



REPUBLIC OF GHANA

**PERFORMANCE AUDIT REPORT
OF THE
AUDITOR-GENERAL
ON THE PROVISION OF
FLOOD CONTROL DRAINS**

**BY HYDROLOGICAL SERVICES
DEPARTMENT OF
MINISTRY OF WORKS & HOUSING**

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This report has been prepared in compliance with Article 187(2) of the 1992 Constitution of Ghana and Section 13(e) of the Audit Service Act, 2000 (Act 584) for submission to Parliament in accordance with Section 20 of the Act.

**Johnson Akuamoah Asiedu
Acting Auditor-General
Ghana Audit Service
9 July, 2021**

**The study team comprised:
Theophilus Kojo Eghan, Renata Termokie Pinto and
Daniel Neequaye under the supervision of
Lawrence N. Ayagiba (DAG, PSAD)**

**This report can be found on the Ghana Audit Service
Website: www.ghaudit.org**

**For further information about the
Ghana Audit Service, please contact:**

**The Director, Communication Unit
Ghana Audit Service - Headquarters
Post Office Box MB 96,
Accra**

**Tel: 0302 664928/29/20
Fax: 0302 662493/675496
E-mail: info@ghaudit.org
Location: Ministries Block 'O'**

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TRANSMITTAL LETTER

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**Office of the Auditor-General
Ministries Block 'O'
P. O. Box M.96
Accra
GA-110-8787**

**Tel: (0302)662492
Fax (0302)675496**

9 July 2021

Dear Rt. Hon. Speaker,

PERFORMANCE AUDIT REPORT OF THE AUDITOR-GENERAL ON PROVISION OF FLOOD CONTROL DRAINS

I have the honour, in accordance with Article 187(2) of the 1992 Constitution of Ghana, Sections 13(e) and 16 of the Audit Service Act, 2000 (Act 584) to submit to you a performance audit report on the provision of flood control drains.

2. An amount of GH¢117,711,420.90 has been invested to construct and maintain drains and culverts in flood-prone areas in the country from 2015 to 2019.

3. Despite the investments in flood protection structures, the problem of flooding persists, with the country experiencing at least one major flood disaster every year over the past 10 years resulting in the loss of lives and property. The Auditor-General commissioned the audit to ascertain whether measures Hydrological Services Department (HSD) of Ministry of Works and Housing (MWH) had implemented were effective and to recommend corrective actions for improvement.

4. We carried out the audit at the offices of HSD in Accra and selected storm drains construction sites throughout the country between July and September 2020. The audit covered the period 2015 to 2019.

5. We reviewed documents, conducted interviews of officials of MWH, HSD and contractors as well as physically inspected projects, to gather evidence to support our observations.

6. We found that HSD did not produce Drainage Master Plans (DMPs) to guide the coordinated development of drainage facilities which thus affected the department's ability to plan the provision of flood control structures in a holistic manner. Each year, from 2015 to 2019, HSD significantly fell short of implementing their target of drainage facilities needed to mitigate flooding nationwide. Over the audit period, 12.2km (i.e., 11%) of the targeted 110km of drains was constructed and none of the retention ponds targeted for 18 drainage basins had been done.

7. We also noted that HSD ensured contractors were paid for only valid works done and the final costs of projects were within their respective contract sums. However, construction of 20 (i.e., 74%) of our 27 sampled projects delayed partly because of delayed payments to contractors which made them to suspend works on the projects.

8. Furthermore, we found that HSD and the MWH did not maintain completed and existing drains because maintenance was not prioritised and therefore not included in annual activity plans and budgets to enable implementation. The unmaintained drains had weeds, silts, debris that impeded the smooth flow of water and reduced the effectiveness of existing drains to mitigate flooding.

9. In our opinion, HSD's implemented measures has largely not been effective in controlling and mitigating flooding in the country. I have made recommendations to HSD/MWH, to have a long term and holistic planning of drainage development and collaborate with other key player agencies.

10. I have also recommended that HSD prioritise the development of DMP as a blue print to guide key players to align drainage facilities and other civil infrastructure that create conflicts in drainage networks and reduced the efficiency and effectiveness of storm water drains.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Johnson', written in a cursive style.

**JOHNSON AKUAMOAH ASIEDU
ACTING AUDITOR-GENERAL**

**THE RT. HON. SPEAKER
OFFICE OF PARLIAMENT
PARLIAMENT HOUSE
ACCRA**

LIST OF ABBREVIATIONS

AAP	Annual Action Plan
BOQ	Bill of Quantities
DLP	Defects Liability Period
DMP	Drainage Master Plan
DUR	Department of Urban Roads
GAS	Ghana Audit Service
GIFMIS -	Ghana Integrated Financial Management Information System
GMet	Ghana Meteorological Agency
GOG	Government of Ghana
HSD	Hydrological Services Department
IPC	Interim Payment Certificate
ISSAIs	International Standards of Supreme Audit Institutions
MMDAs	Metropolitan, Municipal and District Assemblies
MOF	Ministry of Finance
MWH	Ministry of Works and Housing
NADMO	National Disaster Management Organisation
PPA	Public Procurement Authority
PPBME	Policy Planning, Budget, Monitoring and Evaluation
SMTDP	Sector Medium Term Development Plan
UN	United Nations
WMO	World Meteorological Organization

GLOSSARY OF TERMS

Bill of Quantities (BOQ)	A document used for bidding in the construction industry in which materials, parts, and labour are itemised. It also details the terms and conditions of the construction contract and itemises all work to enable a contractor to price the work for which he or she is bidding. The priced BOQ becomes part of the contract documents after the bid has been accepted and the construction contract has been signed.
Culvert	A closed conduit for the free passage of surface drainage water under a highway, railroad, canal or other structure. A tunnel carrying a stream or open drain under a road or railway.
Defects' liability period	The agreed period from completion of a structure during which the contractor has an obligation to repair any faults or shortcomings in the construction work, performance of components or materials covered by the contract.
Detention basin/pond	A basin or area, designed or treated to protect against flooding and, in some cases, downstream erosion by temporary holding storm or flood waters, and releasing such waters in a controlled manner to attenuate outflows.
Drainage master plan	A plan that formulates the proposed management of urban storm water runoff for a particular drainage area. It typically addresses issues such as infiltration and runoff characteristics, flow paths of major overland flows, location and size of storm water drainage components such as detention/retention systems and storm water conveyance and quality improvement structures.
Drainage system	The system of gulley inlets, pipes, overland flow paths, open drainage channels, culverts and detention basins used to convey storm water runoff to its receiving water bodies within a drainage catchment or catchments.
Flood control works	Any structural technique used to control the frequency or severity of flooding by confining the water to a particular channel or directing it along planned floodways. Examples are dams, reservoirs, embankments, levees, channel improvements like concrete drains and culverts, and catchment treatment to induce temporary holding of water like detention ponds.

Hydraulic studies and analysis	A study of the flow conditions of water (or other liquids) in conduits and open watercourses. It involves numerical analysis of actual or expected flow conditions (such as water surface elevation and velocity) used as a basis for designing hydraulic structures like drains and culverts.
Hydrological studies	The study of the amount and quality of water being stored or conveyed on the land surface, and in soils and rocks near the surface.
Operational hydrology	The collection, transmission, processing, storage, retrieval and publication of basic hydrological data or elements from a network of hydrological stations. This is distinguished from applied hydrology, which is the analysis and interpretation of hydrological data for applications such as the design of bridges, dams, culverts, canals and drains to control flooding.
Primary drains	Major drains network that receives water from secondary drains and empties the water into rivers, lagoons or the sea. Because the coverage of primary drains is from the highest point in a catchment to the outflow point in a river or lagoon, primary drains are more susceptible to changes in the catchment characteristics such as in paved areas due to urbanization.
Secondary drains	Network of drains in neighbourhoods and roadsides, designed to collect storm water and grey water from adjacent buildings, surface run-offs, and tertiary drains and empties them into primary drains.
Site studies	An investigation into the soil conditions, topography, vegetation, slope stability, erosion and flooding potential, access, ownership boundaries etc. of proposed project sites in order to determine appropriate design solutions.
Storm drain	A buried pipe, conduit, or constructed open channel that conveys storm water runoff. It may include components of open channels such as culverts, and inlets and outlet structures.
Technical specifications	A detailed description of technical requirements, usually with specific acceptance criteria, prescribing materials, dimensions, and workmanships for work items to be built or installed.
Tertiary drains	Tertiary drains are normally small U-shaped drains of widths between 0.5 meters to 1.0 meters, located either on both or on one side of roads as part of the road construction. They are designed to collect water from roads and surfaces next to the drains.

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EXECUTIVE SUMMARY

Ghana experiences flood disasters every year, resulting in loss of lives and property. The National Disaster Management Organisation (NADMO), between 2015 and 2020, recorded 1,446 flood events, which caused 309 injuries, 510 deaths, 54,744 houses being inundated and the destruction of 136,563 acres of farmlands.

2. Ministry of Works and Housing (MWH) and its implementing agency, Hydrological Services Department (HSD) are responsible to provide and manage primary drains to control and mitigate flooding. From 2015 to 2019, an amount of GH¢117,711,420.90 was invested in constructing and maintaining drains and culverts in flood-prone areas in the country but the problem of flooding persists. Research studies have attributed the problem of perennial flooding to inadequately sized culverts and blockage of drains due to neglect and lack of maintenance.

3. In view of this, the Auditor-General, in line with Section 13(e) of the Audit Service Act, 2000 (Act 584), commissioned this audit to ascertain whether measures HSD had implemented were effective and to recommend corrective actions for improvement.

What we did.

4. We assessed HSD's planning, implementation, and maintenance of drainage infrastructure across the country. We sought to find out whether HSD;

- i. developed adequate plans to guide the effective provision of drainage and flood control facilities.
- ii. implemented their planned drainage projects towards the effective mitigation of flooding; and
- iii. maintained existing and completed drains to ensure the structures retained their structural integrity and functioned efficiently and effectively.

5. To gather data for our assessment, we reviewed documents, interviewed field officers and visited project sites to physically inspect drainage facilities implemented in known flood-affected areas in the country between 2015 and 2020.

What we found.

Planning and design of drainage facilities.

6. HSD did not produce Drainage Master Plans (DMPs) to guide the coordinated development of drainage facilities which affected HSD's ability to plan the provision of flood control structures in a holistic manner. DMPs provide a framework to manage storm water through proposed improvements to existing drainage networks. It also provides a means of synchronising flood control drains with other civil works developed by other agencies, for the efficient and effective drainage of storm water.

7. Since 2013, the MWH and HSD had included the production of DMPs in the Ministry's Sector Medium Term Development Plans but did not prioritise, plan and budget for their production.

Implementation of targeted drainage structures.

8. Each year, from 2015 to 2019, HSD significantly fell short of implementing their target of drainage facilities needed to mitigate flooding nationwide. Over the audit period, 12.2km (i.e., 11%) of the targeted 110km of drains was constructed and none of the retention ponds targeted for 18 drainage basins had been done. This was because HSD and the MWH did not allocate sufficient budget to cover the planned length of drains, and Ministry of Finance (MOF) did not release funds on time to complete drainage projects, causing the projects to stall.

Completing drainage projects on time, to quality specifications and cost.

9. HSD ensured contractors were paid for only valid works done and the final costs of projects were within their respective contract sums. Construction of 20 (i.e., 74%) of our 27 sampled projects delayed partly because of delayed payments to contractors which made them to suspend works on the projects. Also, HSD did not carry out adequate monitoring and inspection of works to ensure they were done to quality standards and specifications. We found defects in 15 (i.e., 55%) of the 27 sampled projects we inspected that had not been corrected.

Maintenance of existing and completed drains.

10. HSD and the MWH did not maintain completed and existing drains because maintenance was not prioritised and therefore not included in annual activity plans and budgets to enable implementation. The unmaintained drains had weeds, silts, and debris that impeded the smooth flow of water and reduced the effectiveness of existing drains to mitigate flooding.

What we recommend.

11. We recommend the following corrective actions to enhance the effectiveness of the measures HSD has in place to control and mitigate flooding in Ghana.

12. To improve their planning of drainage facilities, we recommended that;

- HSD should begin preparatory works towards the development of DMPs for the country in manageable phases. They should develop a program of implementations and conduct studies of existing drainage facilities and conditions, towards the development of DMPs.
- In consultation with MWH, liaise with the MOF to ring-fence funds for the development of DMPs.

13. To improve their implementation of planned drainage facilities, we recommended that:

- i. MWH allocation of budget ceilings to HSD for the construction of drains should be based on their annual targets.
 - ii. HSD should prioritise monitoring and develop schedules to enhance the efficiency of their monitoring activities and to report on instructions issued to contractors.
 - iii. HSD should ensure that contractors rectify all identified defects before their respective contracts end and retention monies are released to them.
 - iv. HSD should ensure that only works completed satisfactorily by contractors are certified for payments.
 - v. MWH and HSD should liaise with the MOF for the timely and regular release of funds to enable contractors to be paid on time to avoid works stalling on sites.
14. To ensure existing and completed drainage facilities are maintained, we recommended that;
- i. HSD should ensure maintenance activities are included in their annual action plans for implementation each year.
 - ii. HSD and MWH should ensure that funds are earmarked for the maintenance of completed concrete drains during the budgeting process.
 - iii. HSD should ensure the development of maintenance schedules and manuals to guide the implementation of maintenance activities on concrete drains.
15. Management of HSD has agreed to the findings and stated that it has noted the recommendations for implementation. The response is attached to this report as *Appendix 'K'*.

CHAPTER ONE

INTRODUCTION

1.1 Motivation for the audit

Flooding is the overflow of water beyond the normal confines of a watercourse, or the accumulation of water over areas that are not normally submerged.¹ This normally occurs when there is flow of excess water beyond drainage channels, when there is unexpected rise of water levels caused by either a dam failure or extreme rainfall duration and intensity.

2. According to the United Nations, flooding is the single most destructive type of natural disaster that causes over one-third of the total estimated costs of damages and is responsible for two-thirds of people affected by natural disasters worldwide². Flooding has been a long-standing problem in Ghana and in many cases had resulted in the destruction of life and property. The National Disaster Management Organisation (NADMO), between 2015 and 2020, recorded 1,446 floods in Ghana, which resulted in 309 injuries to persons, 510 deaths, 54,744 houses being inundated and 136,563 acres of farmlands being destroyed³.

3. The Ministry of Works and Housing oversees the implementation of measures to manage floods. The Ministry has performed this function since 1995, through the Hydrological Services Department as an implementing agency. A total amount of GH¢117,711,420.90 has been invested into the construction and maintenance of drains and culverts in flood-prone areas in the country from 2015 to 2019.

¹ WMO/UNESCO- *International Glossary of Hydrology* (WMO- No. 385, 1992).

² *United Nations- Guidelines for Reducing Flood Losses*.

³ *National Disaster Management Organisation (information received in November 2020)*

4. Despite the investments in flood protection structures, the problem of flooding has not lessened, with the country experiencing at least one major flood disaster every year, over the past 10 years. Tasantab et al (2018)⁴, a group of settlement planning and disaster management experts, in a study on the flooding situation in Ghana, asserted that in over 50 years, about 4 million people in Ghana have been affected by floods, resulting in economic damages exceeding US\$780 million. They noted that in Ghana's urban areas like Accra and Kumasi, floods are triggered by seasonal rainfall and predicted that flood risks will get worse as rainfall classified as 'heavy' are projected to increase between 2010 and 2050.

5. One notable flood occurred on 3 June 2015, resulting in the deaths of over 150 people and destruction of properties estimated at GH¢1,658,847.00. ⁵Sam Jr. (2002), in his research on the causes of flooding in Accra, attributed the problem of perennial flooding in Accra especially to inadequately sized culverts, and blockage of major drains due to accumulation of silt caused by years of neglect and lack of maintenance.

