The Greater Accra Resilient and Integrated Development (GARID) Project is a Government of Ghana initiative, intended to provide both structural works and non-structural services towards improving flood and solid waste management in the Greater Accra Metropolitan Area (GAMA) and to deal with climate change. As part of the project two (2) Waste Transfer Stations (WTS) will be constructed at Korle Gonno and West Legon for proper and efficient management of solid waste in the GAMA. The Transfer Stations will receive domestic and commercial waste from neighborhoods within GAMA for onward transportation to final disposal sites; and will also serve as sorting points for recyclable materials for processing and/or reuse.

The project is being implemented by the Ministry of Sanitation and Water Resources (MSWR). The Environmental and Social Impact Assessment (ESIA) Consultant for the project commissioned the baseline monitoring of ambient air quality ($PM_{10,}$ TSP and Gases) and noise as part of the ESIA study at the West Legon project site as required by EPA.

1.1 Purpose of Environmental Quality Monitoring

It is a legal requirement in Ghana under the Environmental Protection Agency Act 1994, Act 490 and the Environmental Assessment Regulations 1999, LI 1652, that new establishments undertake baseline environmental monitoring before the commencement of their operation. In addition, it is the policy of those implementing the project to ensure that its operations do not negatively impact the environment and human health. The aim of this monitoring is therefore to gather relevant environmental quality baseline data with respect to ambient air quality and noise within the environs of the proposed site. The data gathered will provide useful information to help manage the environmental and health impacts of the proposed project.

1.2 Monitoring Objectives

The objectives of the monitoring are to:

- Measure the concentrations of particulate matter (PM_{10} and TSP) and gases (NO_2, SO_2 and CO) in the ambient air at the project site and nearest community;
- Assess the noise equivalent values at the project site and nearest community; and
- To fulfil the permitting requirements of the Environmental Protection Agency.

2.0 ENVIRONMENTAL MONITORING METHODOLOGY

Particulate matter, gases and noise were monitored at two different locations; Project site (N 5.66233°; W 0.19106°) and in the nearby community (Haatso, around Agbogba junction – N 5.667946°; W 0.188680°). The weather condition observed at the time of monitoring was cloudy and intermittent drizzling.

2.1 Particulate Matter

Particulate matter was sampled using MiniVol samplers set to a flow rate of 5 L/min. Samplers were placed at a minimum height of 5 meters above ground level to prevent the collection of ground level dust temporarily made airborne by gusting winds.

Pumped air was siphoned through a quartz filter paper, mounted in the sampling unit and sampling undertaken for 24 hours at each sampling location. The quartz filter paper was stabilized for a minimum of 24 hours before and after sampling in a desiccator.

The fresh quartz filter paper was weighed before sampling. After the 24-hour sampling period, post sampling filters were weighed and the difference in weight (W2-W1) was used to calculate the concentration of the particulate matter in $\mu g/m^3$ using the formula below.

$$(PM_{10}/\ TSP)\mu g/m^3 = \frac{\text{Net dust weight} * 10^6}{\text{Flow rate (L/Min)} * \text{Sampling time (Min)}}$$

2.2 Gases

Sulphur dioxide and nitrogen dioxide were sampled using the detector tube method. The detector tubes (dragger tubes) contain chemical agents that change color in the presence of the pollutant gas of interest. The dragger tubes were opened at both ends and hanged for a period of 24 hours to allow the diffusion of ambient air through the chemical resins in the tube (passive method). After the sampling period the length of the colored zone was read in parts per million (ppm) and the concentration of the gas calculated in $\mu g/m^3$ using the relation below.

$$\mu g/m^3 = \frac{\text{Concentration of gas (ppm)*molecular weight of gas}}{22.4}$$

Plates 1 and **2** show air quality monitoring equipment mounted at the project site and Agbogba junction respectively.

Plate 1: Air quality monitoring at project site

Plate 2: Air quality monitoring at Agbogba junction

3.0 RESULTS AND DISCUSIONS

The results of the ambient air quality and noise monitoring are shown in tables 1, 2 & 3 below.

3.1 Ambient Air Quality

3.1.1 Particulate Matter

Table 1. Ambient PM_{10} and TSP Measured from 14th to 15st September, 2018

LOCATION	**PM_{10} (µg/m^3)**	**TSP (µg/m^3)**
West Legon project site	20.0	75.8
Nearby Community (Agbogba junction)	68.2	160.0
EPA's 24-hour ambient air quality guideline for PM_{10} and TSP	70	230

The PM_{10} concentrations measured at the West Legon project site and nearby community (Agbogba junction) were 20.0 and 68.2(µg/m^3) respectively, and the TSP concentrations recorded at the same locations were 75.8, and 160 (µg/m^3) respectively (see table 1).

3.1.2 Gases (NO_2, CO and SO_2)

Table 2. Carbon Monoxide, Nitrogen Dioxide and Sulphur Dioxide levels Measured from 14th to 15st September, 2018

LOCATION	**CO** (µg/m^3)	**NO_2** (µg/m^3)	**SO_2** (µg/m^3)
West Legon project site	2.0	45	20
Nearby community (Agbogba junction)	8.0	32	30
EPA guideline for NO_2 and SO_2.	10 (8hrs)	150 (24hrs)	150 (24hrs)

The NO_2 concentrations recorded at the West Legon project site and nearby community (Agbogba junction) were 45.0 and 32.0 (µg/m^3) respectively. Similarly, SO_2 concentration were also found to be 20 and 30 (µg/m^3) at the West Legon project site and nearby community (Agbogba junction) respectively. Again, CO concentrations were 2.0 and 8.0 (µg/m^3) for both West Legon project site and nearby community (Agbogba junction) respectively (See table 3).

3.3 Ambient Noise

Table 3. Ambient Noise levels (dBA) recorded on 14/09/2018

LOCATION	**LEQ**	**L_{10}**	**L_{50}**	**L_{90}**	**L_{MAX}**
West Legon project site	35.1	40.3	34.1	43.0	50.8
Nearby community (Agbogba junction)	64.7	73.6	66.8	50.0	86.9
EPA ambient noise guideline for all areas	70				

The ambient noise levels (LEQ) recorded were 35.1 and 64.7 dB (A) for West Legon project site and nearby community (Agbogba junction) respectively. The noise equivalent values recorded at both locations were within the EPA's noise guideline value of 70 dB (A) for all zones.

CONCLUSION

Ambient PM_{10} concentrations recorded at the two sampling locations over the monitoring period were found to be lower than EPA ambient guideline value of 70µg/m^3 for all areas. Similarly, ambient TSP concentrations recorded at the same monitoring locations were also found to be lower than EPA guideline value of 230 µg/m^3. There were no observable activities on the site apart from an existing effluent treatment plant. This could account for the low levels of PM_{10} and TSP recorded during the 24 hour period. However, the second monitoring was carried out in the nearby community (Agbogba junction) in a residential facility close to the road and with some light commercial activities.

The concentrations of the gases (NO_2, CO and SO_2) recorded at the time of monitoring were also below the EPA guideline value of 150 µg/m^3 for both NO_2 & SO_2, and 10 µg/m^3 for 8 hour CO. The noise recordings were also within the EPA permissible level.

