# PROVIDING SEWERAGE
## SOLUTIONS TO LOW-INCOME URBAN COMMUNITIES IN THE GREATER ACCRA REGION

GAMA SWP TECHNICAL Brief No.2 2022

GAMA SANITATION AND WATER PROJECT

## INTRODUCTION AND BACKGROUND

### Introduction

The Greater Accra Sanitation and Water Project (GAMA SWP), in addition to providing household and institutional toilets, as well as extension of piped water connections to low-income households, has also provided two simplified sewerage facilities in Ashiaman and Bankuman in the Greater Accra Region. Both facilities have been provided in low-income communities for the first time in Ghana. This document provides brief information on project background, objectives, scope of work, type of facilities, and capacities, as well as proposed facility operation and management models.

MINISTRY OF SANITATION AND WATER RESOURCES

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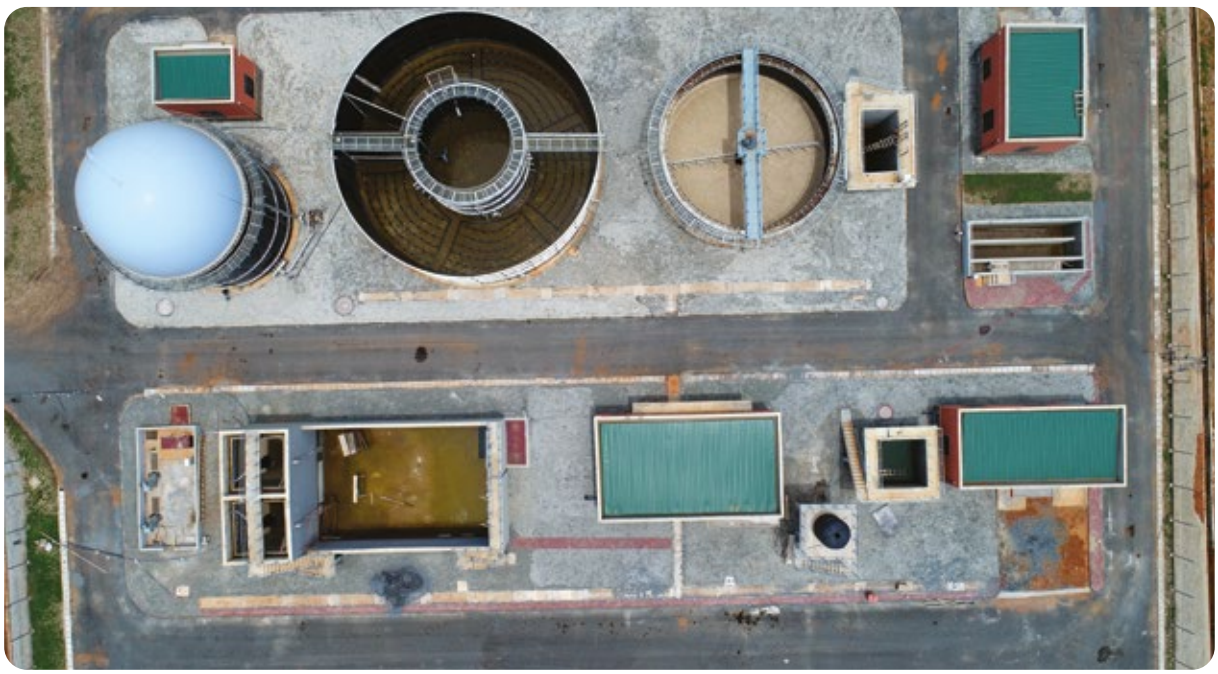
## Background

The Government-led World Bank funded Greater Accra Metropolitan Area Sanitation and Water Project (GAMA SWP) started in 2015 and has currently been extended to the Greater Kumasi Metropolitan Area (GKMA) in the Ashanti Region, expected to end by December 2024. The primary objective of the project is to improve sanitation, water supply, and environmental sanitation services in two Metropolitan and 22 Municipal Assemblies in Greater Accra and one Metropolitan and seven Municipal Assemblies in Greater Kumasi. By the end of the parent project in 2020, about 28,000 household and 406 institutional toilet facilities had been provided, while more than 11,000 households had been connected to water distribution pipelines together touching the lives of more than 900,000 low-income dwellers. Four major drainage systems had been expanded to reduce flooding in Accra, while the capacities of thousands of government and civil society staff and a number of institutions had been built. One other rare area in sanitation that the project ventured into, was the construction of two Simplified Sewerage Systems in Ashaiman New Town in the Ashaiman Municipal Assembly and Bankuman in the Tema Metropolitan Assembly.

## Project objectives

The central objective of the project is to increase access to improved sanitation in the Greater Accra Metropolitan Area with focus on two low-income urban communities and ensure disposal of treated effluent in a sustainable manner in order to minimize sanitation-related public health issues.

# THE ASHAIMAN SIMPLIFIED SEWERAGE SYSTEM



## Project Communities

The Ashaiman Simplified Sewerage System is located within Ashaiman New Town and serves that community and the Tema Development Corporation (TDC) Quarters. In Ashaiman New Town, the households rely mainly on public toilets for defecation. Other methods for defecation include tying faeces in polythene bags and dumping it in refuse containers in addition to defecating in gutters, nearby bushes, and open fields. At the TDC Quarters, an existing waste treatment facility constructed in the 1970s for treating sewerage from the community has become defunct and the existing sewer network currently flows into a communal septic tank located within the site. The lack of effective disposal of human excreta in the communities poses a critical challenge to environmental sanitation improvement efforts of the Municipal Assembly. Ashaiman New Town has an estimated land size of 1.27km2, whilst the TDC Quarters covers an estimated land size of 0.18km2. Both communities have a total estimated population of 24,311 with an estimated 5,455 Households.