6. In view of this, the Auditor General, in line with Section 13(e) of the Audit Service Act, 2000 (Act 584), commissioned this audit into the provision of drainage facilities by the Hydrological Services Department of the Ministry of Works and Housing to control floods.

1.2 Purpose of the audit

7. The purpose of the audit was to ascertain whether measures the Hydrological Services Department (HSD) of Ministry of Works and Housing (MWH) has implemented to control and mitigate flooding in the country were effective and to recommend corrective measures for improvement.

⁴ <https://theconversation.com/amp/ghana-must-move-from-coping-with-floods-to-adapting-for-them-104493>

⁵ <http://www.africanenviro.org/SWMVisi.htm>

1.3 Scope of the audit

8. We sampled and audited storm drainage projects implemented across the country from 2015 to 2019, by the HSD. The audit focused on;

- Planning and design of drainage facilities;
- Implementation of planned drainage facilities; and
- Maintenance of existing and completed drainage projects.

9. The audit field studies were carried out between July and September 2020 at the offices of HSD in Accra and at the various sites of the projects sampled for our audit assessment.

1.4 Audit objectives

10. The objectives of the audit were to determine whether the Ministry of Works and Housing, through the Hydrological Services Department;

- i. Developed adequate plans to guide the effective provision of drainage and flood control facilities i.e., whether they;
 - a. developed Drainage Master Plans (DMPs) for the country, to guide the long-term implementation of drainage facilities;
 - b. developed adequate and appropriate drainage designs for drainage projects;
- ii. Implemented their planned drainage projects towards the effective mitigation of flooding. i.e., whether they;
 - a. implemented the targeted length of drains each year; and
 - b. ensured drains were implemented within cost, time and quality specifications; and;
- iii. Planned and implemented the maintenance of existing and completed drains to ensure the structures retained their structural integrity and functioned efficiently and effectively.

1.5 Audit questions and assessment criteria

11. Table 1 presents the audit questions, their corresponding assessment criteria, and the sources from which the criteria were derived.

Table 1. Audit questions, assessment criteria and sources of criteria.

No.	Audit questions	Audit criteria	Source of criteria
1	<p>For Objective 1 (Planning)</p> <ul style="list-style-type: none"> • Has HSD developed adequate plans to guide the effective provision of drainage and flood control facilities? • Has HSD developed Drainage Master Plans to guide the development of drainage facilities in the country? • Did HSD develop adequate and appropriate designs for drainage structures in line with proposed master plans and results from site studies and analysis? 	<ul style="list-style-type: none"> • HSD is to develop Drainage Master Plans for all the major drainage basins to guide the systematic, coordinated implementation of measures to control and mitigate flooding. • HSD is responsible for the design of drainage improvement structures and flood control mechanisms. They are to develop adequate and appropriate designs based on results of site and hydrological studies and analysis. 	<ul style="list-style-type: none"> • <i>Sector Medium Term Development Plan (2018-2021)</i> • <i>Sector Medium Term Development Plan (2014-2017)</i> • <i>Functions of HSD</i>
2	<p>For Objective 2 (Implementation)</p> <ul style="list-style-type: none"> • Has MWH and HSD implemented their planned drainage structures to effectively mitigate flooding? • Were MWH and HSD able to implement their yearly targets of drains? • Was HSD able to implement drainage projects within the cost, time and quality specified in construction contracts? 	<ul style="list-style-type: none"> • We expect the MWH and HSD to implement all planned drainage projects in order to effectively mitigate the country’s flooding problem. • HSD is required to monitor and closely supervise contractors’ performance, works done, materials used, equipment and labour force at construction sites; to ensure drains are constructed in accordance with contract specifications, and completed within agreed cost and time. 	<ul style="list-style-type: none"> • <i>Functions of HSD.</i> • <i>PPA Manual</i> • <i>PPA Contract Administration Manual for Works-Manual 2.</i> • <i>Contract Documents.</i> • <i>Public Financial Management Regulations, 2019 (L.I. 2378).</i>
3	<p>For Objective 7 (Maintenance)</p> <ul style="list-style-type: none"> • Did HSD make provisions for the maintenance of existing and completed drainage structures to ensure the structures were sound and functioned properly? 	<ul style="list-style-type: none"> • As a function, HSD is responsible for the maintenance of primary drainage channels to ensure the drains are structurally sound and are functioning properly. To carry out this function, we expect HSD to plan, budget and implement the maintenance of completed drainage projects. 	<ul style="list-style-type: none"> • <i>Mandate of HSD.</i>

Source: GAS Audit team compilation (July 2020).

1.6 Audit standards, sampling and methodology

1.6.1 Audit standards

12. We carried out the audit in accordance with the International Standards of Supreme Audit Institutions (ISSAIs), relevant to performance auditing. These are: *ISSAI 100-Fundamental Principles of Public-Sector Auditing*, *ISSAI 300-Fundamental Principles of Performance Auditing*, and *ISSAI (3000-3100)-Performance Audit Guidelines*.

1.6.2 Audit sampling

13. We sampled 27 concrete drainage projects, out of 107 projects implemented throughout Ghana, between 2015 and 2020. The 27 selected project locations were known flooding hotspots purposefully sampled from four regions of Ghana to cut across the geographical north, middle and south of the country. These were the Greater Accra and Central regions, in the southern zone, the Ashanti region within the middle belt, and the Upper East region in the north. The projects from these four regions together make up 72% of the total 107 projects implemented by HSD over the audit period.

14. Based on the regional distribution of the 107 projects, we allocated a proportionate quota to each of the sampled regions to make the regional distribution of our sample more representative of that of the population. Fifteen projects (i.e., 56%) were therefore selected from Greater Accra Region, six projects (22%) from Ashanti Region, three projects (11%) from Central Region and three projects (11%) from Upper East Region. Refer to *Appendix 'B'* for details of the 27 projects we sampled for our audit. At *Appendix 'A'*, is a map showing towns identified by NADMO in 2016 as flooding hotspots.

1.6.3 Audit methodology

15. To fulfil our audit objectives, we reviewed relevant documents on the planning and implementation of drainage projects; interviewed key players in the project delivery process; and inspected projects at the construction sites. We

engaged an expert in Drainage Engineering to advise us on the data collection, analysis and interpretation that was performed in carrying out this audit. In accordance with Section 29(1) of the Audit Service Act, 2000 (Act 584), we gave HSD 30 days to respond to our findings and conclusions via a management letter (*the cover of the management letter and HSD's full response are attached as Appendix 'K'*).

i. Documents review

16. We reviewed available documents, on studies that HSD carried out on existing drainage conditions towards the development of long-term solutions; and specifically, on the 27 sampled projects sites. We also reviewed design documents to determine if they were complete, adequate and could be used to guide implementation of drainage facilities.

17. We examined project execution documents (such as monitoring, supervision, and progress reports) to assess the extent and effectiveness of HSD's monitoring and supervision and the validity and timeliness of payments to ensure construction works met quality, time and cost targets. We reviewed evidence of HSD's planning and conduct of maintenance activities on completed drainage structures to ensure the structures were in good condition and were functioning properly. A detailed list of documents and files we reviewed is presented in *Appendix 'C'*.

ii. Interviews

18. We interviewed officers of HSD, MWH, and MOF that played key roles in terms of planning, implementation, and maintenance of drainage facilities across the country. This was done to obtain clarifications, confirmations and explanations on issues we noted from documents review. We also interviewed officers of other stakeholder institutions such as MMDAs and DUR whose activities are critical in the provision and management of public drainage facilities; and those involved in flood disaster management such NADMO. This was to assess

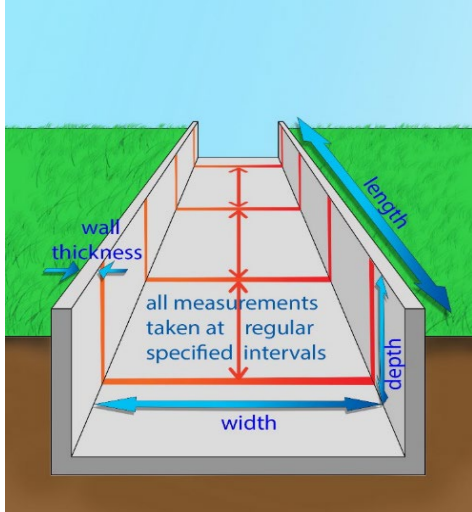
the extent of HSD's/MWH's collaboration with these stakeholders to ensure the proper coordination of efforts in the drainage of urban and rural storm water to solve flooding.

19. We interviewed selected contractors to obtain information on HSD's site supervision of construction works; and on the timelines of payments by the MOF, as well as challenges and factors contributing to delays in project completion. Refer to *Appendix 'D'* for the full list of persons interviewed.

iii. Observations and inspections

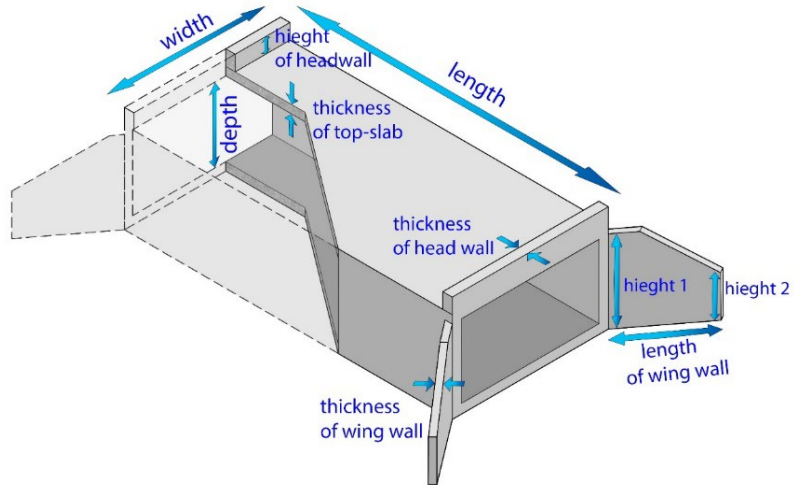
20. We observed HSD's field officers carrying out surveys of proposed project sites to confirm that necessary studies are carried out before design of projects. We also visited and inspected the sites of the 27 projects we sampled to verify if the projects exist and were carried out to the quality specifications in the contract documents. At the project sites, we measured works done and assessed the concrete strength of the drainage structures. The measured works were compared with the volume of work certified for payment by HSD, to determine if the extent of works done was commensurate with the payments to contractors. For 12 of our 27 sampled projects which had been completed and were in use, we examined if maintenance activities (such as removal of weeds and silts and repair of cracked, worn-out or broken structures) were carried out to ensure their proper functioning. *Pictures 1-4* show the audit team taking measurements during field inspections while *Figures 1 and 2* show the types of measurements we took on each drainage structure. We have presented at *Appendix 'E'*, samples of the Recording Sheets showing typical measurements we took on both open drains and culverts during our site inspections.

Figure 1: Types of measurements taken on open drains.



Source: by GAS Audit Team (July 2020).

Figure 2: Types of measurements taken on box culverts.



Source: Produced by GAS Audit team (July 2020).

Picture 1: Taking measurements of the width of a drain.



Source: GAS Audit team (July 2020).

Picture 2: Taking measurements of the depth of a drain.



Source: GAS Audit team (July 2020).

Picture 3: Measuring the concrete strength of a drain (using the Schmidt hammer).



Source: GAS Audit team (July 2020).

Picture 4: Taking the measurement of the length of a drain (using a pedometer).



Source: GAS Audit team (August 2020).

CHAPTER TWO

DESCRIPTION OF THE AUDIT AREA

2.1 The role of HSD within the institutional framework for managing storm water drainage in Ghana

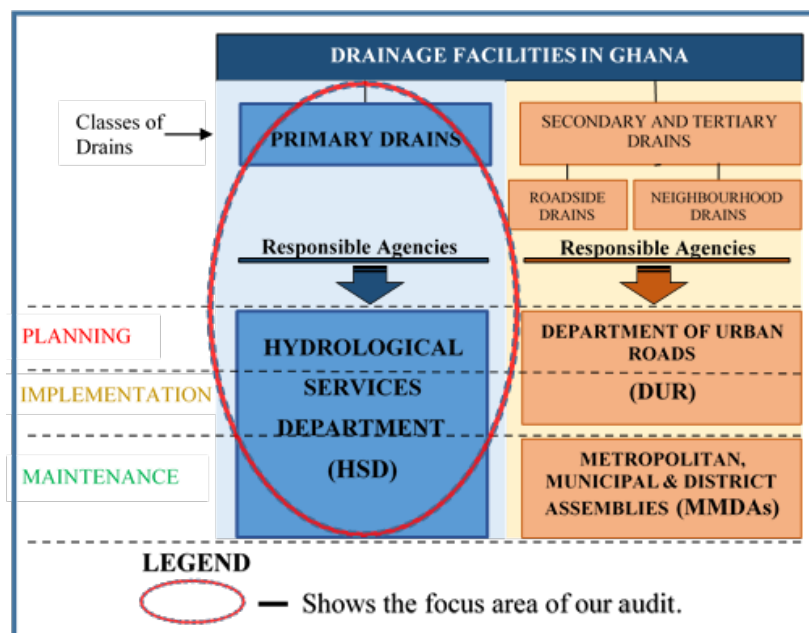
21. The responsibilities for drainage systems in the country is shared by different agencies under three government ministries, the Ministry of Works and Housing (MWH), the Ministry of Roads and Highways (MRH), and the Ministry of Local Government and Rural Development (MLGRD).

22. The Department of Urban Roads (DUR) under the MRH is responsible for the planning and construction of secondary and tertiary drains. These are the network of neighbourhood and roadside drains designed to collect storm water and grey water from adjacent buildings and surfaces and convey them to primary drains for onward discharge into natural water bodies. DUR funds, procures and supervises the procurement of works of all such category of drains, but once completed are maintained by MMDAs, which are under the oversight of the MLGRD. The Urban Roads and Works departments of the various MMDAs are responsible for the maintenance of the secondary and tertiary drains constructed by DUR that fall within their respective jurisdictions.

23. The Hydrological Services Department (HSD) under the MWH is responsible for planning, implementation and maintenance of primary drains with respect to flood control and mitigation. Primary drains are major drainage networks that receive water from secondary drains and empty the water into rivers, lagoons or the sea. Our performance audit focused on the provision of primary drainage structures by HSD to control and mitigate flooding. Figure 3 presents a schematic overview of the institutional framework for the management of drainage systems in the country with the focus area of our audit highlighted. *(Refer to the Glossary of terms for detailed definitions of primary, secondary and tertiary drains).*

Figure 3: Institutional set-ups for the management of drainage facilities in Ghana.

(The institution and class of drains our audit focused on is circled in red).



Source: Produced by GAS Audit team (July 2020).

2.2 Background of HSD and its flood management activities

24. The Hydrological Services Department (HSD) operates as a department under the auspices of the Ministry of Works and Housing (MWH). It used to be the Hydrological Division under the Public Works Department, which was established in the 1850s. In 1975, the Division was transferred to the Architectural and Engineering Services Corporation (AESC), now Architectural and Engineering Services Limited (AESL), and later in 1995, to the MWH as a Department.

25. Since its establishment, HSD has performed functions broadly categorised as operational hydrology, applied hydrology, drainage engineering, sewage engineering and coastal protection. Under operational and applied hydrology, HSD collects, analyses and processes hydrological data, and conducts river surveys which are used for the design of drains, culverts, dams and canals. Under drainage engineering, the Department designs and supervises the procurement of drainage works with emphasis on primary drains and flood control measures.