Annex 4: Extracts of 2015 Audit Report for Kpone Landfill

Government of Ghana

Ministry of Local Government and Rural Development

LOCAL GOVERNMENT PROJECTS COORDINATING UNIT

FINAL REPORT

TECHNICAL AUDIT OF OPERATION AND MAINTENANCE MANAGEMENT OF ENGINEERED LANDFILL SITE FOR TEMA METROPOLITAN ASSEMBLY AT KPONE NEAR TEMA

By Lukman Y. Salifu

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JULY 2015

6. Findings, Opinions and Proposed Remedial Measures/Actions

6.1 Extending the Operational Life of the Landfill

139. The Phase 1 of development of the Kpone landfill, which has a design life of 8 -10 years, will be full by the end of 2016. The operation life of this engineered landfill may be extended by carrying out the following:

- Existing cells - increasing the airspace by extending the height of the existing landfill cells to a maximum level of 24 meters above the formation of the cell.
- Additional cells – construction of new cells on parcels of land adjoining the existing cells. These parcels have a total estimated area of 12.5 hectares and could provide an additional airspace volume of out about 2,275,000 m^3. This will add about 6 more years of operational life.

140. It is recommended that the Operator is guided and directed to improve waste placement and increase the fill to an average operating height of 20 m.

141. The construction of additional cells using adjoining parcels of land as discussed under Section 4.13 of this report will extend the operational life span by 6 years beyond end of 2016.

142. The TMA with the assistance of the MLGRD should urgently seek funding for the construction of additional cells which is estimated at Seven Million, Three Hundred and Ninety Thousand United States dollars (US$7,390,0000).

143. Further to the above it is recommended that the MLGRD/TMA pursue the purchase of new landfill compactor and crawler-tractor bulldozer of adequate capacity to intervene in the provision of in-house O&M services at the landfill site when necessary.

6.2 Improving Institutional Arrangements

144. There is the need for the TMA, the Operator and other key stakeholders to have a common review committee for the periodic joint review, discussions and resolution of pressing issues. It is recommended that a Joint Landfill Management Review Committee be constituted to carry out quarterly reviews of the landfill operations, payment of user fees by service providers and to facilitate the settlement of issues.

145. The following membership is recommended.

Entity	**Members**
GoG/TMA	▪ Metropolitan Chief Executive (MCE) -(Chairman) ▪ Metropolitan Coordinating Director ▪ Head, Waste Management Department ▪ Metropolitan Finance Officer

	▪ Rep. MLGRD ▪ Rep MESTI/EPA
Operator (ZGL/Waste Landfills Ltd)	▪ General Manager ▪ Landfill Manager ▪ Landfill Accountant
ESPA	▪ Rep of Executive Secretary

6.2.1 Option for Optimal Institutional Arrangement

146. Based on the site management practices that have been adopted since the commencement of operations at the Kpone Landfill as discussed under previous sections, the reliance on a Private Operator to be solely responsible for all management activities has important implications:

(i) Financial obligations for the TMA as it now has to pay tipping fees for solid waste coming from its collection zones, especially those of the Communal collection category;

(ii) The oversight of weighbridge, billing and collection of user/tipping fees by the Private Operator in addition to waste placement, introduces additional responsibility of maintaining the weighbridge and has potential *elements of conflict of interest*.

147. These *elements of conflict of interest* in point (ii) will occur in the event of breakdown of the weighbridge. In that instance there could be possible under-statement (recording) of the tonnages received at the site which reduces the total amount of *franchise fee* payable to TMA.

148. The following institutional arrangements are proposed for the management of Kpone Landfill.

149. Environmental Health and Sanitation Directorate (EHSD) of Ministry of Local Government *& Rural Development (MLGRD)*

150. The EHSD will play the following roles:

- overall monitoring role of the operations of the Landfill and advising the Ministry of developments to be addressed.
- Reviewing Quarterly Reports of the Oversight Committee and reporting to the Minister on the operations of the Landfill.
- Compilation of best practices of the operations for replication on other landfills across the country.
- Resolution of unresolved disputes by the Oversight Committee.
- Advising the Minister on further expansion of the Landfill.

Landfill Management Oversight Committee

151. The recommended Landfill Oversight Committee should be put in place without delay with the following minimum Agenda for their meetings:

- Review of Operator's Quarterly Landfill Reports
- Review of TMA's Head, Waste Management Department's Quarterly Landfill Reports
- Review of Operator's Quarterly Landfill Financial Statements
- Landfill Debtors position and corresponding punitive actions to improve payments for dumping
- Review of tariffs, fees etc.
- Quarterly review of void space and remaining lifespan of the Landfill
- Half –yearly Report of External Landfill Operations Auditor/Evaluator (see below)
- Mandatory preparation and submission of Oversight Committee Reports to the Minister, MLGRD through the ESHD.

Waste Management Department (WMD)

152. TMA Waste Management Department will continue to supervise the daily operations of the Operator and present daily/weekly, monthly, quarterly and annual reports as required.

The Private Operator

153. The appointment of the Operator and its sub-Contractor to take charge of the overall operations at the site (franchise arrangement) provides an appropriate management option albeit requiring an effective monitoring and evaluation of its operations.

154. For example, ensuring that all waste for disposal is properly recorded, weighed and classified according to source (MMDA jurisdiction), type (domestic, commercial etc) and carrier (i.e. specific service provider and/or others) is an important element of the monitoring of private operator's services.

155. Following from the above, the review of the Operator's adherence to the Conditions of the Service Contract including meeting specific requirements such as those mentioned under Table 2.8 – 2.10 should, among others, determine the continued engagement of the Operator when the current contractual arrangements expires by 31st October, 2015.

Appointment of an Independent Landfill Technical Auditor/ Evaluator

156. The appointment of an Independent Landfill Technical Auditor/Evaluator to undertake a half- yearly technical audit of the Landfill will enhance the M&E functions of the TMA-WMD. This will ensure that the Operator's activities are evaluated for timely compliance of benchmarks for waste placement and compaction to achieve the estimated unexpired lifespan of the Landfill which is currently critical to waste management for the Tema Metropolis and its environs.

Appointment of an Independent Weighbridge Operator/Fee Collector

157. A variation of the above institutional arrangement will be for the Private Operator to revert to the stated role in the Service Contract while TMA appoints a Weighbridge

Manager to manage and maintain the weighbridge, billing and collection of tipping (user) fees and payment of utility bills. This variation in essence privatizes TMA's previous role as contained in the Service Contract. Under this arrangement the Weighbridge Manager will pay the Private Operator of the site its Contract fees and pay TMA a portion of the franchise fees and retain the balance as its own fees. This arrangement is to ensure that there is a dedicated focus on maintenance of the weighbridge which is very critical for records management which in turn impacts on the entire operations of the landfill. The Private Operator is also afforded focus on waste placement operations.