## Scope of Work

The project entails Community Mapping and Engagement, assessment of WASH facilities and hygiene promotion, and construction of 51km pipeline simplified sewerage networks, which include household sewer connections, laying of block or lateral sewer lines, laying of trunk or collector sewer lines, and construction of household chambers.

Other project activities include rehabilitation of the existing TDC Quarters sewer network covering replacement of defective sewer lines, rehabilitation of defective manholes and household connection chambers, rehabilitation of communal septic tank, and rehabilitation of the defunct pumping station.

In addition, there is construction of Wastewater Treatment Plant with a capacity of 1,800m3/day comprising Preliminary, Primary, Secondary and Tertiary Treatment Units, Sludge Treatment Units, Biogas Facilities, Operation and Processing Units, and Office building plus.

## Facility description

The Ashaiman Simplified Sewerage facility, with 20 years expected lifespan, comes with the following components:

- Simplified sewer lines in which the sewage flows.
- Sewer network manholes and household connection chambers normally used for inspection and maintenance purposes.
- Screening Chamber which removes debris and floating materials from the wastewater influent.
- Sewage collection wells where sewerage is stored.
- Attenuation tank which provides a constant hydraulic or organic loading of downstream treatment processes.
- Primary sedimentation tank which supports separation and removal of suspended solids and scum from wastewater.
- Up-flow blanket filtration tank in which organic fraction of wastewater is converted to biogas under anaerobic conditions in the reactor.
- Anoxic-Anaerobic-Anoxic (A2O) tank in which aerobic-anoxic treatment occurs, which mimics activated sludge processes to reduce

the nutrient content of wastewater effluent from the Up-flow Biological Filter (UBF).

- Secondary sedimentation tank in which micro-organisms and other solids are removed after biological treatment.
- Sludge treatment and storage tanks where liquids are separated from solids.
- Disinfection tank where effluent polishing intended to destroy pathogens is done.
- Finishing ponds, a final point where the effluent goes before it is discharged into a waterbody.

## Proposed Facility Operation and Management Model

The intention is for the Government to absorb the investment cost while the Municipal Assembly, in partnership with a selected private operator, takes care of the daily operation and management of the plant. Beneficiary households will be billed monthly, and proceeds will be used to settle operational expenditures and replacement of depreciating components of the plant.

***Hon. Cecilia Abena Dapaah (middle in red), Minister for Sanitation and Water Resources, on a tour to the Ashaiman Sewerage facility site during construction.***

# THE BANKUMAN SIMPLIFIED SEWERAGE TREATMENT FACILITY

*Simplified Sewerage Treatment Plant at Bankuman in the Tema Metropolis*

## Project Communities

The project communities include Bankuman, Zinginshore, Abonkor and parts of Tema New Town within the Tema Metropolitan Area. The main target community is Bankuman with possible extension of services to the other communities. Bankuman is located about 7km east of Tema with an estimated population of about 21,069 and 3,144 households. The community covers an area of approximately 3.2km2 with a generally gently undulating topography with the southern section completely developed. Streets, lanes, and other secondary accesses are also quite clearly identified and general infrastructure and other facilities are quite moderately developed. Management of liquid waste disposal facilities are, however, generally poor. The only off-site collection and disposal facility is the trunk sewer that runs through a section of the community which discharges into an existing Detention Basin and finally channeled into the sea.

A baseline survey carried out in the community revealed that 51% of the inhabitants of Bankuman use public toilets; 45% practice open defecation, and 4% use dedicated household toilets. A section of the Tema sewarage collector system, which serves the eastern basin covering parts of Tema

Communities 1, 4, 7, the Industrial Area, as well as the Harbour and New Town area, passes through Bankuman. The effluent is intercepted at the existing detention basin for treatment and is discharged into the sea through outfall pipes.

## Scope Of Work

Project implementation activities associated with the installation of the Bankuman Simplified Sewerage facility included community mapping and engagement, WASH facilities assessment and hygiene promotion, construction of a 26.9km sewer network involving household sewer connections, laying of sewer lines and collector sewer manholes, rehabilitation of trunk sewer lines and defective manholes, and rehabilitation of existing detention basin. There was construction of a Secondary Treatment Plant with a capacity of 1,600m3/day comprising Primary and Secondary Treatment Units (Trickling Filter), Tertiary Treatment Units (Drying Beds), and a Fence Wall around the treatment units, as well as construction of an Office Building.

## Facility Description

With an expected lifespan of 15 years and a total installation cost of US$6.6 million, the Bankuman facility comes with the following main components:

- Simplified sewer lines in which the sewage flows.
- Sewer network manholes and house connection chambers normally used as inspection for maintenance purposes.
- Screen/Grit Channel which removes debris and floating materials from the wastewater influent.
- Detention Basin which facilitates settling of particles or solids.
- Trickling filter, an aerobic treatment system that uses micro-organisms attached to a medium to remove organic matter from wastewater.
- Secondary sedimentation tank for the removal of micro-organisms and other solids after biological treatment.
- Sludge drying bed which dries the wet sludge using the sun.
- Outfall, where the treated effluent is disposed of in the sea.

## Proposed Facility Operation and Management Model

The intention is for Government to absorb the investment cost while the Tema Metropolitan Assembly, which already has experience in managing a sewerage system, takes care of the daily operation and management of the plant. Beneficiary households will be billed monthly, and proceeds will be used to settle operational expenditures and replacement of depreciating components of the plant.

*A World Bank monitoring visit to the Bankuman Sewerage Facility site during construction*


*Households in Bankuman being connected to sewer lines*

MINISTRY OF SANITATION AND WATER RESOURCES

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*Photos: Emmanuel Lamptey*