HSD has since its establishment undertaken the National Flood Control Programme, which entails:

- i) the construction of concrete drains and culverts; and
- ii) the excavation and desilting of natural drainage channels, throughout the country.

2.3 Mandate of HSD

26. HSD as a department under the auspices of the MWH is charged with the overall responsibilities to provide services in hydrology, drainage, sewage and coastal engineering and to promote and maintain high international standards and best practices in hydrology, drainage, sewage and coastal engineering.

27. With regards to drainage and flood management, HSD is responsible for programming and facilitating the construction and maintenance of primary storm drainage facilities countrywide and the monitoring and evaluation of surface water bodies.

2.4 Vision of HSD

28. To become a world-class institution, employing global best hydrological practices, to deliver excellent services to safeguard the environment and for sustainable development.

2.5 Mission of HSD

29. The Department seeks to promote quality hydrological services delivery with respect to planning, design, execution, operation and maintenance of flood control mechanisms and coastal protection systems, drainage improvement, river development, operational and applied hydrology.

2.6 Objectives and functions of HSD

30. The functions of HSD relating drainage and flood management are:

- To formulate strategies for the effective mobilisation of resources for the execution of hydrological and storm water drainage projects.
- To conduct investigations into hydrological and drainage engineering issues and advise the MWH accordingly.
- To store hydrological and drainage information for the purposes of planning and implementation of infrastructure projects.
- To design and supervise the construction of drainage engineering works to control flooding.

2.7 Funding for MWH/HSD drainage construction works

31. From 2015 to 2019, the MWH/HSD obtained funding for storm drainage activities mainly from the Government of Ghana (GOG) budgetary allocations, the Non-Roads Arrears vote and the Annual Budget Funding Amount (ABFA). The funds were disbursed through the Ministry of Finance (MOF). Table 2 shows the total approved budgets for concrete drain construction, and actual amounts spent on drain construction, for each of the years from 2015 to 2019.

Table 2: Approved budgets and expenditures on drainage construction works managed by HSD.

Year	Approved budget for drainage construction (in GH¢)	Expenditure on drainage construction (in GH¢)
2015	1,532,959.00	389,190.10
2016	1,549,092.00	494,473.42
2017	1,659,438.93	1,048,000.00
2018	12,959,160.50	101,131,616.06
2019	25,289,268.00	14,648,141.34
Total	64,368,841.43	117,711,420.92

Source: Extracted from MWH's Detailed Annual Budgets (2015-2019) and information from Policy Planning, Budget, Monitoring and Evaluation Directorate, MWH (December, 2020).

32. The approved budget figures are based on budget ceiling allocations determined by MWH for HSD to provide drainage projects. The actual expenditures drawn on these budgets are made up of payments directly to contractors for work done on drainage projects. These payments were made by the MOF only when

funds were available and this account for the consistently lower expenditure figures as compared to the budget except for 2018. In 2018, there was a special parliamentary vote of GH¢200,000,000.00, made outside of the approved budget, to boost the provision of drainage systems. This increased the availability of funds to pay contractors and explains the large expenditure figure for 2018.

2.8 Organisational structure for provision of drainage/flood control structures

33. A director heads the HSD, assisted by eight sectional heads who operate from the head office of HSD in Accra. The Director of HSD reports to the Chief Director of the MWH. In matters relating to drainage and flood control, four of the eight sectional heads perform and supervise staff to undertake technical functions in the areas of:

- Drainage engineering,
- Quantity surveying,
- Operational and applied hydrology, and
- Land and hydrographic surveying.

34. Two sectional heads (i.e., head of Finance and Accounting and head of General Administration) provide supporting services such as human resource management, transport management, stores management, accounting, finance and general administration. Seven Regional Engineers oversee the operations of HSD at the 16 regions of the country, and report to the Director and the sectional heads as the need arises. The organogram depicting the organisational arrangements for drainage and flood control activities is presented in *Appendix 'F'*.

2.9 Key players and stakeholders and their main activities

35. Table 3 presents the key players within the MWH and HSD, and the roles they play in the planning, implementation, and maintenance of drainage structures. The interest and roles played by other stakeholder institutions in the subject matter are presented in *Appendix 'G'*.

Table 3: Key players and their responsibilities.

Key players	Responsibilities
The Minister and the Chief Director, MWH	Responsible for the formulation, direction and co-ordination of policies and programmes for the development of the country's flood control systems and generally oversee the operations of HSD.
Entity Tender Committee, MWH	Ensures that procurement activities follow procedures prescribed in the PP Act (Act 663 Amended by Act 914) by reviewing and approving the contractor selection process, before the MWH enters into contract with successful bidders.
Director, HSD	Responsible for the direction of work and the day-to-day administration of HSD. The Director must ensure the implementation of the policies and decisions of the MWH.
Head of Drainage Engineering, HSD	Responsible for reconnaissance and geodetic surveys, design, supervision and general management of drainage engineering works. Collaborates with the Quantity Surveying Section on the procurement of drainage works.
Head of Quantity Surveying, HSD	Responsible for project cost estimation; processing of contractor claims, valuation of works, and issuing of payment certificates for contractor payments. Leads the procurement of works for the Department.
Head of Operational Hydrology, HSD	Responsible for establishing and monitoring hydrological stations and networks; collection and analysing hydrological data from rivers and streams countrywide; setting up models for interpreting hydrological information and flood forecasting.

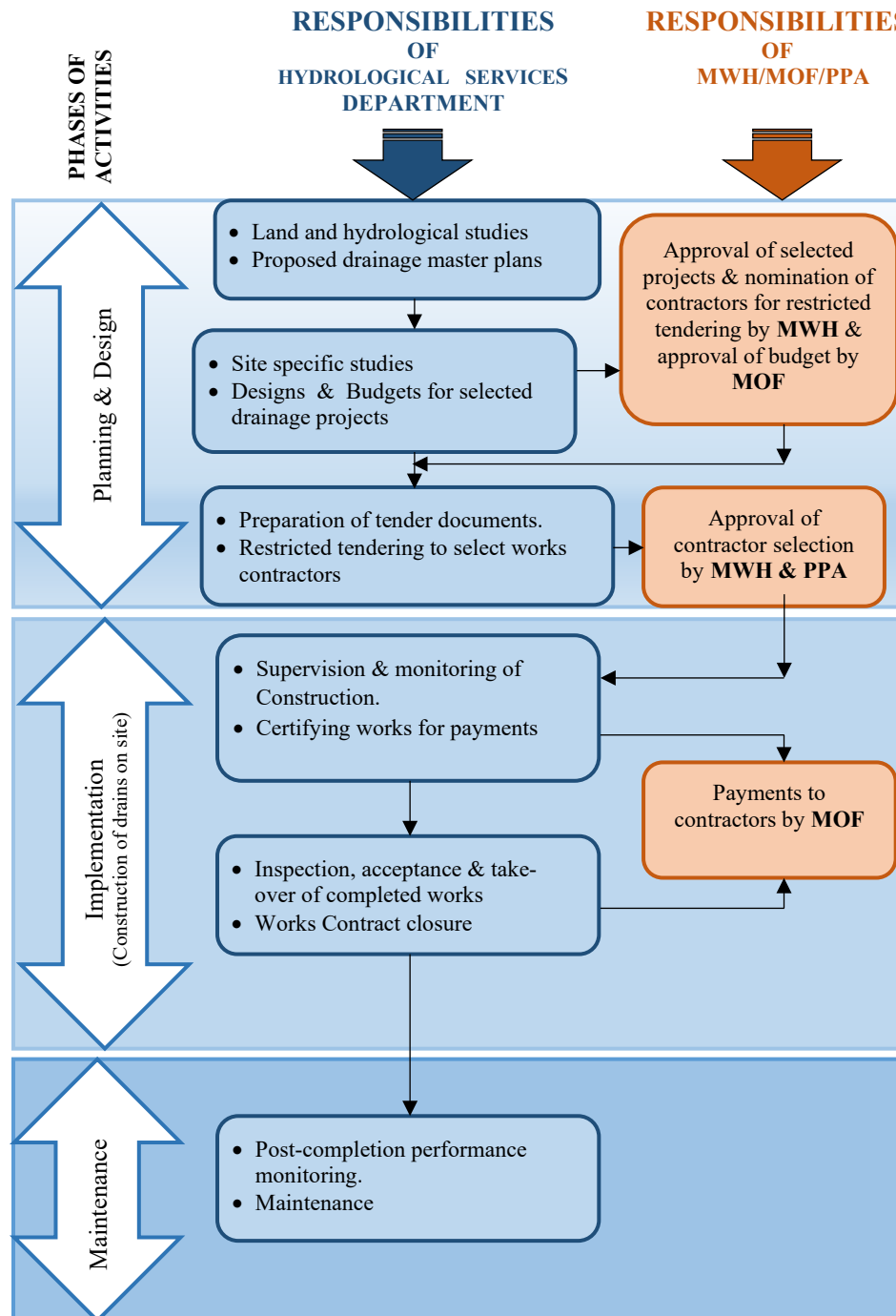
Key players	Responsibilities
Head of Land and Hydrographic Surveying, HSD	Responsible for the supervision of hydrological field inspections and hydrographic survey that are utilised for drainage projects.
Director for Policy Planning, Budget, Monitoring & Evaluation, MWH	Responsible for Coordination of budget preparation for all agencies of the ministry, including HSD; processing warrants for payment to contractors; and monitoring of projects done under the MWH.
Regional Engineers, HSD	<p>Oversee the operations of HSD at designated regions of Ghana. Responsible for identifying flood-affected areas and existing drains that need maintenance, and notify the head office for their possible inclusion in works to be done under the National Flood Control Programme.</p> <p>Monitor, inspect and supervise drainage works at various regions.</p>
Works Contractors	Engaged by the MWH to construct and complete drainage works to contract specifications and time durations.

Source: GAS Audit team compilation from the Website, Annual Reports and other corporate documents of the MWH and HSD (July 2020).

2.10 System description

36. Figure 4 illustrates the processes that HSD and other key players must perform to plan, implement and maintain storm drainage and flood control projects. Detailed description of the process is presented in *Appendix 'H'*.

Figure 4: Process Diagram for drainage and flood control project delivery.



Source: GAS Audit team (July 2020).

2.11 Current development.

37. Government is currently in the process of enacting a law that will transform HSD into an authority. This will give HSD more autonomy to mobilise resources for drainage and flood control projects, and to make independent decisions on project planning and implementation. The eventual enactment of the law will also give HSD more regulatory powers to control the development of primary drainage or flood control infrastructure in the country.

CHAPTER THREE

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

3.1 Introduction

38. This chapter presents our findings, conclusions, and recommendations based on evidence we gathered to answer our audit questions. In line with our audit objectives, our audit findings are presented under the following headings:

- a. Planning and design of drainage facilities.
- b. Implementation of targeted drainage structures.
- c. Completing drainage projects on time, to quality specifications and cost.
- d. Maintenance of existing and completed drains.

3.2 Planning and design of drainage facilities

39. Planning guide's stakeholders and project managers on how to identify goals, go about project phases, meet deadlines, prioritise essential tasks, reduce risks, and deliver the desired result in an economical, efficient, and effective manner. Planning allows for identification of task dependencies, resource allocation and the setting of acceptable milestones for successful implementation. Where a project involves designs as in drainage works, sufficient feasibility studies are undertaken to gather data, identify deficiencies and to produce design drawings appropriate to remedy the problems.

40. We assessed planning preparations undertaken by HSD to guide the implementation of projects under the flood control framework, focusing on availability of a master plan on drains and designs drawings for individual drains to aid construction. Our observations on the planning activities of HSD show that some challenges exist that need to be addressed and are presented under the following headings:

- MWH/HSD has not produced Drainage Master Plans (DMPs) to guide the systematic and coordinated development of drainage systems.
- HSD developed adequate and appropriate designs for individual drainage projects.

MWH/HSD has not produced Drainage Master Plans (DMPs) to guide the systematic and coordinated development of drainage systems.

41. Among the strategies outlined in the MWH's Sector Medium Term Development Plans of (2014-2017) and (2018-2021) to address the recurrent problem of flooding, was to prepare and implement adequate plans (i.e., DMPs) for all MMDAs. To fulfil this, HSD as an implementing agency of the MWH was to carry out studies into hydrological and drainage issues including baseline studies of the existing drainage facilities and conditions in the country, which will serve as basis to develop DMPs.

42. Drainage Master Plans (DMPs) provide a framework to manage storm water by both structural means through proposed improvements to existing drainage networks, and non-structural means such as, regulations, policies and programmes to manage drainage related issues such as land use, development control, waste management, and the operation and maintenance of drains. DMPs are synchronised with other development plans such as existing and future land-use plans, road network plans, utility services plans, and the network of secondary and tertiary drains, and therefore incorporates mechanisms for coordination and collaborations with the agencies and authorities responsible for these other developments.

43. We found that in 2015, HSD carried out an assessment of 140 drainage sites, in nine drainage basins in Accra and its environs, when they were tasked by the President at the time, after the 3 June 2015 flood disaster in Accra. Through this assessment, HSD identified deficiencies with each of the 140 sites and proposed specific remedies for the individual sites and the cost estimates for

remediation works. The assessment was done only in some areas of Accra and its environs and proposed the development of DMPs as a long-term measure to tackle flooding in these areas. Since the assessment in 2015, no effort has been made to produce the DMPs. HSD has not carried out baseline studies of existing drainage facilities and conditions in any other part of the country, towards the development of DMPs.

44. We noted from the MWH's Sector Medium Term Development Plan (SMTDP) of (2014-2017) that HSD set medium-term targets to develop DMPs for 14 regions and districts with an indicative cost of GH¢2 million but did not initiate actions to develop the DMPs during that period. Again, in the SMTDP of (2018-2021), HSD planned to begin the production of 10 regional and 20 district DMPs with a total indicative cost of GH¢270 million in 2018, to be completed in 2021, but as of January 2021, no activities had begun on the preparation of the DMPs. There was no evidence of any preparatory work such as developing a programme of implementation, or efforts to mobilise resources for DMP development.

45. We found that the MWH and HSD did not make budgetary allocations in their annual budgets of 2015 to 2020 for the preparation of DMPs although they were in their medium-term plans. From 2015 to 2020, the approved budget for drainage management each year ranged from GH¢1,532,959.00 to GH¢25,289,268.00, all of which was directed to the provision of drainage structures and desilting of drains. The Director of Policy Planning, Budget, Monitoring and Evaluation (PPBME) of the MWH, explained that funds were not provided because the cost of producing DMPs are prohibitive.

46. The lack of DMPs has hampered HSD's ability to plan and implement drainage facilities that are well coordinated with secondary and tertiary drains constructed by DUR and other civil infrastructure such as utility lines developed by utility service providers. We noted that, lack of DMPs impacted on the

Department of Urban Roads' (DUR) ability to develop secondary and tertiary drains and culverts that are aligned with the primary drains' development by HSD, thus creating drainage inefficiencies. This has created a situation whereby DUR-constructed drainage structures, which connect to primary drains, tend to be of the wrong size and connected at the wrong angle and slope, reducing the efficiency at which storm water is drained off. For example, in HSD's 2015 Hydrological Assessment of Floods in Accra Report, a culvert located at Sakaman Filling Station on the General Ankrah High Street, constructed by DUR, was identified as inadequately sized and poorly aligned. We inspected the site of this culvert and confirmed that the cross-sectional area of the culvert was 0.76 m² which was smaller than the 3.75 m² cross-sectional area of the HSD-constructed primary drain connecting to it.