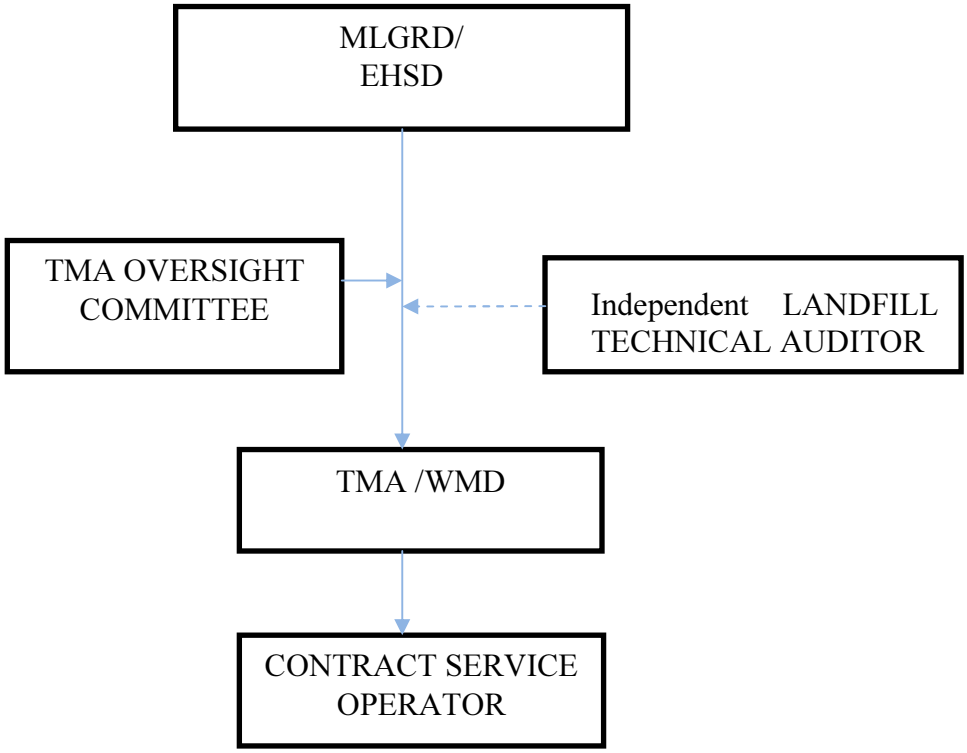


Fig 5.2 Institutional Arrangement for the management of Kpone Landfill

6.3 Improving Operations and Maintenance Activities

158. The Operator, ZGL/Waste Landfills Ltd, should be directed to comply and improve the following site procedures immediately:

- Waste acceptance and registration – all incoming trucks should be inspected for unauthorized waste. The MLGRD/EPA should assist and prepare a categorization and posting special waste to be applied for the Kpone Landfill Site.
- Waste placement – the Operator should prepare a phased (sequence) filling plan for the final cell and the final landform to be achieved for the entire site
- Waste compaction – the use of a Crawler Compactor as specified in the Landfill Operation and Maintenance Manual and the Service Contract should be adhered to consistently to ensure that the stipulated densities for the compacted wastes can be achieved. This will lead to maximum utilization of airspace at the landfill.

- Working face management – the extent (width) of the working face should be minimized to improve aesthetic conditions especially in the absence of litter screens. The activities of scavengers of the working face should be effectively regulated by erecting moveable screens/barricades to hinder their entry.
- Application of cover material - The application of cover material should be adhered to as specified in the Service Contract.
- Handling and disposal of special waste – the prescribed procedures for co-disposal of special wastes should be adhered to as specified in the Landfill Operational and Maintenance Manual and the Service Contract.
- Record keeping – quality control measures should be put in place to evaluate the performance of the data entry clerks periodically. This involves delegating a supervisor to cross-check entries at the end of each week.

6.4 Improving Profitability of Business Operations

159. The following proposals are made for the improvement of the cost recovery, profitability of the landfill.

- The Operator's operating costs should be analyzed periodically for the purpose of determining future fees etc.
- The operations of the Operator should be monitored closely and any dereliction in performance should be quantified in monetary terms (pecuniary penalty) and debited to it reduce its operating profit.
- The Service Contract should be reviewed and amended to include the submission of the Operators periodic (quarterly/annual) financial statements for review.

160. The status of compliance of the Private Operator to the provisions of the Service Contract regarding the above, among others, should determine the continued engagement of the Operator when the current contractual arrangement expires by 31st October, 2015.

6.5 Improving Health and Safety Systems

161. The performance of the TMA and the Operator(s) with regards to ensuring the requisite health and safety standards is unsatisfactory. It is recommended that the following issues be addressed immediately:

- Preparation of a site safety plan for all activities on the landfill site
- Preparation of an emergency response plan which delineates procedures for responding to fire explosions or any releases of harmful substances.
- Appointment of a Health and Safety officer to ensure its compliance of safety procedures by all the personnel, scavengers and users of the facility.
- A system for reporting and maintaining records of accidents, occupational injuries and illnesses.

6.6 Improving Environmental Monitoring

162. Environmental monitoring is a very important procedure during operation, closure and aftercare management. The following remedial actions should be undertaken immediately:

- The scope and terms of reference under which GAEC is providing environmental testing services should be examined and reviewed appropriately to ensure that the

entire spectrum of groundwater/surface water monitoring parameters outlined in the O&M Plan are covered.

- There is the need to procure the requisite equipment for gas and leachate monitoring as stipulated in the O&M Plan.
- The requisite after sales servicing agreements with suppliers should be ensured when procurement is being done.

Annex 5: Evidence of Stakeholder Consultations

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: Municipal Environment, Health officer

Date of Consultation: 13/7/2018 **Time:** ~~10:48am~~ 12:17pm **Venue:** GEMA

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**
Derick Tata-Anku	0244016583	Municipal Env. Health officer

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations
	- There are 60 bylaws (180 pages) for waste management. - A form has been developed to register tricycles (waste management) - ~~Abotaj Kpong is the currently the main dumpsite.~~ - Environmental Health office is the one in charge of waste management in municipal. Two Zonal offices at Dome and Abokobi who work with the sanitary offices. Schedule officers are in charge of bins and refuse trucks belongs to the municipal assembly. Most of the work is done by the private sector with which they liase with the ~~municipal~~ Assembly for waste management activities - Waste management activities are part of the assembly's budget - Management would be in the hands of the assembly and ~~the~~ I recommend the project make room for capacity building.

Signature: .....

Name: .....

MUNICIPAL ENV. HEALTH OFFICER
GA EAST MUNICIPAL ASSEMBLY
DERICK TATA—ANKU
Chief Env. Health Technologist

Date: 13/7/2018

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: Municipal Environment, Health Officer

Date of Consultation: 13/7/2018 **Time:** 12:17pm **Venue:** GEMA

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**
Derick Tata-Anku	0244016563	Municipal Env. Health officer

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations
- Expense from private sector managing such facilities is not very good because they create unnecessary queues that dont exist because they would prefer their refuse collected & dumped first.	
- private sector is mainly in for money so they might compromise on doing the right thing	
- funding is an issue currently in waste management for the Municipal Assembly.	
- A solution to the unauthorized dumping of refuse is the registration and a mobile transfer dumb which Zoomlion has decided to give to the municipal Assembly.	
- Meeting with UG on land Acquisition was successful. UG has asked for some documents. (size of land & sketch & Architectural drawings) and EIA report, feasibility study report. further collaboration with university compost treatment section.	

Signature:.....

Date:.....

Name:.....

MUNICIPAL ENV. HEALTH OFFICER
GA EAST MUNICIPAL ASSEMBLY
DERICK TATA—ANKU
Chief Env. Health Technologist

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: Municipal Environmental Health Officer

Date of Consultation: 13/7/2018 **Time:** 12:17pm **Venue:** GEMA

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**
Derick Tats-Anku	0244016563	Municipal Env. Health officer

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations	
- major concern is the project must be given to the GEMA.		
- Public opinion can be a big hindrance but with good public education and sensitization it can work.		
- ~~Concern~~ with the segregation aspect of the project the main issue would be with the plastic management and the organic waste would be sent to organic waste for processing.		
- The assembly has distributed 4 dustbin each to 33 basic schools in the Municipal the schools are currently practicing segregation of waste because the dustbin have been labled into Organic, Plastic, paper. waste		
- Municipal intends to construct a paper factory under the PPP to recycle paper.		

MUNICIPAL ENV. HEALTH OFFICER
GA EAST MUNICIPAL ASSEMBLY
DERICK TATA—ANKU
Chief Env. Health Technologist

Signature:.....

Name:.....

Date:.....

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: UNIVERSITY OF GHANA

Date of Consultation: 27.07.18 **Time:** 8:00am **Venue:** PDMSD DIRECTORS OFFICE

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**
CHARLES KOFINTI	0260759919	DIRECTOR, PDMSD (PHYSICAL DEVELOPMENT AND MUNICIPAL SERVICES DEPT.)

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations
- The ~~estate manager~~ director would want to see the design and the land size for the project. - Initial / Preliminary discussions were held with the VC and the Chief executive. - Scoping on impacts of immediate environs and adverse effects. - The design and environmental impacts from the project is key. Since trucks will also need access, the land required needs to be thoroughly discussed. - The ~~consultant~~ The plan for the project should be well documented so the university is better informed. - Advice: When the consultant gets more information a meeting can be arranged with the VC and other staff of Inst of Env Studies to provide more details. - The proposed land will be near the Accra Sewage Plant, the area is an environmentally controlled Area.	

Signature:.....

Name: CHARLES KOFINTI

Date: 27/07/18

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: UNIVERSITY OF GHANA

Date of Consultation: 27/07/18 **Time:** 8:40am **Venue:** PDMSD DIRECTORS OFFICE

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**
CHARLES KOFINTI	0260759919	DIRECTOR, PDMSD

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations	
- Inst of Env Studies have a compost facility at Amasaman, similar project will be done around the stabilization ponds area - The University is not certain on what the project wants To do before we can move forward. - It will be useful to share info prior To the meeting to make the discussion more engaging and then the way forward will be finalized from there.		

Signature:.....

Name: CHARLES KOFINTI

Date: 27/07/18

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: Waste Landfills Co. Ltd

Date of Consultation: 14/9/2018 **Time:** 12:00pm **Venue:** Conference Room

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**
Kwei Dagadu	0208630454	General Manager.

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations
- ~~What the new transfer~~ Depending on which waste transfer site waste is taken to, they still end up bringing it to the Kpong Landfill site. - There are serious issues with the Kpong Landfill site. The current site is almost out of ~~the~~ land unless there is an expansion. By the end of the first quarter of 2019 if there is no expansion the Kpong Landfill site might have to shut down. - Data shows that at one point in time, everything was collected by 2 o'clock with no work to be done at night showing that when the distance of the transfer site to the ~~Kpong~~ then Achimota landfill makes a difference impr	

Signature: [illegible]

Name: Kwei Dagadu

Date: 14/09/2018

(2)

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: Waste Landfills Co. Ltd

Date of Consultation: **Time:** **Venue:**

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations
	- There is a slight dispute between Kpong Municipal and TMA on who owns the Kpong Landfill site. - An EIA was prepared for the Kpong Land fill site hence environmental monitoring is done with ground water done 3-4 times a year and leachate analysis and Gas, dust control. - There are fire extinguishers, Fire hydrants and a dedicated water tanker for emergency fire cases. - There are no interuptions to traffic on normal operational days. ~~but when the~~ - Existing transferstations are fully underutilized because of financial constraints.

Signature:.....

Date:.....

Name:.....

(3)

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: Waste Landfills Co. Ltd.

Date of Consultation: **Time:** **Venue:**

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations	
- TMA ~~officials~~ have representing officials on the Kpong Landfill site involved in most of the environmental monitoring. - Kpong Land fill is not the only place for waste disposal. There are other places.		

Signature:.....

Date:.....

Name:.....

SAL CONSULT LIMITED STAKEHOLDER ENGAGEMENT FORM

Title of Project: Environmental and Social Impact Assessment for the Proposed Waste Transfer Stations at Korle Gonno and West Legon

Identified Stakeholder: Department of Urban Roads (DUR)

Date of Consultation: 26/09/2018 **Time:** 1:29pm **Venue:** DUR, Head Office

Stakeholder/Officer(s) Consulted		
Name	**Contact Number**	**Position**
Ferdinand Tali	0244573587	Head, Environment Unit

Summary of Stakeholder Discussion, Comments and Concerns

Issue	Comments/Concerns/Recommendations
	- Design the road and the designs submitted to urban Roads for inputs and comments. - As part of the project team there should be a representative from Urban Roads who would be a liason between the Department of Urban Roads and the project team - Management plans for the road should be made available to the assembly. - Assembly is responsible for maintenance of roads within their jurisdiction - Department of Urban Roads are very mindful of the impacts, movement of construction materials and there should be a traffic impact assessment and - Traffic management plan during construction

Signature: .....

Name: Ferdinand Tali

Date: 26/09/18

ESIA FOR WASTE TRANSFER STATION (WTS)–GARID PROJECT

Report on consultation with University of Ghana, Legon.

Venue: The Balme Library- University of Ghana, Legon

Date: 10th September, 2018

Attendants: In attendance were representatives from five institutions which include;

- Institute for Environment and Sanitation Studies(IESS)- University of Ghana, Legon
- World Bank
- Ministry of Sanitation and Water Resources
- Ga East Municipal Assembly
- SAL Consult Limited

Issues Discussed:

Generally, issues on the design and scope of the project were discussed at the meeting. Other issues concerning the operation and risk management of the project when completed were also discussed.

Concerns raised:

The concerns of the university include;

1. Design of the project
    - The size of land (10acres) that was requested by the Ministry is quite large
    - The type of technology to be adopted
    - The volumes of waste to be received at the WTS
    - The components of the waste to be received
    - Risk management of the facility
2. The roles of the University in the construction and operation of the facility
3. Sustainability of the WTS specifically whether or not the operation of the facility will be affected by political issues such as change of Government

Response to concerns raised:

The responses to the concerns by the Ministry include;

1. Design of the project
    - The size of land requested was informed by the catchment area where the facility will be situated and the estimated quantity of waste to be received. The land size

proposed will also to make room for future expansion of the facility if the need arises.

- The final technology to be used has not yet been determined. This is because, Ministry intends to align the project scope with that of the University to cater for material recovery, compost, etc.
- The facility will only be allowed to receive municipal solid waste.

2. Political interference or continuity is not a problem because the project is funded by the World Bank.
3. The Ministry would like the University to partake in the designing of the project.