47. We also noted that the primary drain was out of line with the DUR-constructed culvert and connected at an angle instead of joining the culvert straight up. These conditions reduce the efficiency with which water flow from drains. *Picture 5* shows two pictures of the Sakaman Filling Station drain and culvert respectively taken by HSD and the GAS audit team showing conflicts that result between HSD-constructed drains and DUR-constructed drains because of lack of coordination due to the absence of a DMP.

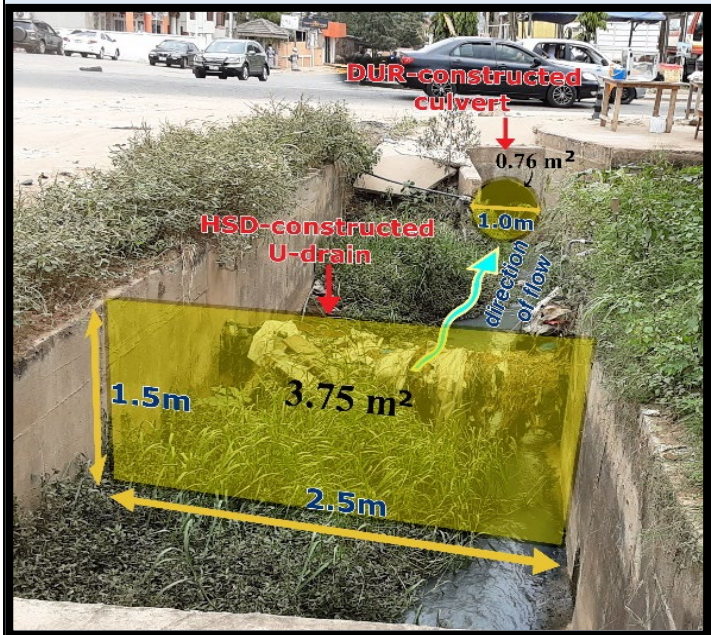
Picture 5: Example of DUR-constructed culvert being in conflict (in terms of size and alignment) with HSD-constructed primary drain- the Sakaman Drain.

Identified by **HSD** as inadequately sized and poorly-aligned.



Source: HSD's Hydrological Assessment of Floods in Accra Report, June 2015 (Extracted by GAS Audit Team on November 2020).

Confirmed by **GAS Audit Team's** measurement and observation on site.



Source: GAS Audit team (August 2020).

48. Furthermore, we noted that the absence of a DMP to align HSD's drainage provision with other civil infrastructure such as utility lines had made the drainage systems ineffective. For example, service lines of utility providers (i.e., Water and electricity) sometimes also crossed major drainage structures, obstructing the flow of water as a result of lack of coordination to align them through a DMP. As shown in Picture 6, we observed that the pipes and cables of these service lines obstructed the flow of water and trapped debris which resulted in floods.

Picture 6: Examples of utility lines crossing drainage facilities.



Source: GAS Audit team (August 2020).

HSD developed adequate and appropriate designs for individual drainage projects.

49. HSD is responsible for the design of flood control structures and drainage engineering works to mitigate and control flooding in the country. In line with HSD's standard design practices and procedures, HSD is to carry out studies and analysis of individual project sites to gather information for design purposes.

50. We reviewed design drawings for individual drains and noted that although HSD did not have a DMP, drawings were prepared adequately for individual drains for aid of construction.

51. We found that HSD carried out geodetic surveys to pick the location and spot levels at proposed project sites; hydrological analysis of the catchment areas, to estimate the amount of storm water flows that needed to be conveyed by designed drains; and hydraulic analysis, to determine the sizes of the drains.

52. We also noted that for each of our sampled projects, HSD produced design information with detailed drawings, technical specifications, and bills of quantities that fully described the construction works that were to be implemented on the project sites.

Conclusion

53. HSD developed adequate designs for individual drainage projects but did not produce DMPs that will ensure the coordination of HSD's drainage development with the drainage facilities and utility lines developed by other agencies such as DUR and utility service providers. This affected HSD's ability to plan the provision of drainage facilities in a holistic manner and ultimately reduced the effectiveness and efficiency of public drainage systems to convey and discharge storm water. Although the preparations of DMPs were included in SMTDPs since 2013, their production has not been prioritised and until date, no plans or budgets have been made to develop the DMPs.

Recommendations

54. We recommended that HSD should:

- Review and update the 2015 Hydrological Assessment of Floods in Accra Report for use as bases to scale-up studies towards the development of DMPs for the nine basins in which the assessment was done;
- Begin preparatory works towards the development of DMPs for the country in manageable phases. They should;
 - Develop a scheduled program of implementations with cost estimates and milestones to achieve each year, so realistic budget provisions can be made in the annual budgets towards the preparation of DMPs.
 - Conduct in phases, studies of existing drainage facilities and conditions that will serve as baselines to develop proposals for the preparation of DMPs.

- In consultation with MWH liaise with the MOF to ring-fence funds for the construction of storm drains.

Management Response

55. *Management of HSD has agreed to the findings and stated that it has noted the recommendations for implementation.*

3.3 Implementation of targeted drainage structures

56. We assessed the performance of HSD by evaluating the level of implementation of their planned activities to control flood and mitigate its effect in the country. Our assessment was to find out whether HSD amid limited resources had strategized to implement a plan, knowing the quantum of work available to progressively address the issue of flooding. We observed that HSD had a plan to develop retention ponds as transit to collect excess water but was unable to do so. HSD also projected to construct an estimated 110 kilometres length of drains but could only construct 12.2km. Details of these are presented below.

MWH/HSD were unable to implement their yearly target quantity of drains.

57. To alleviate the damages and disruptions to life and property caused by flooding, HSD from 2015 to 2019, set targets to construct 20 to 30 kilometres of drains each year, and to construct retention ponds for 18 drainage basins in 2018 and 2019. According to HSD, these targets were based on their assessment of the quantum of drainage works needed in the short term to achieve a tangible impact in mitigating flood occurrences.

58. We computed the total measured length of drains constructed each year from the reports attached to Interim Payment Certificates (IPCs) that were issued per annum from 2015 to 2019. This we compared with HSD's annual targets for

drainage facilities, to determine the extent or rate of progress towards the achievement of the targeted drainage structures. We also enquired about the implementation of planned retention ponds in 2018 and 2019 as targeted. Our findings from our computations, analysis and enquiries are presented in Table 4.

Table 4: Annual Targets for development of drainage structures compared with actual achievements.

	Drainage structures	Target vs. Actual	Years					Total
			2015	2016	2017	2018	2019	
1.	Construct primary storm drains	Target	20 Km	20 km	30 km	20 Km	20 km	110 Km
		Actual	0.1 Km	0.4 km	0.0 km	1.3 Km	10.4 km	12.2 Km
		% Achieved	0.5 %	2.0 %	0.0 %	6.5 %	52.0 %	11.1 %
2.	Develop and maintain detention/retention ponds	Target	None	None	None	9 Basins	9 basins	18 Basins
		Actual	None	None	None	0 Basins	0 basins	0 Basins
		% Achieved	None	None	None	0.0 %	0.0 %	0.0 %

Source: Targets from Annual Budget Performance Reports (2015-2019) and Actuals compiled by Audit Team from IPCs issued over the period (2015-2019).

59. From Table 4, it can be noted that as of December 2019, the MWH and HSD had constructed a total of 12.2 kilometres of drains out of the targeted 110 kilometres for the period of 2015 to 2019. This represents an achievement of 11.1%. In addition, HSD were unable to develop any retention ponds although they had targeted to construct retention ponds for nine basins.

60. Our analysis show that year-on-year, HSD is unable to meet their target length of drains and this has created a huge deficit of drainage works that need to be done. This has overwhelmed their efforts to mitigate flooding and although

from 2015 to 2019 an amount of GH¢117,711,420.92 had been spent on drainage works, this has not had an effect on the nationwide record of flooding. Statistics from NADMO indicated that the number of flood events has not reduced but has rather steadily increased over the same period, causing loss of lives and damages to property. Table 5 presents details of annual statistics of flood events and the damages to life and property between 2015 and 2019. Also, from 2015 to the time of this audit, Ghana has continued to experience at least one major flood event of magnitude and impact that qualifies to be recorded on EM-DAT⁶, a widely recognized global database of major natural disasters.

Table 5: Number of flood occurrences and the related damages each year from 2015 to 2019.

Year	No. of Flood Occurrences	Damages caused			
		No. of Persons Injured	No. of Deaths Recorded	No. of Houses Affected	Acres of Farmland Destroyed
2015	69	212	163	512	949
2016	126	15	75	7,324	249
2017	207	27	113	5,751	10,819.5
2018	466	23	54	17,931	39,077.4
2019	359	27	88	20,261	3,594.9
Total	1,227	304	493	51,779	54, 689.9

Source: National Disaster Management Organisation-(November 2020).

61. The inability of HSD to achieve the targeted length of drains each year was because the MWH allocated budget ceilings for the construction of drains that could not pay for the targeted length of drains. For example, in 2017, HSD targeted to construct 30 km of storm drains but was provided a budget ceiling of GH¢1,659,438.93 which could only do 1.3km of drains (i.e., based on the fact

⁶ EM-DAT-**criteria for including disasters** is that it must conform to at least one of the following: -10 or more deaths; -100 or more people affected; - a declaration of a state of emergency; -and a call for an international assistance.

that in 2017, a total of 1.1 km drains were awarded at a combined contract sum of GH¢1,409,134.28)⁷.

62. We also found from the Director of PPBME of MWH, that MOF did not make funds available on time for MWH/HSD to commence new drainage projects, and to pay contractors executing on-going projects, causing the projects to stall. For example, we noted from correspondences that MOF gave clearance to commence projects budgeted for implementation in 2018 as late as 27 July 2018, and the MWH subsequently gave the go-ahead to HSD to commence procurement on 4 and 7 September 2018. Procurement of the projects therefore commenced in 2019 although they should have been implemented in 2018.

63. We analysed the trend of expenditure on drains as compared to the length of drains constructed each year for the period 2015 to 2019, the result of which has been presented in Table 6. As shown in Table 6, it is noted that the expenditure on drains increased over the period under review with a significant increase in 2018 which was due to an extra budgetary vote of GH¢200,000,000 that was made available that year to pay contractors. The total expenditure for the years in review was GH¢117,711,420.92 and the total drains constructed was 12, 200 meters (or 12.2 kilometres).

64. The movement in the values for 'Expenditure' however appear not to match that of 'Length of drains constructed'. For example, in 2018, while GH¢101,131,616.06 was spent, only 1.3 km of drains were constructed, whilst in 2019, a significantly less amount of GH¢14,648,141.34 was spent but a longer length of drain of 10.4 km was constructed. Also, in 2017, an expenditure of GH¢1,048,000.00 was made but no drainage works was recorded. Our reviews revealed that the reason for the mismatch was that payments for drainage works were always in arrears and the expenditure figure for a particular year was not

⁷Contract documents of projects awarded in 2017- 1.1 km and GH¢1,409,134.28 obtained by extracting and aggregating the lengths and contract sums of awarded projects from the Contract documents.

entirely for the drains constructed that year but was used to settle some arrears for work done in prior years.

Table 6: Expenditure on drainage works compared with the length of drains constructed each year over the period 2015-2019.

	2015	2016	2017	2018	2019	Total
Expenditure on drains (in GH¢)	389,190	494,473	1,048,000	101,131,616	14,648,141	117,711,420
Length of drains constructed (in km)	0.1	0.4	0.0	1.3	10.4	12.2
Length of drains constructed (in meters)	100	400	0	1,300	10,300	12,200

Source: Compiled by GAS Audit team with data obtained from IPCs (issued from 2015-2019) and PPBME Directorate (i.e., expenditure on drains from 2015-2019).

Conclusion

65. Over the period 2015 to 2019, HSD fell significantly short of achieving the length of drains needed each year, to mitigate the effects of flooding as they could implement only 11.1% of planned drains and none of the planned retention ponds over the period.

Recommendations

66. We recommended that;
- The MWH and HSD should liaise with the MOF for the timely and regular release of requested funds for payment to contractors to avoid works stalling on sites.
 - The MWH allocation of budget ceilings to HSD for the construction of drains should be based on their annual targets.

Management Response

67. Management of HSD has agreed to the findings and stated that it has noted the recommendations for implementation.

3.3 Completing drainage projects on time, to quality specifications and cost

Completion of drainage projects delayed.

68. According to Clause 17 of the Conditions of contracts, contractors executing the drainage projects must complete the works by the intended completion dates stated in their respective contracts i.e., within the stated contract durations. Timely completion of projects ensures that project benefits (i.e., flood mitigation) are derived at the expected time for targeted beneficiaries.

69. We analysed the recorded completion dates of projects in HSDs database and found that the construction of 20 of our 27 sampled projects went beyond the intended completion dates stated in their respective contracts i.e., the implementation of the projects delayed. Table 7 presents the summary results of our findings on the timeliness of completion of the 27 projects, grouped into three contract duration categories, showing the number of projects in each category that delayed and the extent of delays as at 31 October 2020. Details of this analysis showing the extent of delay on each specific project is presented in *Appendix 'I'*.

Table 7: Summary of the Number and Extent of Delays on our 27 projects (broken into three categories of contract durations).

CATEGORY (Based on contract durations)	Total No. of Projects	No. Projects completed On-Time	No. Projects that Delayed	Period of delays
3 months projects	4	1	3	12 to 14 months
6 months projects	20	6	14	7 to 87 months
Others (18-24) months projects	3	0	3	10 to 103 months
Grand Total	27	7	20	

Source: GAS Audit Team analysis of information obtained from HSD's project records. - (November 2020).

70. Thirteen of the 20 projects that had delayed were still on-going and two had not started, although they should have been completed as at 31 October 2020 when our audit fieldwork was finalised.

71. Delays in payments to contractors partly accounted for extensions of project completion times as we noted that contractors suspended work until certificate were honoured, thereby affecting completion periods. According to Clause 43 of the Conditions of contracts, contractors must be paid within 28 days of HSD issuing IPCs certifying amounts due contractors. We analysed payment records of 10 delayed projects and four timely completed projects and found that payment of IPCs on the 10 delayed projects had delayed by 35 to 624 days. We noted that on the four timely completed projects, there were also payment delays ranging from 97 to 463 days. The contractors on the timely completed projects informed us they were able to complete the projects on time despite the delays of their payments because of loans they secured to enable the uninterrupted progress of construction on site (*Result of our analysis of payments on 10 delayed and 4 timely completed projects is presented in Appendix ‘J’*).

72. Delays in completion and stagnation of construction resulted in problems such as the choking of on-going drains by weed growth and silt build-up at the sites of suspended works, as we observed at the Akora River, Bolga Kumbosco, New Ningo and Kumasi Aboabo projects (*See Pictures 7 and 8*).



Source: GAS Audit Team (July, August 2020).

Picture 8: Weed growth in suspended works.



Source: GAS Audit Team (July, August 2020).

73. Protracted delays and suspension of works at the Tepa (Lot 2) and Ejura projects (which had both delayed by 87 months) had resulted in storm water creating gulleys and erosion at the communities where construction halted (See *Picture 9*). Delayed and stagnated projects also created nuisance in beneficiary communities by obstructing vehicular movement, becoming breeding grounds for mosquitoes and emitting foul smell (*Picture 9*). Residents in the communities of these suspended projects, especially the ones at the discharge ends of the drains, that we interviewed, informed us that the flooding problem at their communities was worsened as a result of the suspension and non-completion of works.

Picture 9: Gulleys and stagnant water created by delayed and stagnated projects.



Source: GAS Audit Team (July, August 2020).