Consultation with the University of Ghana

Annex 6: Concept Note and Draft MoU

PROPOSED MUNICPAL WASTE TRANSFER STATION

AT

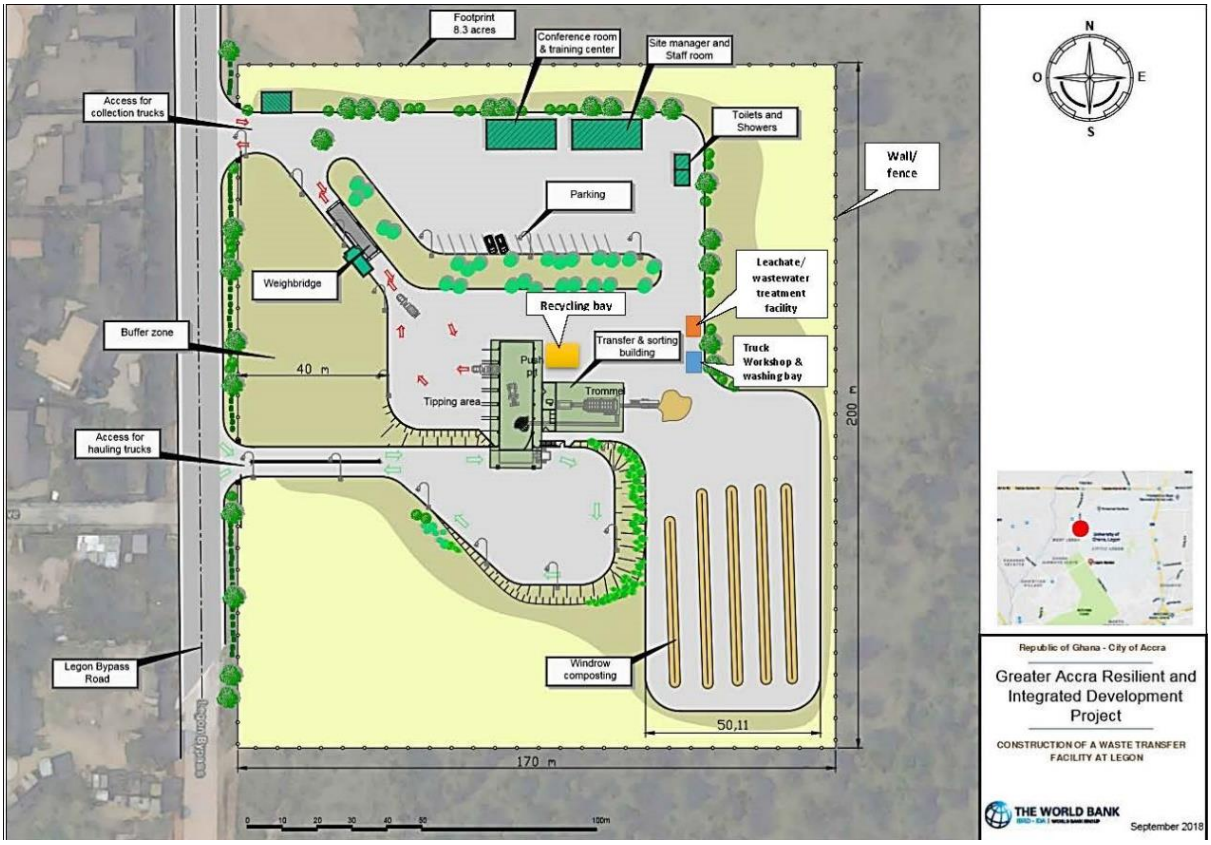
UNIVERSITY OF GHANA

CONCEPT NOTE

ON

COLLABORATION BETWEEN

UNIVERSITY OF GHANA, MINISTRY OF SANITATION AND WATER RESOURCES, AND GA EAST MUNICIPAL ASSEMBLY



MINISTRY OF SANITATION AND WATER RESOURCES
ACCRA

UNIVERSITY OF GHANA
ACCRA

GA EAST MUNICIPAL ASSEMBLY
ABOKOBI

SEPTEMBER 2018

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SOLID WASTE TRANSFER STATION AND MATERIALS RECOVERY PLANT

I. General Context

The Government of Ghana with support from the World Bank is undertaking the Greater Accra Resilient and Integrated Development (GARID) project. The project aims at supporting critical investments to improve flood and solid waste management, and provision of public services to targeted vulnerable communities within the Odaw Basin of Greater Accra Region. The key interventions will focus on dealing with challenges with Drainage, Solid Waste and reducing the vulnerability of communities along the Odaw Channel to flooding.

The project components are as follows:

- Component 1: Climate Resilient Drainage and Flood Mitigation
- Component 2: Solid Waste Management Capacity Improvements
- Component 3: Participatory Upgrading of Targeted Flood Prone Settlements
- Component 4: Project Management and Institutional Capacity Development
- Component 5: Emergency Contingency Fund

The solid waste management interventions under Component 2 are being led by the Ministry of Sanitation and Water Resources. There are three main activities which will be undertaken. These include capping of dumpsites, community-led solid waste management in low income communities and construction of a state-of-the-art transfer station with material recovery facility.

a. Project Description

A state-of-the-art transfer station and material recovery plant will be designed and constructed. The plant will serve the University of Ghana and the surrounding municipalities within a 5-7km radius. The capacity of the transfer station will be between 600 and 750 tons per day. The material recovery plant will include a sorting bay, a plastic recycling and a composting center. In addition, the transfer station will be equipped with a training facility to serve as Center of Excellence for Integrated Solid Waste Management in Accra.

The key components of the facility will include:

- The main transfer station with hopper and trailer;
- Composting Station;
- Plastic Recycling Station;
- Weighbridge, Gate, and Control Room;
- Office complex with conferencing facilities and laboratory (Center-of-Excellence);
- Access roads, site roads and parking areas;
- Drainage system;

- Provision of fire protection systems, including water supply and extinguishers;
- Construction of workshops, including bays for repair and maintenance of transfer trucks;
- Washing and cleansing facilities for trucks and equipment; and
- Ancillary works.

The land area required for the different components of the transfer station, material recovery plant, center of excellence and a buffer zone will be between 7 and 10 acres.

b. Knowledge Sharing – Centre of Excellence for Waste Management

The transfer station and material recovery plant will be located on the University of Ghana campus. The Institute of Environmental Sanitation Studies (IESS) in the University will serve as the focal point and will be included on the management team. It will serve as a center of excellence for training students on various waste management technologies waste transfer and re-use options. The facility will serve as a research center and will be equipped with a laboratory, conferencing facilities etc. for the use of the Institute and other training centers. The research center will be located with a buffer zone and car park between the transfer station and the research center.

c. Why the Transfer Station

The travel distance to landfill sites are getting further and further from city centers. In the Greater Accra Metropolitan Area, the existing disposal sites are located to the far east in the Kpone-Katamanso Municipal Assembly and to the north at Adjen-Kotoku and Nsumia. The travel distance makes it difficult for the disposal trucks to make the expected number of round trips each day and hence makes waste collection service more expensive. The Transfer Station will be located to reduce the travel distance for refuse trucks. The Figure 1 provides the break-even point using the haulage cost and the round-trip distance of refuse trucks.