74. We specifically noted the case of the Akora River Drainage Project, highlighted in Box 1, where the project has delayed beyond its initial expected completion date by 76 months (i.e., about 6 years), caused by combination of factors such as inadequate planning and delayed payments. This resulted in the project being virtually abandoned for five years, and the already completed parts of the work now damaged beyond repair. The MWH is in the process of terminating the contract with the contractor, M/s Las Aventuras Ltd. An amount of GH¢11,558,895.00 has been spent on the project already but the entire reinforced concrete floor (of about 600-meter length and 25-meter width), is damaged and have to be redone, making the already sunk cost fruitless.

Box 1: The Special Case of Akora River Drainage Project at Agona Sweduru.



Project description: Construction of 2200m X 25m X 2.5m reinforced concrete drain along the Akora river.

Contract description: Lump sum contract of contract sum, GHC 23,117,790.00 and initial contract duration of 24 months.

Key events & payments: Construction began on 30 Nov. 2012. By April 2015, a total of three IPCs had been issued, certifying an amount of Ghc11, 558,895. **Payment of the three IPCs delayed by 1-15 months.**

On 12 Dec. 2014, a 12-month extension-of-time (EOT) was granted to the contractor for delays caused by

the rocky nature of the river bed that had to be blasted. A second EOT of 24 months was granted on 21 July 2016 for similar reasons, extending the expected completion date to 26 Dec. 2017. At that time, 667 meters of the 2200 meters drain (i.e. 40% level of completion) had been achieved. In March 2019, on agreement of the parties, and on approval of the PPA, the contract was modified for the remaining 60% of works to be executed for Ghc 27, 929, 248.52.

Challenges: At the time of the second EOT, **there were signs of non-performance by the contractor, as the contractor had abandoned the site since 2015, contributing to delays.** Also, the contractor has not been able to fulfil the requirements of providing a new Performance Security and PPA Registration Certificate to proceed with the modified contract.

Current status: The MWH has began processes to terminate the contract. **As shown in the Pictures highlighted in this Box, the entire floor and part of the walls of the aready done drain are extensively damaged due to the years of neglect by the contractor, providing little value for the money already spent.**

Source: GAS Audit team compilation of information from the Akora River Project File (October 2020).

Some implemented drainage projects had quality defects.

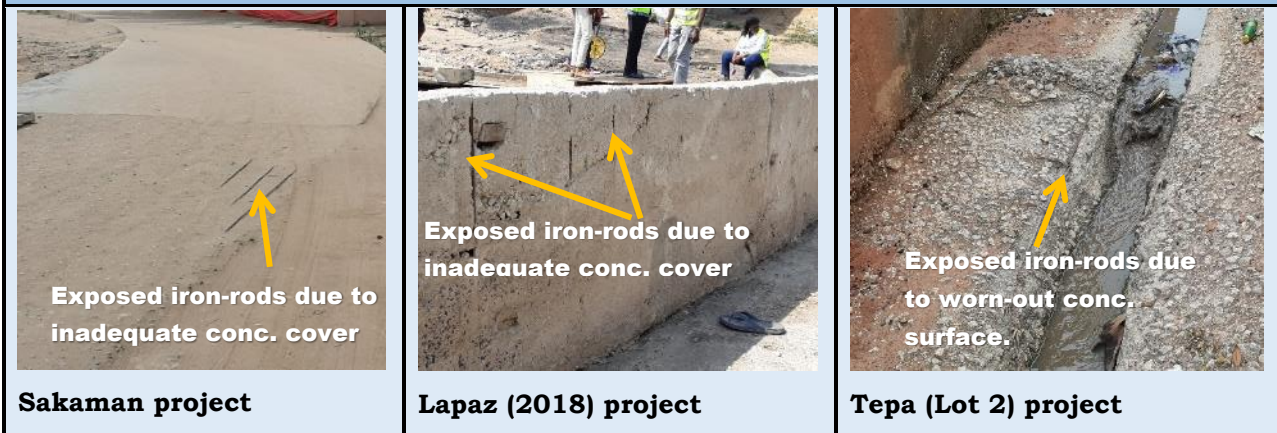
75. According to Clause 16 of the Conditions of contracts, contractors are to construct drainage works in accordance with the Contract Drawings and Technical Specifications. Clause 33 and 35 requires HSD to inspect the works, notify contractors of any defects and the contractors shall correct the notified defects within the time specified by HSD. HSD is also to monitor and track the progress of works via tools and control measures embedded in the construction contract, such as Programme of works (POW) that is updated monthly (*Clause 27*), monthly progress reporting, and the conduct of monthly site meetings (*Clause 31*).

76. We inspected the 27 sampled projects and found that 15 had defects while 10 were satisfactory and two had not started. The construction contracts defined defects as any part of the works not executed in accordance with the contract. The categories of defects were;

- Inadequate concrete cover or worn-out concrete surfaces resulting in exposure of iron-reinforcements. (*observed at 8 project sites*);
- Reinforcing rods in concrete walls of drains smaller and more widely spaced than specified in the contract drawings (e.g., the use of 10mm diameter rods instead of the specified 12mm and 16mm diameter rods. Spaces between rods were 250mm and 350mm instead of the specified 200mm. (*observed at 3 project sites*);
- Worn-out concrete surfaces exposing aggregates (*observed at 9 project sites*);
- Concrete strength less than the 25N/mm² specified in the contract BOQ (i.e., weak concrete) (*observed at 10 project sites*);
- Poor workmanship (i.e., honeycombing of walls, unequal thickness of walls, uneven wall surfaces) (*observed at 7 project sites*).

77. We have presented the list of defects we identified on each of the 27 projects in *Appendix T*. Pictures 10 to 12 show some examples of the different types of defects we found during our site inspections at the sampled project sites.

Picture 10: Inadequate concrete cover or worn-out concrete surfaces exposing iron-reinforcements.



Source: GAS Audit Team (July, August 2020).

Picture 11: Reinforcing bars smaller and more widely spaced than specified and honeycomb walls.



Source: GAS Audit Team (July, August 2020).

Picture 12: Cracked and broken floors and walls.



Source: GAS Audit Team (August 2020).

78. The defective works presented under paragraph 76 and shown in Pictures 10-12 were as a result poor and ineffective monitoring and supervision. We noted that HSD did not have records or reports on monitoring and supervising projects that would have indicated that specific instructions were issued to contractors to rectify and make good such defects before payments were made. We found that only four projects out of the 27 that we inspected, had monitoring reports but the number of these reports were inadequate because they did not cover much of the project durations. For example, the Akora project, which had run for over 100 months, had only two Inspection Reports (*dated 5 April 2017 and 2 August 2017*), three Minutes of Site Meetings (*held on 3 December 2013, 12 February 2014 and 11 October 2014*) and three POWs. The essence of these documents is to ensure stakeholders are informed about the status of projects, the actions that were taken to address problems that arose in the course of the project, and enable corrective measures to be taken.

79. We found from interviews with the head of Drainage Engineering that HSD is unable to achieve the desired level of monitoring and inspection because of inadequate logistics in the form of fuel for vehicular transport to site. The amount budgeted and released every year between 2015 to 2020 for Goods and Services, which covers fuel for monitoring, and stationery and equipment for producing project reports, ranged between GH¢20,000.00 and GH¢52,314.97⁸. This according to the Ag. Head of HSD, could not adequately support HSD's monitoring and supervision operations nation-wide.

80. Also, according to the head of Drainage Engineering, HSD needed a minimum of six technical staff in each of their seven regional offices to adequately supervise drainage projects nationwide but the level of technical staff strength fell short of the required number. We noted from staff records that, as of 31 December 2020, only five technical staff at the head office in Accra were managing 53

⁸ MWH's Detailed Budgets (2015 – 2020)

projects spread across the Greater Accra and Eastern Regions (a geographical area of 8,714 square miles). Similarly, at the regions, a single technical officer supervised 11 projects in the Northern, North East, Savannah, Upper East and Upper West Regions (a combined geographical spread of over 51, 569 square miles); and two technical officers were in charge of 17 projects in the Ashanti, Bono East, Ahafo and Bono Regions (a geographical area of 37,985 square miles).

81. Although the causes expressed by the Department for their inability to improve supervision were normal and legitimates, we observed that ten projects that had no defects could be attributed to the experience and capacity of individual contractors protecting their integrity.

82. The existence of defects in constructed drainage structures when not remedied, will accelerate the rate of deterioration of the structures, reducing their lifespan, and increase the cost of maintenance and repair of the structures.

HSD ensured payments to contractors were valid and final costs of projects were within contract sums.

83. In accordance with Clauses 37 and 42.4, of the Conditions of contract, HSD is to issue certificates for payments to contractors, based on works done by the contractors and valued at the rates in the contract BOQ. This is to ensure payments to contractors are for actual work that contractors have satisfactorily done and valued as agreed in the contract documents to avoid overpayments.

84. From the BOQs attached to Interim Payment Certificates (IPCs), we noted that for all our sampled projects, the quantities of work HSD certified for payment matched the quantity of works we measured at the respective project sites. HSD also valued the certified works using the rates in the contract BOQs as required by the Conditions of contracts.

85. For all IPCs that were issued by HSD, the measured quantities and valuations attached were signed by officers who had inspected and measured the actual works done by contractors before IPCs were prepared to pay the

contractors. The IPCs were endorsed by the project quantity surveyor (i.e., the head of QS Division) to certify that the measurements and valuations of the works were accurate; and by the project engineer (i.e., the head of Drainage Engineering), to certify that the works were done to quality specifications and workmanship. The Ag. Director of HSD signed all the IPCs to approve the payments, before the IPCs were submitted to the MWH for processing on the GIFMIS towards payments.

86. Our reviews of Payment Vouchers generated from the GIFMIS system also showed that, only the amounts that were certified on IPCs were paid to contractors. We also noted that for 12 out of the 27 projects that were completed, total payments were within their contract sums, i.e., the projects were completed within expected costs. For two projects, works had not started, and for another two, the work done was not significant, hence no IPC had been issued for payment. For the remaining 11 projects that were on-going, the percentage of works certified and paid for, matched the percentage done except in the case of the Tapa (Lot2) project, where 22 % of works had been done but total payments were 40% of the contract sum, and the Ejura project, where 32 % had been done but total payments were 60 % of the contract sum. The increased payments in these two cases were due to fluctuation payments that were made pursuant to Clause 47 of the Conditions of contract which allowed specified amounts payable to the contractor to be adjusted (i.e., increased) to reflect increases in the prices of labour, materials and equipment by application of a formula stated in the contract.

Conclusion

87. The costs of executing drainage projects were within their contract sums as HSD ensured contractors were paid the right amounts for actual work done. Construction of **20** of our sampled **27 (i.e., 74%)** projects, however experienced delays ranging from **seven to 103 months**, largely caused by delayed payments which compelled contractors to suspend works on site. In one instance, i.e., on

the Akora River Project, the suspension of work for almost five years resulted in extensive damages to already done work, causing loss of value of **GH¢11,558,895.00**. Also, HSD could not carry out adequate monitoring and inspection of projects during the implementation phase to ensure all projects were constructed to the quality specified in the contract documents. We found that **15** out of our sampled **27 (i.e., 55%)** projects had quality defects which had not been corrected.

Recommendations

88. We recommended that;
- The MWH should liaise with the MOF to improve the timing of fund releases to enable contractors to be paid on time.
 - HSD should prioritise monitoring and develop schedules to enhance the efficiency of their monitoring activities and to report on instructions issued to contractors.
 - HSD should ensure the contractors working on on-going projects with defects identified by this audit, correct the defects before their respective contracts end. For the completed projects for which final retention had not been released, HSD should ensure the contractor rectifies all the identified defects before retention monies are released to them.
 - HSD should ensure that only works completed satisfactorily by contractors are certified for payments.

Management Response

89. *Management of HSD has agreed to the findings and stated that it has noted the recommendations for implementation. Management further stated that it will make all efforts to improve on the supervision and monitoring of projects and ensure contractors correct the defects identified by this audit.*

3.4 Maintenance of existing and completed drains

90. In line with its mandate to maintain primary drains, HSD must plan to maintain completed concrete drainage structures to ensure they remained in good structural conditions and functioned properly to mitigate flooding. The range of maintenance activities expected include removal of weeds, silt, debris and the repair and reconstruction of cracked or damaged concrete drainage structures to ensure the structures retained their flow capacity and structural integrity to effectively convey flood water.

91. We found that HSD did not put in plans to maintain 12 completed drains from our reviews and inspections. There were no maintenance schedules covering the completed drains and HSD's annual action plans of 2015-2020 did not include the maintenance of concrete drainage structures. During our audit site visits, we noted that the 12 projects, which had been completed and handed over in the last 6 to 46 months, had not been maintained. These structures were either heavily silted, overgrown with weeds, filled with debris, or had worn-out surfaces as shown in *Picture 13 to 15*.



Source: GAS Audit Team (July 2020).

Picture 14: Excessive weed growth in drains.



Lapaz (2018) project



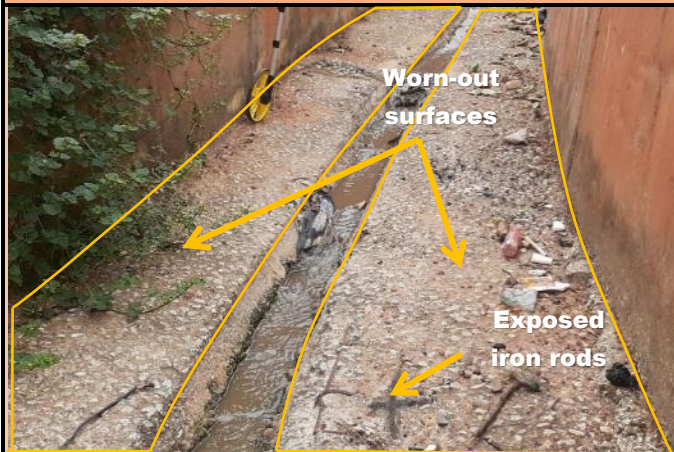
Mallam project



Sakaman project

Source: GAS Audit Team (July 2020).

Picture 15: Wearing out of concrete surfaces due to poor maintenance.



Tepa (Lot 1) project





East Legon project

Source: GAS Audit Team (July, August 2020).

92. We reviewed HSD's component of the MWH's Detailed Budget Statements of 2019 and 2020 and found that provisions were not made for the maintenance of the completed concrete drains and this was the reason maintenance was not carried out. We noted that under drainage management, funds were only allocated for the construction of new concrete drains, the continuation of ongoing concrete drains (i.e., Work-In-Progress), and the desilting of natural channels. The Director for PPBME of the MWH explained that priority is given to the provision of new drainage structures than maintaining completed drains

because of the huge deficit of drainage construction works that needed to be done to alleviate flooding across the country.

93. What is obvious from our inspection was that the weeds and silts build up in the drains, apart from reducing the allowable volumes of water through them, also impeded the smooth flow of water. When worn-out or cracked drains and culverts are not rectified through maintenance works, they eventually lead to structural failure. For example, on the Tewa (Lot 2) project, the continuous wearing of the concrete floor of the drain eventually made it to break (See Picture 16). The primary drain behind the Old American Embassy at Osu Klottey has large portions of collapsed walls that started as cracks and wearing that were not repaired (See Picture 17).

<p>Picture 16: Broken concrete floor</p>	<p>Picture 17: Collapsed concrete wall</p>
	
<p>Tewa (Lot 2) Project</p>	<p>Osu Klottey (Behind Old American Embassy)</p>
<p>Source: GAS Audit Team (August 2020).</p>	<p>Source: GAS Audit Team (August 2020).</p>

Conclusion

94. HSD and the MWH has not prioritised maintenance of completed drains and has therefore not included it in their annual activities for it to be budgeted for. Without a budget, maintenance activities to ensure the sustained functionality of drains are not carried out, reducing the effectiveness of existing drains to mitigate flooding.