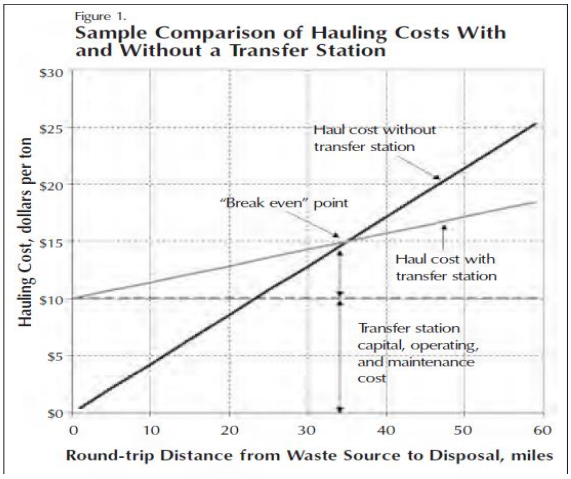


Figure 1: Comparison of costs with and without waste transfer station

II. Design, Operation and Management

The design of the facility will be done by a specialized engineering firm. The University will be involved through review and comments on draft design and finalization of the design process. Furthermore, the University will be used as a sounding board for the

design and technical studies. The management of the plant will be jointly undertaken by the Ministry of Sanitation and Water Resources, The University of Ghana (IESS) and the Ga East Municipal Assembly. The operation of the facility is expected to be handled by the private sector. An overall management team with relevant stakeholders will oversee the operations of the facility.

The processes to be undertaken at the site will include:

- Transfer of waste to final disposal sites;
- Waste sorting;
- Recycling of plastics;
- Composting of organic fraction; and
- Any other activities which may be proposed in the future which will be subject to prior approval by the Ghana EPA and the University.

All the activities will be done in conjunction with the Center of Excellence to ensure good practice and sustainability.

The transfer station will function as a unit where disposal trucks will use a ramp and deposit waste through a hopper. The waste will be consolidated into waiting higher volume transfer vehicles for disposal at a final disposal site. There will be no long-term storage of waste at the Transfer Station.

Figure 2: Sample Waste Transfer Station

Figure 3: Waste Transfer Station Operational Schema

A sorting unit will be set up where pre-sorted waste will be deposited. This will undergo additional sorting as may be required for various re-use activities. A plastic waste recycle unit will be set up for plastic recycling. A composting unit will also be set up. It should be noted that the composting process generates gases which are not pleasant. Therefore, there will be a buffer between the Center of Excellence and the operational areas of the station.

A detailed Operation and Maintenance Plan shall be provided by the installation team for all aspects of the operation of the facility. This shall include all relevant health and safety measures.

a. Types of Waste

The Transfer Station will receive domestic waste of all types from within a 5-7km radius and from the Ga East, Adentan, La Nkwatanang Madina and Ayawaso West Municipalities. The transfer station will not receive industrial/hazardous waste.

It is expected that the surrounding municipalities will engage in source separation of their wastes. The segregation of waste has already been started in the Ga East municipality and in some of the nearby markets. The segregated waste will be directed to the sorting bay. The unsegregated proportion of the waste will be sent to the transfer bay to be sent to the final disposal site.

b. Safety

The design and operation of the facility will be done to ensure safety of all workers, drivers, visitors, students etc. Entrance and exits for waste trucks and workers will be at different locations respectively.

Safety precautions shall be provided at all relevant locations. Ramps will be provided for use by the physically challenged. Fire assembly points shall be provided at an appropriate location in the event of an emergency. All workers and visitors to the operational areas of the plant shall be required to use Personal Protective Equipment (PPE) at all times. Fire and evacuation drills shall be carried out periodically to ensure that disasters are minimized. The system will ensure that there is a zero tolerance for accidents. Safety procedures shall be clearly indicated at all relevant locations.

Appropriate records of all site activities including personnel, trucks and visitors shall be kept. A log of all key operational activities shall be kept.

c. Environmental and Social Impact Assessment

An Environmental and Social Impact Assessment (ESIA) will be prepared in accordance with World Bank environmental and social safeguard policies and will be reviewed and cleared by both the Ghana EPA and the World Bank prior to being publicly disclosed. This study will be carried out to ensure that all the relevant impacts have been considered. An Environmental and Social Management Plan (ESMP) will be developed from the findings of the ESIA.

III. Risks

There are a number of risks associated with this proposal, categorized according to operations, financing, management and for which the following considerations have been put forward.

a. Operational risk

The operational risks are further divided into environmental and social, health and safety, technical and administrative sub-categories

Environmental and Social risks

There is the risk of the operations of the facility generating pollutants that would leach into nearby water bodies, contaminate the soil, create excessive noise, toxify the air and/or adversely affect the visual landscape. To address this, there will be a full Environmental and Social Impact Assessment undertaken prior to the completion of the engineering design that will identify the potential for the occurrence of these and other environmental risks and determine measures necessary to mitigate them. Subsequently, before the commissioning of the facility, an Environmental Management Plan (EMP) will be developed to guide the operations of the facility. Prior to the inception of operations in the facility, the EMP and other operational plans will be subjected to assessments by the Environmental Protection Agency and the local government following which Environmental Permits and Business Operating Permits shall be issued. These permits shall serve as additional guidance to mitigate all environmental and social risks posed by the facility. During the operational phase, the operators will be mandated to establish a grievance redress mechanism (GRM) that will provide a platform for interested parties to advance any and all grievances and ensure opportunity exist for resolution.

Health and Safety risks

The operations of the facility can potentially create health and safety risks for the workers, visitors and neighbouring communities. These risks may arise from the poor handling in the operations of the equipment, poor maintenance of the equipment, movement of vehicles, biochemical hazards, inadequacy of appropriate apparel, tools and kits, among many others.

Mitigation measures, captured in a Health and Safety Plan, to address these risks include the preparation of training and operational manuals, institution of equipment maintenance protocols, preparation and placement of advisory notices, periodic health and safety audit regimes,

Technical and Administrative risks

The potential technical risks associated with the operations of the waste transfer station may arise from ensuring the use of the facility conform to the design standards. These

include ensuring daily inflow limits are not exceeded, mandatory evacuation of the residual waste are maintained, the caliber of the personnel recruited for the facility is not compromised, the specifications of the waste collection vehicles for waste inflow and (residual) outflow do not vary from the design, off-taking arrangements of the recovered waste do not fail, among others.

b. Financing Risks

The risk posed by unsustainable financing of the operations to the long-term viability of the facility is considerable that requires a non-conventional approach, given the frequent failure conventional approaches have led to. In this regard, the long-term costs for running the facility has to be assured to fulfill the objective of assigning it a Center of Excellence status.

The measures to mitigate this risk include the preparation of a Facility Business Plan that will lay out the conditions for the long-term viability. It will outline all the options for full cost recovery for the services rendered at the facility.

c. Management Risks

The risk of changes to the management of the facility is a serious threat to be considered. This is particularly so where the persons in charge of the parties involved in this proposal change in the future and the successors are not minded with the same concerns as the originators are.