Recommendations

95. We recommended that;
- The Director of HSD should ensure maintenance activities are included in HSD's annual action plans for implementation each year.
 - The Directors of HSD and MWH's PPBME should ensure that funds are earmarked for the maintenance of completed concrete drains during the budgeting process.
 - The Director of HSD should ensure the development of maintenance schedules and manuals to guide the implementation of maintenance activities on concrete drains.

Management Response

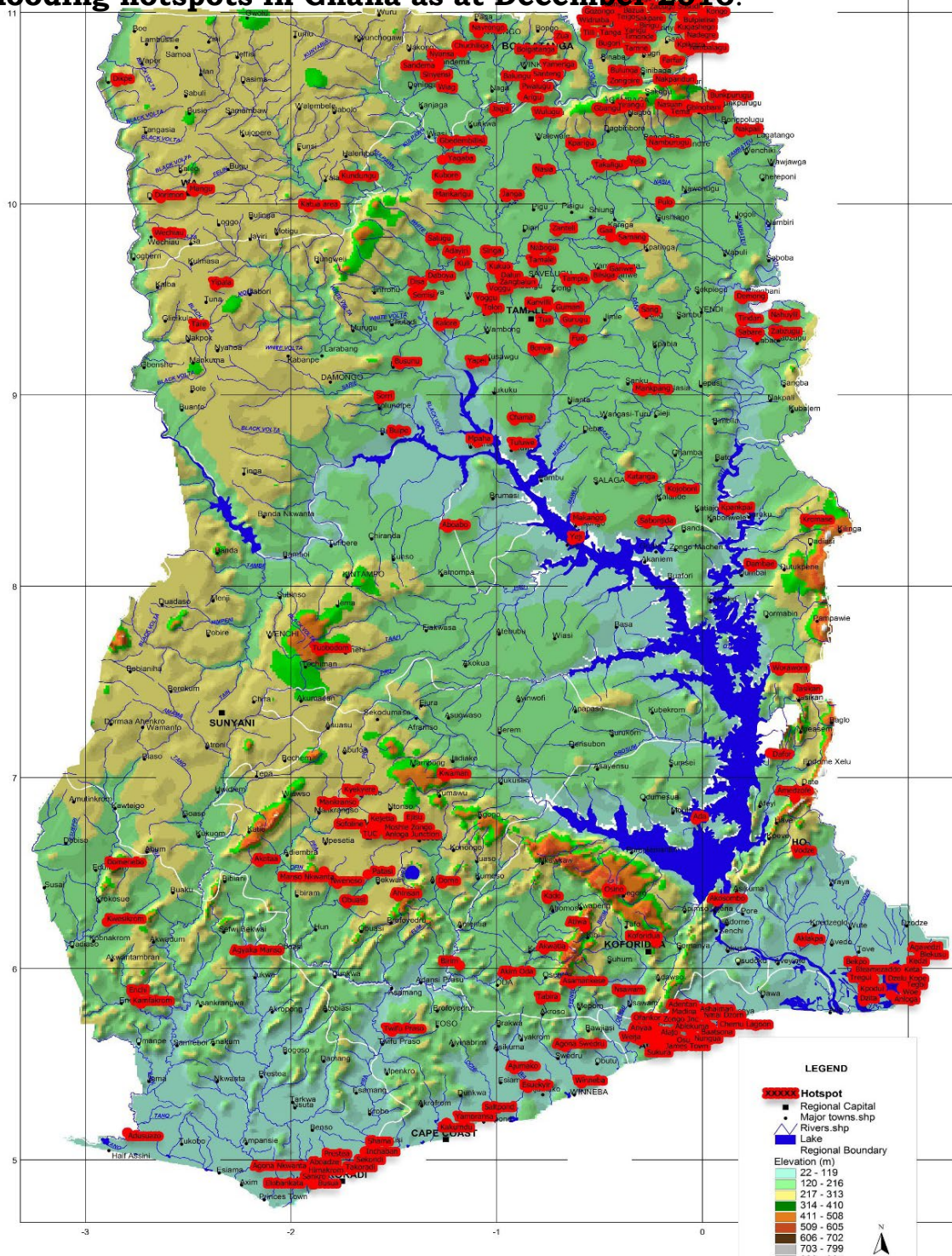
96. *Management of HSD has agreed to the findings and stated that it has noted the recommendations for implementation.*

3.5 Overall conclusion

97. It is our opinion that HSD's implementation of measures has largely not been effective in controlling and mitigating flooding in the country. There was no long-term, holistic planning of drainage development and inadequate collaboration with other key player agencies due to the absence of DMPs. The absence of DMPs as a blue print to guide these key players to align drainage facilities and other civil infrastructure created conflicts in drainage networks that reduced the efficiency and effectiveness of storm water drainage. This coupled with the fact that the MWH and HSD could implement only 11.1% of targeted drains, meant that there was no mitigating impact on the flooding situation in the country as whole.

98. In addition, HSD was unable to adequately monitor and supervise drainage construction to ensure they had no defects and this coupled with a lack of a maintenance programme, made the drains susceptible to early deterioration, shorter lifespans and operated at a reduced efficiency and effectiveness to hold and convey storm water.

Flooding hotspots in Ghana as at December 2016.

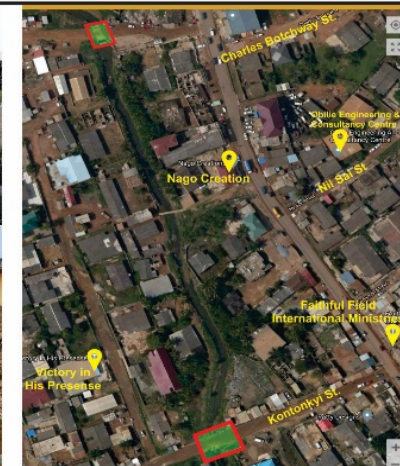


Source: National Disaster Management Organisation (Information obtained in November 2020).

Details of our 27 sampled projects.

Details of projects presented in this format:

Project Picture	Satellite Map showing Location of projects as Red lines
Project Description	



1. 165m x 3.50 x 2.00m reinforced concrete covered drain at Santa Maria.
(Redesigned to 2 no., 20m x 5m x 2.5m and 16m x 9m x 2.5m box culverts- 100% completed)



2. 600m x 3.7m x 2.50m reinforced concrete covered drain at South Nima.
(Redesigned to 250m x 8m x 2.5m reinforced concrete drain & culvert and relocated to Haatso -55% completed)



3. 180.0m x 2.50m x 1.50m reinforced concrete open drain at Sukura.
(Redesigned to 370m x 0.9m x 0.9 concrete U-drain - 100% completed)



4. 15.00m x 3.50mm x 1.50mm reinforced concrete open drain at Ashiyic. (Redesigned to 16m x 4m x 2m box culvert- 100% completed)



5. 21.50m x 3.6m x 1.70m rectangular reinforced concrete drain at East Legon, – 100% completed



6. 21.50m x 3.6m x 1.70m rectangular concrete drain at Kordjor. -25% completed



7. 250.0m x 3.50m x 1.50m reinforced concrete open drain at Abeka Lapaz (2018). (Redesigned to 350m x 2.0m x 1.3m rein.conc. drain -100% completed)



8. 90m x 2.50m x 1.00m rectangular plain concrete drain at Abeka Lapaz (2017).
-100% completed



9. 120.0m x 7.00m x 2.50m reinforced concrete open drain at Mallam.
(Redesigned to 2no., 23m x4m x 2.5m and 16m x 9m 2.5m box culverts -52% completed)



10. 125.00m x 2.50m x .50m concrete covered drains and 900.00m x 0.75m x 0.750m concrete U-drain at New Ningo -25% completed



11. 420m x 0.60m x 0.60m concrete U-drain at North Legon
-100% completed



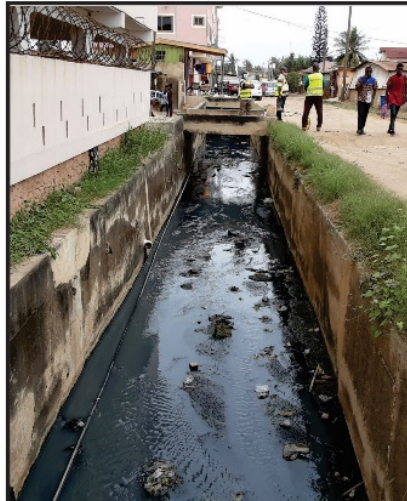
12. 250.0m x 3.50m x 1.50m reinforced concrete drain at Nungua.
(Redesigned to 250m x 3.0m x 1.8m rein. conc. drain-95% completed)



13. 150.00m x 0.90m x 0.90m concrete U-drain at Ogbojo Market- 0 % completed



14. 130.0m x 0.90m x 0.90m concrete U-drain at Osuwem- 100% completed



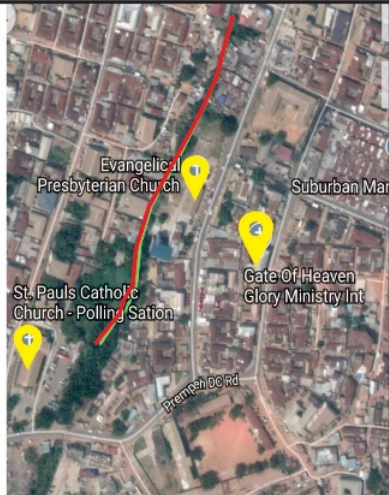
15. 535.0m x 3.50m x 1.60m reinforced concrete drain at Sakaman -100% completed



16 Pipe drain size 1.5m (diameter) x 131m (length) at Tepa (lot 2)
(Redesigned to 150m x 2.0m x 1.5m rein. conc. drain-22% completed)



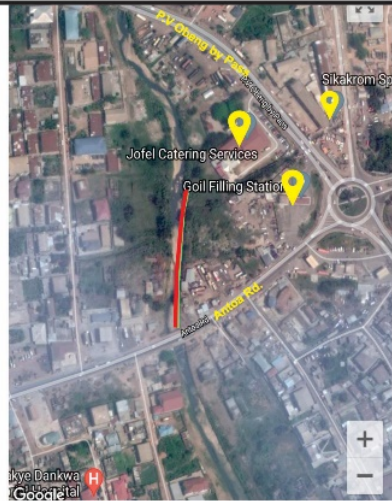
17. 411m x 2.7m x 1.60m reinforced concrete drain at Ejura- 33%



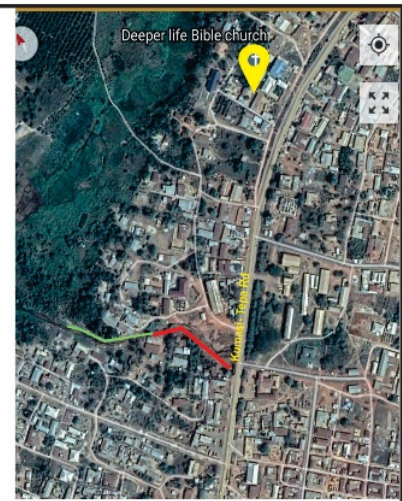
18 165m x 3.5m x 2.00m rein.concrete drain at Kumasi Amakom E.P Church.
(Redesigned to 350m x 2m x 2m rein.concrete drain-100% completed)



19. 305.00m x 16.00m x 2.50m reinenforced concrete drain at Kumasi Aboabo.
-23% completed



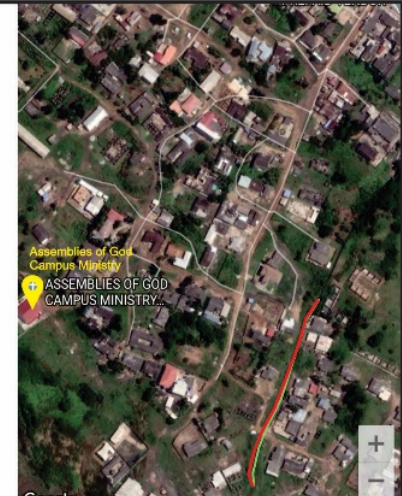
20 420.00m x 4.00m x 2.50m reinforced concrete drain at Dichem.
-0% completed



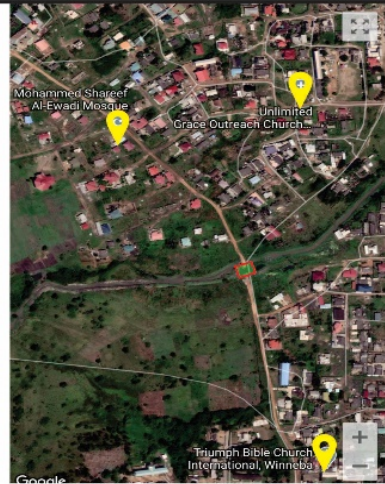
21 42.00m x 3.30m x 1.80m and 89.00m x 2.00m x 1.60m reinforced concrete open drain at Tapa (lot 1) -100% completed



22. 2200m x 25.0m x 2.5m reinforced concrete drain at Akora (Agona Swedru)
-40% completed



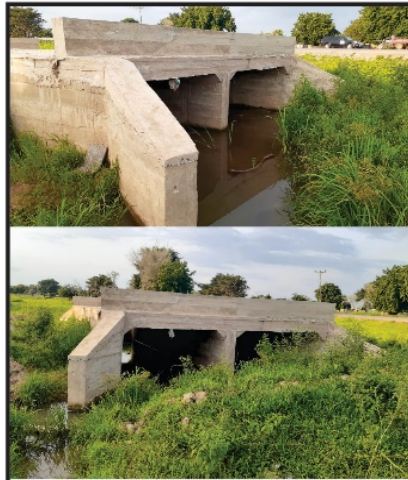
23 280.00m x 3.00m x 1.50m reinforced concrete drain at Winneba Salt Pan
(project at stand still - 0.1% completed)



24. 280.00m x 4.00m x 2.00m reinforced concrete drain at Winneba Ntafakor. (Redesigned to 10.5m x 8.5m x 1.5m box culvert-45% completed)



25. 230.0m x 3.00m x 1.50m reinforced concrete drain at Bolgatanga, Kumbosco. (Redesigned to 1000m x 0.6m x 0.6m U drain-61% completed)



26. 230.00m x 3.00m x 1.50m concrete drain at Bolgantaga, Soe. (Redesigned to 450m x 0.6m x 0.6m U-drain and 13.5m x 7m x 1.5m box culvert-15% completed)



27. 60.00m x 3.00m x 1.50m reinforced concrete drain at Zebilla. (Redesigned to 120m x 2m x 1.5m reinforced concrete drain-100% completed)

Source: GAS Audit team (project sites visited in July & August 2020).