The parties engaged in the development of the facility shall deal with this risk by establishing a corporate entity comprising representation from all parties to own and manage the operations to prevent the operations to become subject of political convenience, be it local, institutional or national.

Annex 1 - Draft Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE MINISTRY OF SANITATION AND WATER RESOURCES

AND

UNIVERSITY OF GHANA

AND

GA EAST MUNICPAL ASSEMBLY

FOR

THE ESTABLISHMENT OF A WASTE TRANSFER STATION, MATERIALS RECOVERY FACILITY AND CENTER OF EXCELLENCE FOR INTEGRATED SOLID WASTE MANAGEMENT

The Ministry of Sanitation and Water Resources, represented by the Chief Director, hereinafter referred to as “the Government” on the one hand

And

The University of Ghana, represented by the Director of the Institute of Environmental Sanitation Studies (IESS), on the other hand; hereinafter referred to as “the University”,

And

The Ga East Municipal Assembly, represented by the Municipal Coordinating Director, on the other hand, hereinafter referred to as “the Assembly”;

All collectively referred to as the “**Parties**”.

WHEREAS:

A. The Parties have considered the establishment of a partnership towards the enhancement of teaching, researching and practical application of modern methods of sanitation management;

B. The Parties have committed to working together and collaborating on matters relating to the development of state-of-the-art waste transfer station and material recovery facility together with a Center of Excellence for Integrated Solid Waste Management (hereinafter described and referred to as **“the Project”**);

C. The Parties have determined the best suited location for the Project to be on a 10-acre parcel of land whose coordinates are annexed heretofore;

D. The Parties have agreed that the waste to be supplied to the Project shall be limited to household and municipal waste and exclude industrial and medical waste

E. The Parties have considered and acknowledge the critical importance of sustaining the development and maintenance of the Project to facilitate improvements in solid waste management in the Greater Accra Metropolitan Area (GAMA) in addition to training, learning, research and innovations; and

F. The Parties are conscious of the need for effective management of the Project subsequent to its completion to preserve the asset and the investment made.

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. A state-of-the-art waste transfer station having a capacity that ranges between 600 and 750 tons per day and including ___ (size) hopper and trailer, ramp and associated automated weighbridge, control room and gate, compactors for residual waste, with workshops and bays for repair and maintenance of transfer trucks;

ii. A multi-purpose material recovery facility with multiple units for detoxification, deodorising and sorting bays and conveyors accommodating pulp, organic, plastics, glass, electronic, ferrous and non-ferrous metals waste separation, packaging and buyback operations;

iii. Office complex with conferencing facilities and laboratory (Center-of-Excellence);

iv. Other ancillary works comprising access roads, parking areas, drainage system, fire protection systems, including water supply and extinguishers; greenfield development in buffer

ARTICLE 3 – COVERAGE OF SERVICE AND LINKAGE

The project is expected to serve the communities within 7km radius of the site comprising the Assembly and other communities falling within Adenta, La Nkwantanang Madina and Ayawaso West Municipalities will be linked to the final waste disposal site designated by the Government for the dumping of all residual waste from the Project.

ARTICLE 4 – OBLIGATIONS OF THE PARTIES

Article 4.1 – The Government

i. **The Government** shall

a. secure the funding of 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 engineering consultants to undertake the design for the project

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. establish an appropriate administrative structure for the oversight of the operations and maintenance of the project, including initial funding to cover the operational costs at the inception of operations.

f. Avail senior officers to support the University in the teaching and research activities, as may become necessary

Article 4.2 – The University

ii. **The University** shall

a. avail a site in the amount of ten (10) acres on the land for which it possesses the certificate of title under the Executive Instrument….., issued for the acquisition of land towards the establishment of the University. The land shall form the equity contribution of the University to the establishment of the facility and which contribution shall be valorised and reflect in the ownership of the facility.

b. participate in the preparation of the terms of reference for the selection of the engineering consultants who shall be recruited for the design and construction supervision of the Project

c. propose members from the University to be participate in the post-construction management of the project,

d. furnish the Government with evidence-based policy-relevant data and other findings to periodically improve the development and review of applicable policies

e. support the Assembly in the preparation of education, information and communication materials

Article 4.3 – The Assembly

i. **The Assembly** shall, working in cooperation with the other Municipal Assemblies in the designated catchment areas jointly;

a. oversee the activities of the waste collection operators and ensure the transmission of only the approved waste management of the supply of waste to the Project in compliance with the terms in this agreement

b. police the peripheries of the Project to maintain the sanctity of the approaches to the site of the Project and forestall deliberate dumping or damage of the neighbouring environs by miscreants

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 generation of solid waste generators in the catchment areas

Article 4.4 – The Parties

ii. **The Parties** shall

a. employ the appropriately qualified staff to man the operations of the Project
b. efficiently manage the operations of the project to ensure compliance with the terms of this agreement
c. secure additional value for the operations of the project through partnerships other actors involved in the value chain of the waste stream

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 with 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 the performance of the obligations of the Parties is prevented, wholly or in part, by reason of a Force Majeure Event.

ii. If any Party is by reason of a Force Majeure Event 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 Event. Each Party shall:

   a. use all reasonable means to remedy or abate the Force Majeure Event as soon as possible;

   b. resume performance as soon as possible after termination of the Force Majeure Event or abatement of the Force Majeure Event to an extent which permits resumption of such performance; and

   c. notify the other Parties when resumption of performance shall occur.

iii. If a Force Majeure Event continues for a period exceeding eighty-four (84) days, any Party may terminate this Agreement forthwith upon notice to the other Parties.

iv. "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;

v. A Force Majeure Event 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.

vi. 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

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.

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 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 ……..