List of reviewed files and documents

FILES

- Project Files
- Entity Tender Committee File
- Budget File
- 2018 National Flood Control Programme, Construction of Works File

DOCUMENTS

- MWH's Sector Medium Term Development Plans of (2014-2017) and (2018-2021)
- HSD's Hydrological Assessment of Floods in Accra Report, June 2015
- Annual Budgets (2016-2020)
- Annual Budget Performance Reports (2015-2019)
- List of Projects (2016-2020)
- Financial Statement (2016-2019)
- Annual Performance Reports (2016,2018,2019)
- Departmental Action Plan (2017-2020)
- Tender Documents
- Contract Documents
- Sets of Drawings
- Bills of Quantities
- Technical Specifications for the projects
- Tender Evaluation Reports
- Award Notifications
- Performance Securities
- IPCs with Valuation for payments
- Payment Vouchers with supporting documents
- Progress Reports
- Project Correspondences (Instruction to Contractors)
- Minutes of Site Meetings
- Monitoring and Supervision Reports

LAWS AND REGULATIONS

- Public Procurement Act, 2003 (Act 663)
- Public Procurement (Amendment) Act, 2016 (Act 914)
- Public Financial Management Act, 2016 (Act 921)
- Public Financial Management Regulations, 2019 (L.I. 2378)
- PPA Manual
- PPA Contract Administration Manual for Works- Manual 2

List of people interviewed

Key Actors Interviewed

Hydrological Services Department

- Ag. Director HSD
- Head of Drainage Engineering
- Head of Operational Hydrology
- Head of Quantity Surveying Division
- Head of Finance and Accounting
- Head of General Administration
- Regional head (Ashanti, Bono, Bono East and Ahafo Regions)
- Regional head (Northern, Savannah, North East, Upper East and Upper West Regions)

Ministry of Works and Housing

- Chief Director
- Director for Policy Planning, Budget, Monitoring and Evaluation (PPBME)
- Head of Procurement Unit

Ministry of Finance

- Director, Budget Division

Other Stakeholders Interviewed

National Disaster Management Organisation

- Head of Hydrology of the Hydro-metrological Department
- Deputy Head of Climate Change Department

Land Use and Spatial Planning Authority

- The Chief Executive Officer (Head Office)

Department of Urban Roads

- Director of Finance and Administration (Head Office)
- Upper East Regional Engineer (Bolgatanga)

Metropolitan, Municipal and District Assemblies (MMDAs)

-Accra Metropolitan Assembly

- Head of Drains Maintenance Unit

-La Nkwantanang Madina Municipal Assembly

- Municipal Coordinating Director
- Maintenance Engineer
- Urban Roads Engineer



-Bawku West Municipal Assembly

- Works Engineer

Selected Contractors



APPENDIX 'E'

Samples of Recording Sheets used to record measurements of drainage structures on site.
Sheet Type 1-For recording measurements on Open drains.

PERFORMANCE AUDIT OF CONSTRUCTION OF STORM DRAINS AND CULVERTS BY THE MINISTRY OF WORKS AND HOUSING TO CONTROL FLOODING IN GHANA											
CLIENT: HYDROLOGICAL SERVICE DEPARTMENT											
FILE: MEASUREMENT OF WORKS											
PROJECT NAME: Construction of Pipe drain size 1.5(diameter) x 131 (length) at Tapa. 1 2											
MEASURED LENGTH: 143.2m + 13.7m											
NO.	CHAINAGE	DIMENSIONS(Meters)				SCHMIDT HAMMER READINGS					VISUAL REMARKS (Noted defects, general impressions, observed problems that may impact performance eg. Silt built up in drain etc.)
		WIDTH	DEPTH	WALL THICKNESS		FLR	RHS WALL		LHS WAL		
				LHS	RHS		TOP	SIDE	TOP	SIDE	
1	Ch 0+00	1.97	1.62	0.23	0.20	26	20	26	28	24	
2	Ch 0+20	1.96	1.65	0.25	0.23	16	19	21	22	23	
3	Ch 0+40	2.03	1.68	0.25	0.23	20	19	24	18	20	
4	Ch 0+60	2.01	1.18	0.24	0.20	19	13	19	14	20	
5	Ch 0+80	1.95	1.21	0.24	0.23	19	15	19	19	19	
6	Ch 0+100	2.19	1.14	0.23	0.23	12	17	24	14	16	
7	Ch 0+120	2.43	1.13	0.33	0.27	NA	22	20	14	20	
8	Ch 0+140	2.72	1.01	0.22	0.22	NA	16	19	17	23	
9											
10											
GENERAL IMPRESION ABOUT WHOLE PROJECT											
<p>No expansion joints.</p> <ul style="list-style-type: none"> - Worn concrete surfaces exposing aggregates and reinforcing bars - Honey-combing indicating poor placement of concrete - Reinforcing bars 10mm ϕ with distribution bars at 350mm c/c, main bars 250mm c/c - Top 450mm of walls appear not to be reinforced. - Gulleys around drain not filled. "Access slab" not done. 											
Date of site inspection & measurement: 3 AUGUST 2020						Time: 12:15 pm					
Name (HSD Rep.): E. BRIGHT ANITEYE						Name (GAS Rep.): Theophilus Kojo Eghan					
Designation: REG. ENGINEER						Designation: Audit Team Leader					
Signature: 						Signature: 					

Source: GAS Audit team (project sites visited in July & August 2020).

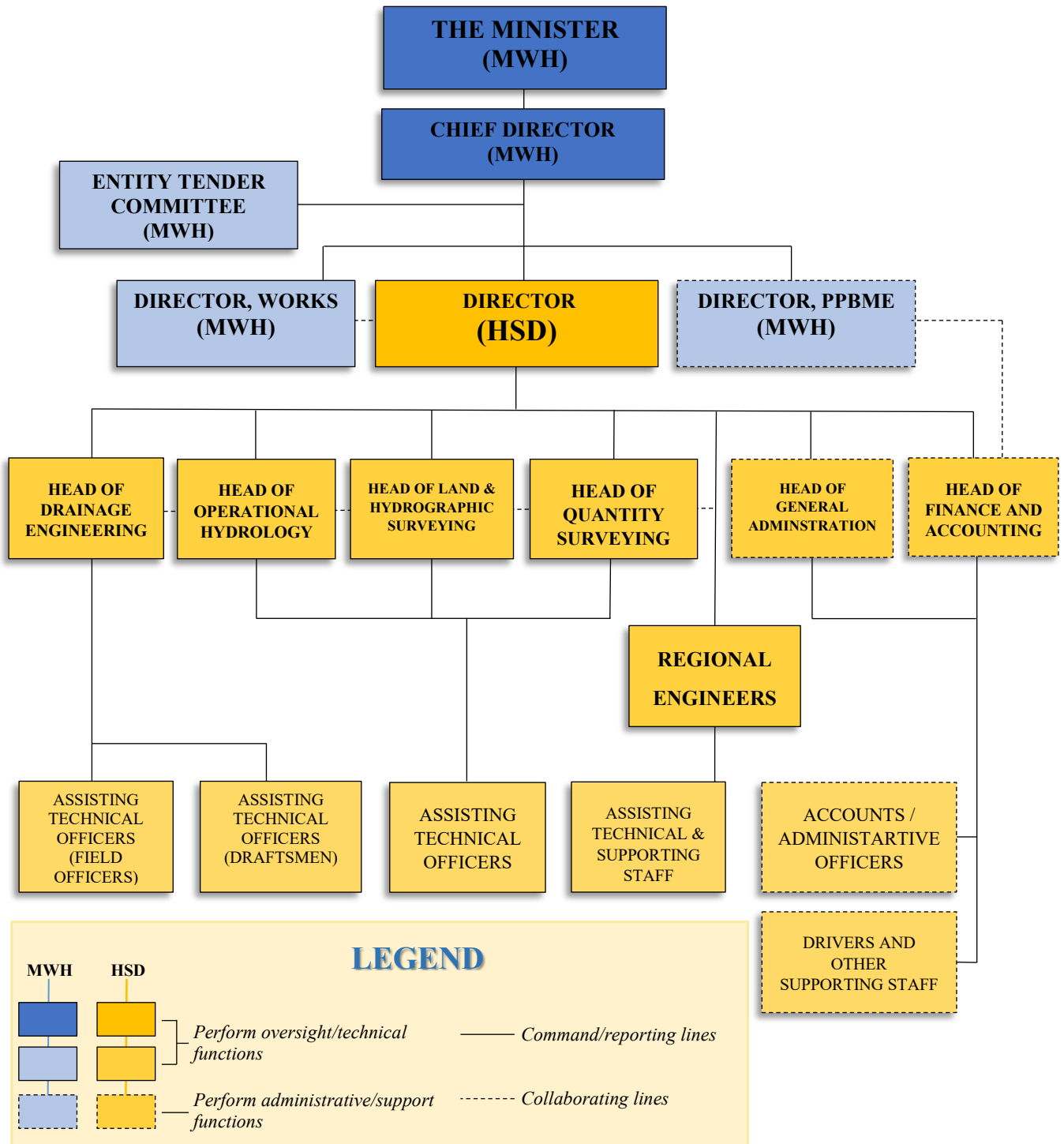
Sheet Type 2-For recording measurements on Culverts.

PERFORMANCE AUDIT OF CONSTRUCTION OF STORM DRAINS AND CULVERTS BY THE MINISTRY OF WORKS AND HOUSING TO CONTROL FLOODING IN GHANA																				
CLIENT: HYDROLOGICAL SERVICE DEPARTMENT																				
FILE: MEASUREMENT OF WORKS																				
PROJECT NAME: Construction of Reinforced concret drain at (SANTA MARIA) (Culvert)																				
MEASURED LENGTH:																				
DIMENSIONS (Meters)			SCHMIDT HAMMER READINGS																	
LENGTH	16.55 m		TOP SLAB			WALL			WING WALLS (U/S)				WING WALLS (D/S)				HEAD WALLS (U/S)		HEAD WALLS (D/S)	
WIDTH	Outter	7.9 m	TOP	SOFFIT	SIDE	RHS	LHS	MID	RHS TOP	RHS SIDE	LHS TOP	LHS SIDE	RHS TOP	RHS SIDE	LHS TOP	LHS SIDE	TOP	SIDE	TOP	SIDE
	Inner 1	7.2 m	N/A	48		N/A	N/A	36	N/A	40	N/A	27	N/A	32	24	20	30	27	33	31
	Inner 2	-	Sand	35				24				31								
WING WALLS	Length	12 m																		
	Height	N/A																		
	Thickness	0.2 m																		
DEPTH		N/A																		
HEAD WALL	Length	12.8 m																		
	Thickness	0.33 m																		
TOP SLAB	Thickness	0.33 m																		
WALL	Length	4.4 m																		
	Height	N/A																		
	Thickness	0.3 m																		
GENERAL IMPRESION ABOUT WHOLE PROJECT																				
Date of site inspection & measurement: 27 July 2020										Time: 3:00 PM										
Name (HSD Rep.): James A. Botchway										Name (GAS Rep.): Theophilus Kojo Eghan										
Designation: Sr. Technician Engineer										Designation: Audit Team Leader										
Signature: 										Signature: 										

Source: GAS Audit team (project sites visited in July & August 2020).

APPENDIX 'F'

Organogram for drainage management by MWH and HSD.



Source: GAS Audit team (August 2020).

Stakeholders and their responsibilities

STAKEHOLDERS	RESPONSIBILITIES
<p>1. Ministry Of Works and Housing(MWH)</p>	<p>Responsible for the formulation, direction and co-ordination of policies and programmes for the systematic development of the country’s flood control systems and generally oversees the operations of HSD.</p>
<p>2. Ministry Of Finance(MOF)</p>	<p>Responsible for mobilising both domestic and external financial resources to fund government projects such as drainage/flood control infrastructure. Also, formulates and monitor policies for the efficient and effective allocation and prudent management and utilisation of resources. The Ministry disburses funds for the payment of works contractors engaged to construct drainage projects.</p>
<p>3. Public Procurement Authority(PPA)</p>	<p>Responsible for the formulation of public procurement policies, setting standards, rules, instructions and other regulatory instruments on public procurement. The PPA reviews and approves contractor tendering processes carried out by HSD/MWH to ensure they conform to the procurement laws and technical guidelines issued by the Authority.</p>
<p>4. Ghana Meteorological Agencies (GMet)</p>	<p>GMet collects, processes, archives, analyse and disseminate meteorological information such as historical rainfall data to end users like the HSD. The HSD uses rainfall information such as frequency duration curves for various locations, obtained from GMet, to design adequate drainage structures for storm run-offs.</p>
<p>5. Department of Urban Roads(DUR)</p>	<p>DUR is an agency under the Ministry of Roads and Highways responsible for the development and maintenance of roads and related facilities within the urban areas of the country. They design and construct secondary and tertiary roadside drains, which discharge into the primary storm drains developed and maintained by the MWH through HSD. The Primary, Secondary and Tertiary drains form the network of drainage systems that work together to convey and discharge floodwater into the sea.</p>
<p>6. National Disaster Management Organization (NADMO)</p>	<p>NADMO is responsible for the management of disasters and other emergencies in the country, including responding to floods and rainstorms. Its functions include the preparation of disaster plans for preventing and mitigating disasters, ensuring the preparedness of communities in the event of floods, and coordinating the activities of governmental and non-governmental agencies in the management of disasters. In this regard, NADMO and HSD share the responsibility of identifying flood hazard areas and must collaborate and share information relating to flood zones and early warning systems.</p>

Source: Compiled from the Websites and Legislatures mandating the stakeholder institutions (November 2020).

Process description

1. HSD's and MWH's management of primary drainage systems to control and mitigate flooding involves activities grouped under the following headings:

- i. Planning
- ii. Budgeting, design and contractor selection
- iii. Supervision, payments, closure of projects
- iv. Operation and maintenance

i. Planning

2. To develop long-term solutions to flooding, HSD is to carry out studies and model existing drainage conditions to identify deficiencies that will form the basis for planning programmed solutions to mitigate flooding. This according to global best practice is done by developing Drainage Master Plans (DMPs). A DMP is a framework of proposed drainage layouts, coordinated with other urban or rural development plans such as road network plans, utility services layout plans, land-use plans etc., with scheduled programme for implementation and cost estimates. The need to synchronise various plans requires that HSD collaborate with the different government agencies and authorities that are responsible for the planning and development of these other public infrastructure that interfaces with drainage systems. This is to ensure effective and efficient conveyance of floodwater in a manner that minimises conflicts with other developments and ensures overall spatial planning and environmental objectives are met.

ii. Budgeting, design and contractor selection

3. Budget preparation for drainage works begins with HSD apportioning some of its budget ceiling for drainage management, which is one of its three main programmes (the others are sea defence and operational hydrology). With the budget allocation for drainage management, HSD prepares a list of drainage sites for either desilting works or concrete drain construction that will be undertaken in the ensuing year under the National Flood Control Programme. In the absence

of DMPs and a programme to guide the systematic development of drains, HSD selects sites for concrete drain construction on emergency basis, where flood-hit areas are noted for drainage improvement works after each rainstorm event. The list of sites for drainage improvement works are submitted to the MWH for review, approval and final incorporation into the Ministry's consolidated budget. The MWH submits its completed budget to the MOF for hearing, consolidation with other sector budgets and submission to Parliament for approval. After parliamentary approval, the MWH uploads and activates its approved budgeted programmes and activities unto the GIFMIS system at the beginning of the implementing year. The MWH then issues a request on the GIFMIS for budget release to commence drainage projects. When funds become available, the MOF issues warrants on the GIFMIS and the MWH/HSD begin processes to procure works on drainage projects.

4. Field officers of the Drainage Engineering Division of HSD visit the earmarked sites to undertake site studies and geodetic surveys. This is to gather information on the proposed sites such as the topography, soil conditions, vegetation cover, location and levels of different spots and features of the sites that will determine the route and structural composition of the proposed drains.

5. In designing drains, HSD's Drainage Engineers also carry out hydrological analysis, whereby rainfall data, length of streams, and catchment area characteristics such as the size, area, shape, land-use characteristics of the catchment are used to estimate the peak water flows that needed to be conveyed in the drains. They then conduct hydraulic analysis to project the flow conditions of the water, such as the elevation (height of water) and velocity, which are used to determine the appropriate sizes for drains. The process ensures that the alignment, slope and sizes of drains are designed to efficiently carry and convey storm water to their discharge points.

6. After design, the Quantity Surveying Division prepares BOQs for the projects and this together with Design Drawings and Technical Specifications

form the descriptions of works that are included in tender documents to solicit for tenders from potential contractors, using the restricted tendering and sole sourcing methods.