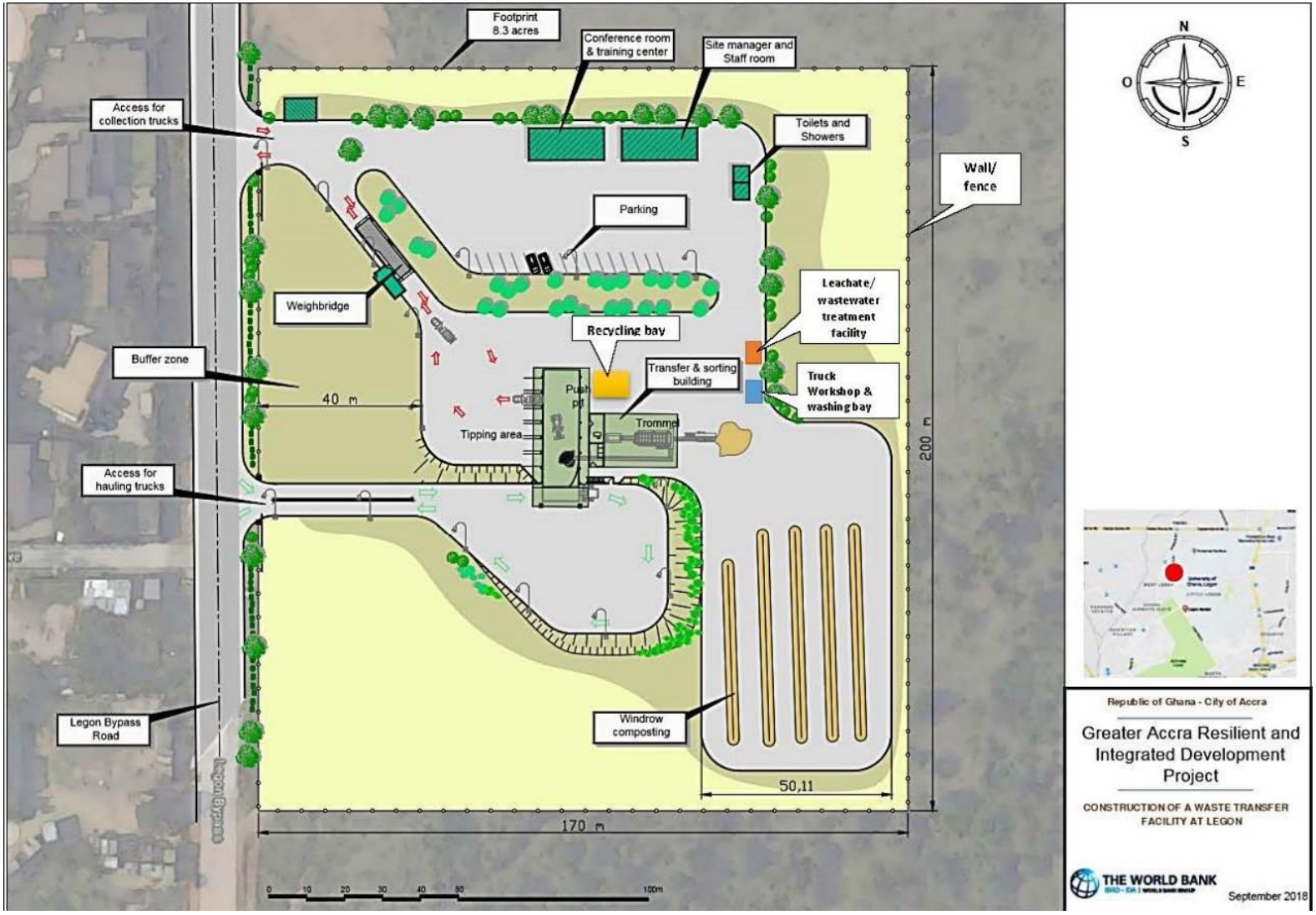
…….

For the Government, Ministry of Sanitation & Water Resources	**For the University of Ghana, Institute for Environment & Sanitation Studies**	**For the Assemblies Ga East Municipal Assembly**
Chief Director	**The Director**	**The Coordinating Director**

Witnessed herein by

ANNEX 1

CONCEPT DESIGN



ANNEX 2

Site Plan

Annex 7: Grievance Redress Forms

GRIEVANCE FORM- CONSTRUCTION PHASE

WASTE TRANSFER STATION PROJECT AT WEST LEGON
(GARID PROJECT)

Reference No:	**Date of submission:**
Name of Grievant: ☐ **I wish to raise my grievance anonymously** ☐ **I request not to disclose my identity without my consent**	**Work Phone:** **Home Phone:** ☐ **Send documents to external representative** **Email:**
Postal Address: **P.O. Box:** **City:**	**Residential Address:** **Street:** **City:**
Date, time and place of event leading to grievance:	Date you became aware of the event, *(if different):*

Frequency of Occurrence

☐ **One time incident/grievance (date _____)** ☐ **On-going (currently experiencing problem)**

☐ **Happened more than once (how many times? _____)**

Detailed description of grievance including names of other persons involved, if any (What happened? Where did it happen? Who did it happen to? What is the result of the problem?)

Proposed solution to grievance:

<u>Grievant</u>: File a copy of this form with your immediate supervisor and retain a copy for filing at the next step or steps if necessary. If you do not receive a response within 5 working days or disagree with the action taken, you may file a copy of the grievance at the next step.

Step	Grievance Filed With *(Please Print Name)*	Date	Complainant's Signature	Date
1	Assembly Member			
2	Municipal Environmental Health Officer			
3	GARID Project Coordinator			

GRIEVANCE FORM – OPERATIONAL PHASE

WASTE TRANSFER STATION PROJECT AT WEST LEGON
(GARID PROJECT)

Reference No:	**Date of submission:**
Name of Grievant: ☐ **I wish to raise my grievance anonymously** ☐ **I request not to disclose my identity without my consent**	**Work Phone:** **Home Phone:** ☐ **Send documents to external representative** **Email:**
Postal Address: **P.O. Box:** **City:**	**Residential Address:** **Street:** **City:**
Date, time and place of event leading to grievance:	Date you became aware of the event, *(if different):*

Frequency of Occurrence

☐ **One time incident/grievance (date _____)** ☐ **On-going (currently experiencing problem)**

☐ **Happened more than once (how many times? _____)**

Detailed description of grievance including names of other persons involved, if any (What happened? Where did it happen? Who did it happen to? What is the result of the problem?)

Proposed solution to grievance:

<u>Grievant</u>: File a copy of this form with your immediate supervisor and retain a copy for filing at the next step or steps if necessary. If you do not receive a response within 5 working days or disagree with the action taken, you may file a copy of the grievance at the next step.

Step	**Grievance Filed With** ***(Please Print Name)***	**Date**	**Complainant's Signature**	**Date**
1	Snr Environmental Monitoring & Compliance Officer of WTS			
2	Municipal Environmental Health Officer			
3	Law Court			

Annex 8: Relevant Environmental Quality Guidelines

RELEVANT ENVIRONMENTAL QUALITY GUIDELINES

National Effluent Quality Guidelines

General Effluent Quality Guidelines for Discharge into Natural Water Bodies- Maximum Permissible Levels

Parameter	EPA Recommended Guideline Value
pH	6 – 9
Temperature Increase	<3°C above ambient
Colour	200 TCU
Turbidity	75 NTU
Conductivity	1500 uS/cm
Total Suspended Solids	50 mg/l
Total Dissolved Solids	1000 mg/l
Oil/Grease	5.0 mg/l
Sulphide	1.5 mg/l
Total Phosphorus	2.0 mg/l
Biochemical Oxygen Demand (BOD_5)	50 mg/l
Chemical Oxygen Demand (COD)	250 mg/l
Nitrate	50 mg/l
Ammonia as N	1.0 mg/l
Alkalinity as $CaCO_3$	150 mg/l
Phenol	2.0 mg/l
Mercury	0.005 mg/l
Total Arsenic	1.0 mg/l
Soluble Arsenic	0.1 mg/l
Lead	0.1 mg/l
Total Pesticides	0.5 mg/l
Fluoride	10 mg/l
Chloride	250 mg/l
Sulphate	200 mg/l
Total Coliforms	400 MPN/100ml
E. coli	0 MPN/100ml
Cadmium	0.1 mg/l
Chromium (+6)	0.1 mg/l
Total Chromium	0.5 mg/l
Copper	5.0 mg/l
Nickel	0.5 mg/l
Selenium	1.0 mg/l
Zinc	10.0 mg/l
Silver	5.0 mg/l
Tin	5.0 mg/l
Aluminium	5.0 mg/l
Antimony	5.0 mg/l
	0.05 mg/l

(Source: Environmental Protection Agency, Accra 1997)