7. The MWH nominates contractors for HSD to carry out tendering procedures to select capable contractors to construct the drains. The tendering processes are reviewed and approved by both the PPA and the Entity Tender Committee of the MWH, before the Ministry represented by the Minister signs a construction contract with the successful tenderers. On signing the contracts, information on the contracted firms, including their bank account details and the awarded projects are uploaded onto the GIFMIS.

iii. Monitoring, supervision, payment and closure of projects

- *Monitoring and supervision of projects*

8. HSD officers monitor and supervise the construction of drains to ensure contractors construct drains in accordance with contract specifications. In line with contract requirements, HSD must obtain Programme of Works (POW) from contractors and must ensure that works at the various project sites progress steadily in accordance with the schedules in the POW. HSD must organize periodic site meetings and produce periodic progress reports to inform stakeholders of the conditions, progress and financial issues on on-going projects.

- *Payments on projects*

9. Periodically, and after contractors have satisfactorily executed works, HSD measures and values the quantities of work done by contractors and issue IPCs for payment to the contractors. The IPCs are submitted to the PPBME Division of the MWH for processing on the GIFMIS system. After going through all the processing and approval requirements on the GIFMIS, the MOF pays contractors directly by electronic funds transfer.

- *Acceptance and closure of projects*

10. When a contractor notifies HSD of completion of works, HSD carries out a formal inspection of the project to verify that the works met all contract requirements before taking-over the project. HSD must then issue a completion certificate and prepare an Inspection and Acceptance Report for filing. The date of completion indicated on the completion certificate marks the beginning of a 6-12 months defects liability period (DLP) as dictated by the contract. The DLP is a set period during the usage of the facility, for notifying defects due to poor materials and workmanship for which the contractor is liable and must therefore rectify at his cost. When HSD is satisfied that the contractor has remedied all defects, HSD issues a Defects Liability Certificate or a certificate of making good defects. HSD must then ensure financial reconciliations are done through preparation of final accounts to know the balance owed to or is owed by the contractor. A final payment certificate based on the final accounts is issued and on honouring the certificate, the contract is deemed to have been discharged.

iv. Operations and maintenance

11. In line with their mandate, HSD must plan, budget and report on the maintenance of existing primary drains. This is to ensure the drainage structures were structurally sound and were operating effectively to convey water to their discharge points. Maintenance activities involve regular monitoring of the conditions of existing drains to identify deficiencies in their performance due to their size and alignment; and the defects that have develop over time from usage. Maintenance activities also include repair and reconstruction of defective structures, desilting, removal of weeds and debris to improve the performance of drains.

APPENDIX 'I'

Summary of defects found on the 27 sampled projects and the extent of delays on each project as at 31 October 2020.

No.	Project Name	Summary of observed defects in materials and workmanship	% Level of Completion	Intended Duration (months)	Actual Duration (months)	Delay in Project Completion (months)
1	Conc. Drains at Osuwem	<ul style="list-style-type: none"> Worn-out concrete exposing aggregate (stone chipping) Weak concrete strength (less than 25N/mm²) 	100	3	17	14
2	Conc. Drains at East Legon	<ul style="list-style-type: none"> Worn-out concrete exposing aggregate (stone chipping) Weak concrete strength (less than 25N/mm²) 	100	3	2	0
3	Conc. Drains at Ashiyie	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	100	3	15	12
4	Conc. Drains at North Legon	<ul style="list-style-type: none"> Weak concrete strength (less than 25N/mm²) 	100	6	6	0
5	Conc. Drain at Lapaz (2018)	<ul style="list-style-type: none"> Worn-out concrete exposing aggregate (stone chipping) Exposed iron reinforcing bars Reinforcing bars smaller than specified Poor workmanship (honey combing, ununiformed thickness of wall, uneven surfaces. 	100	6	13	7
6	Conc. Drain at Ogbojo	Not started	0	3	Not started	13 (Not started)
7	Conc. Drain at South Nima (relocated to Haasto)	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory. 	55	6	19	13 (ON GOING)
8	Conc. Drain at Kordjor	<ul style="list-style-type: none"> Weak concrete strength (less than 25N/mm²). 	25	6	19	13 (ON GOING)
9	Conc. Drain at Baale (relocated to Mallam)	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	52	6	14	8 (ON GOING)
10	Conc. drain at Nungua	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	95	6	16	10 (ON GOING)
11	Conc. Drain at New Ningo	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	25	6	19	13 (ON GOING)

No.	Project Name	Summary of observed defects in materials and workmanship	% Level of Completion	Intended Duration (months)	Actual Duration (months)	Delay in Project Completion (months)
12	Conc. Drain at Lapaz (2017)	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	100	6	5	0
13	Conc. Drain at Sukura	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory Weak concrete strength (less than 25N/mm²) 	100	6	5	0
14	Conc. Drain at Kumasi Dichem	Not started	0	6	Not started	13 (Not started)
15	Conc. Drain at Kumasi, Aboabo	<ul style="list-style-type: none"> Worn-out concrete exposing re-enforcing bars and aggregates Inappropriate material for expansion joint Poor workmanship (honey combing) at some portions Cracks in concrete walls and floor 	50	18	28	10 (ON GOING)
16	Conc. Drain at Kumasi Amakom E.P.	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	100	6	4	0
17	Conc. Drain at Winneba, Salt Pan	<ul style="list-style-type: none"> Already constructed blinding destroyed by water due to neglect. 	0.1	6	19	13 (ON GOING)
18	Conc. Drain at Winneba, Ntafaktor	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	45	6	18	12 (ON GOING)
19	Conc. Drain at Zebilla	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	100	6	7	0
20	Conc. Drain at Bolgatanga, Kumbosco	<ul style="list-style-type: none"> Worn-out concrete exposing aggregate (stone chipping) Poor workmanship (honey combing at some portions) Weak concrete strength (less than 25N/mm²) 	61	6	18	12 (ON GOING)
21	Conc. Drain at Bolgatanga, Soc	<ul style="list-style-type: none"> Poor workmanship (honey combing at some portions) Weak concrete strength (less than 25N/mm²) 	15	6	18	12 (ON GOING)
22	Conc. Drain at Santa Maria (Plus FM)	<ul style="list-style-type: none"> Quality of workmanship was generally satisfactory 	100	6	4	0
23		<ul style="list-style-type: none"> Entire concrete floor damaged Portions of wall failing under sustained earth pressure. Exposed re-enforcing bars 	40	24	100	76

No.	Project Name	Summary of observed defects in materials and workmanship	% Level of Completion	Intended Duration (months)	Actual Duration (months)	Delay in Project Completion (months)
	Conc. Drain at Akora River	<ul style="list-style-type: none"> Worn-out concrete exposing aggregates (stone chipping). 				(ON GOING)
24	Conc. Drain at Sakaman (Lot 1)	<ul style="list-style-type: none"> Exposed iron bars at some portions. 	100	20	123	103
25	Conc. Drain at Tapa (Lot 1)	<ul style="list-style-type: none"> Worn-out concrete exposing re-enforcing bars and aggregates Poor workmanship (Honey combing, uneven wall surfaces) Weak concrete floor strength (less than 25N/mm²) 	100	6	71	65
26	Conc. Drain at Tapa (Lot 2)	<ul style="list-style-type: none"> Worn-out concrete exposing re-enforcing bars and aggregates Weak concrete strength of floor (less than 25N/mm²) Portions of floor slab broken Reinforcing bars smaller than specified. (Used 10mm distribution bars instead of 12mm specified/ 12mm main bars instead of 16mm specified) Spacing of re-enforcing bar greater than specified. (Actual spacing were 350mm and 250mm instead of the specified 200mm.) Top 450mm of wall appeared not to have reinforcements. Poor workmanship (Honey combing, uneven wall surfaces) 	22	6	93	87 (ON GOING)
27	Conc. Drain at Ejura (Lot 2)	<ul style="list-style-type: none"> Worn-out concrete exposing re-enforcing bars and aggregates Poor workmanship (Honey combing, uneven wall surfaces) Weak concrete strength of floor (less than 25N/mm²) Spacing of re-enforcing bar greater than specified. 	33	6	93	87 (ON GOING)

Source: GAS Audit team- Observations from construction sites and analysis of project completion information from Project Files (31 October 2020).

APPENDIX 'J'

Analysis on the timeliness of payments showing payment delays on 10 delayed and 4 timely completed projects.



No.	Project Name	IPC No.	IPC Dates	Certified Amount	Due Dates for Payments (28 days of IPC Date)	Amount Paid	Actual Dates of Payments	No. of Days beyond 28 Days	Months of project delays
Projects that Delayed									
1	Construction of concrete drain at Nungua	1	13-11-19	827,631.95	11-12-19	827,631.95	15-06-20	187	10
		2	31-01-20	422,482.00	28-08-20	422,482.00	20-10-20	235	
2	Construction of concrete drain at Baale	1	11-10-19	933,193.20	09-11-19	933,193.20	01-10-20	328	8
		2	18-06-20	966,421.00	16-07-20	966,421.00	19-11-20	126	
3	Construction of plain concrete drain at Ashiyie	1	12-09-19	262,523.60	10-10-19	262,523.60	20-05-20	223	12
		2	21-07-20	13,963.04	18-08-20	13,963.04	29-10-20	72	
4	Construction of concrete drain at Aboabo	1	2-12-19	1,849,455.00	30-12-19	0.00	Out Standing	297*	10
5	Construction of concrete drain at Winneba Ntafakor	1	21-07-20	326,334.60	18-08-20	326,334.60	10-11-20	84	12
6	Reinforced concrete drain at Kordjor	1	13-01-20	568,367.00	10-02-20	0.00	Out standing	255*	13
7	Reinforced concrete drain at New Ningo	1	07-10-19	817,839.09	04-11-19	817,839.09	30-04-20	178	13
		1	19-12-12	4,623,58.00	16-01-13	2,311,779.00	23-10-13	280	
						2,311,779.00	18-12-13	336	

No.	Project Name	IPC No.	IPC Dates	Certified Amount	Due Dates for Payments (28 days of IPC Date)	Amount Paid	Actual Dates of Payments	No. of Days beyond 28 Days	Months of project delays
8	Reinforced concrete drain at Akora River	2	17-02-13	4,623,558.00	17-03-13	4,623,558.00	23-06-14	463	76
		3	07-04-15	2,311,779.00	05-05-15	1,000,000.00	09-06-15	35	
						1,311,779.00	22-10-15	170	
9	Reinforced concrete drain at Tapa (Lot 2)	1	08-09-16	98,620.25	06-10-16	98,620.25	22-06-18	624	87
		2	31-05-19	461,485.57	28-06-19	461,485.57	17-01-20	203	
10	Reinforced concrete drain at Ejura (Lot 2)	1	20-02-18	808,932.11	20-03-18	808,932.11	30-10-18	224	87
Projects that were Completed on Time									
11	Plain concrete drain at Lapaz (2017)	1	09-08-19	142,076.37	06-09-19	142,076.37	12-12-19	97	0
12	Construction of concrete drain at Zebilla	1	09-12-19	379,457.53	06-01-20	379,457.53	20-10-20	288	0
13	Construction of concrete drain at Santa Maria (Plus FM Area)	1	19-12-19	1,899,115.92	16-01-20	1,899,115.92	09-11-20	298	0
14	Construction of concrete drain at Kumasi Amakom E.P.	1	08-08-19	2,142,284.14	05-09-19	2,142,284.14	11-12-20	463	0

*= IPC had delayed by this number of days and still not honoured as at 21ST October 2020 when this analysis was done

Source: GAS Audit team analysis of payment information obtained from IPCs and the Policy Planning, Budget, Monitoring and Evaluation (PPBME) Division, MWH (21 October 2020).

Cover of Management Letter to Hydrological Services Department (HSD).

AUDIT SERVICE	
<p>In case of reply the number and date of the letter should be quoted</p> <p>PSAD/PAU/PROJ/2020/05</p> <p>My Ref. No:</p> <p>Your Ref. No:</p> <p>Tel: 233 (0) 302 664920/28/29</p> <p>Fax: 233 (0) 302 6751495</p> <p>Website: www.ghaudit.org</p>	 <p>Good Governance and Accountability</p>
	<p>P. O. Box M 96</p> <p>..... ACCRA</p> <p>..... 25 MAY 20 21</p>
<p>Ag. Director Hydrological Service Department Ministry of Works and Housing Accra</p>	
<p>REQUEST FOR RESPONSE: MANAGEMENT LETTER. PERFORMANCE AUDIT OF THE AUDITOR-GENERAL ON THE PROVISION OF FLOOD CONTROL DRAINS Ref. My Letter No. PSAD/PAU/PROJ/2020/3</p>	
<p>In accordance with Section 29 of the Audit Service Act, 2000, Act 584, I write to inform you that a management letter on the performance audit on the Provision of Flood Control Drains has been completed and attached are two copies for your response. These observations reflect the results of detailed review of files, site visits and discussions with your officials.</p>	
<p>2. We had an exit meeting with your team on the 18 and 24 May 2021 in which we discussed the contents and submitted copies of our draft management letter for your review.</p>	
<p>3. MoWH /HSD is to respond in writing to the factual descriptions, findings, conclusions and recommendations of this management letter not later than 24 June 2021. Your response will be carefully considered, correcting factual errors and considering how to take other comments and views into account.</p>	
<p>4. This Management letter is Confidential and until it is tabled in Parliament, you should treat it with appropriate discretion.</p>	
<p>5. The Ag. Auditor-General would like to thank you and your staff for the co-operation extended to the audit team during the period of the audit.</p>	
 Lawrence N. Ayagiba Deputy Auditor-General (PSAD) For: Ag. Auditor-General	

HSD's response to our Management Letter.

In case of reply the number and date of this letter should be quoted



HYDROLOGICAL SERVICES DEPARTMENT

P. O. BOX MB501
ACCRA, GHANA.

Tel: 050-3262396

Email: ghana.hsd@gmail.com

Our Ref. No. H/AF/76/458

Your Ref. No.

29-06 2021

**RE: MANAGEMENT LETTER ON THE PERFORMANCE AUDIT OF THE
GHANA AUDIT SERVICE ON THE PROVISION OF DRAINAGE
INFRASTRUCTURE BY THE HYDROLOGICAL SERVICES DEPARTMENT**

Reference letter no. PSAD/PAU/PROJ/2020 /05 dated 25th May, 2021 on the above-mentioned subject matter. A copy is attached for ease of reference.

The Hydrological Services Department (HSD) wishes to comment as follows:

1. The HSD has taken note of the findings and recommendations of the audit and will make all efforts to improve supervision and monitoring of projects, and also ensure that the contractors correct the defects identified.
2. The supervision and monitoring of projects will be greatly enhanced when the HSD is upgraded to the status of an Authority as more professional staff will be recruited.
3. It is noted that the Ministry of Works and Housing is currently undertaking the process of upgrading the HSD into an Authority.
4. The HSD's inability to submit this response on 24th June, 2021, but rather on the rescheduled date of 29th June, 2021, as agreed upon, was due to our engagement with the Ministry of Works and Housing following the flooding of many areas of Kumasi due to the downpour of 23rd and 24th June, 2021.

Thank you.

*PSAD
ACCRA
Ms. Osei
29/6/2021*

Hubert Osei-Wusuansa
HUBERT OSEI-WUSUANSA
ACTING DIRECTOR

THE AUDITOR-GENERAL
AUDIT SERVICE
ACCRA
(ATTN: DEPUTY AUDITOR-GENERAL/PSAD)



cc: The Hon. Minister
MWH, Accra
(Attn: The Chief Director)