SFD Report

Greater Tamale (Tamale & Sagnarigu) Ghana

This SFD Report - Comprehensive - was prepared by
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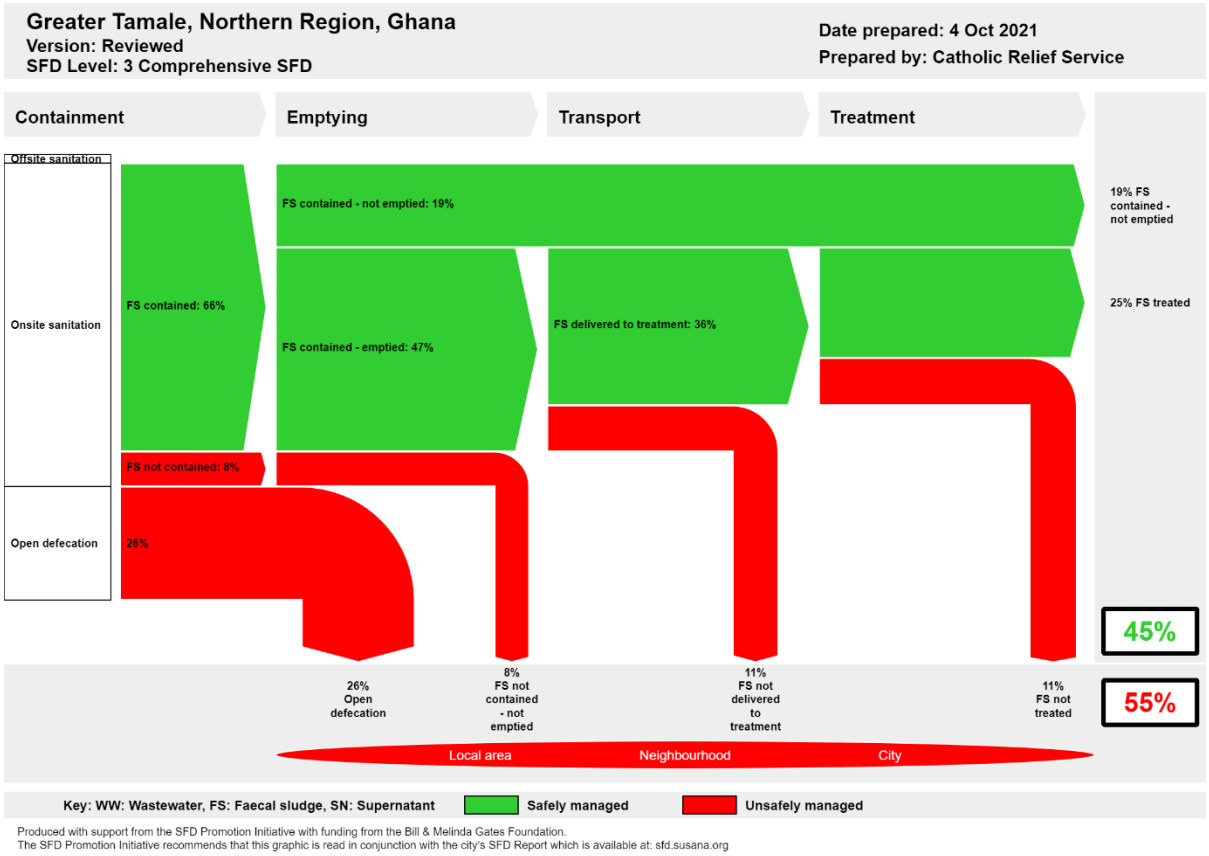
Date of production: 4th October 2021

SFD Report Greater Tamale, Ghana, 2021

1. The SFD Graphic



Produced with support from the SFD Promotion Initiative with funding from the Bill & Melinda Gates Foundation.
The SFD Promotion Initiative recommends that this graphic is read in conjunction with the city's SFD Report which is available at: sfd.susana.org

2. Diagram information

SFD Level:

This SFD is a level 3 – Comprehensive report

Produced by:

Catholic Relief Services, Ghana with technical support from Godfred Fiifi Boadi, Consultant and Kwadwo Antwi Gyasi, Co-consultant

Collaborating partners:

- Tamale Metropolitan Assembly (TaMA)
- Sagnarigu Municipal Assembly (SagMA)
- Regional Inter-agency Coordinating Committee on Sanitation (RICCS), Northern Region

Status:

Reviewed SFD report

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3. General city information

The Greater Tamale Area (GTA) refers to the geopolitical limits of both the Tamale Metropolitan Assembly (TaMA) and Sagnarigu Municipal Assembly (SagMA). GTA is located in the Northern region of Ghana and covers an area of 922km^2. It is one of the largest cities in Ghana with a 2020 projected population of approximately 468,415. About 74% of its population live in urban areas. It has a total of about 198 communities.

Its climatic seasons are well defined: dry season is characterised by dry North-East trade winds from November to February and high sunshine from March to May which is immediately followed by the wet/rainy season.

The total number of households according to the 2010 census for GTA was 82,302, a combination of populations from TaMA and SagMA (TaMA- 58,855 and SagMA - 23,447). The GTA has average household size of 6.3.

4. Service outcomes

Greater Tamale Area (GTA) mainly relies on onsite sanitation though some offsite sanitation exists at the institutional level. The population that relies on offsite sanitation constitute less than 1% of the population for which reason it is not captured in the SFD (CRS, 2021c).

GTA has a range of household sanitation technologies including septic tanks, Kumasi Ventilated Improved Pit /Ventilated Improved Pit (KVIP/VIP) latrine, pit latrine and pan/bucket latrine. Data culled from the 2010 census adapted with updates on household toilet coverage from RICCS showed a higher percentage of GTA population relying on public sanitation (39%) followed by private or household sanitation (35%) and the remaining, over a quarter of its population practising open defecation (26%).

Public sanitation technologies are limited to only KVIP/VIP and septic tanks. The KVIP/VIP can be further classified under two categories; T1A5C10 (25%) - lined pit with semi-permeable walls and open bottom, no outlet or overflow; and T1B10C10 (8%) - containment (fully lined tank, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded. Septic tanks (6%) at public toilets were observed to either have no soakaways or soakaways had become dysfunctional overtime hence were described as T1A3C10 – fully lined tank (sealed), no outlet or overflow.

Private or household sanitation covered septic tanks, KVIP/VIP, pit latrines and pan/bucket latrines. Household septic tanks (26%) unlike those found at public toilets were described as T1A2C5 – septic tank connected to soak pit. KVIP/VIP (7%) had same description for T1A5C10. Pit latrines (2%) on the other hand were described as T1B7C10 – pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow. Pan/bucket latrine were included in the proportion that practiced open defecation since the practice was outlawed by a Supreme Court of Ghana ruling in the case of Adjei Ampofo v. Accra Metropolitan Assembly & Attorney-General. To that effect, excreta in pan/bucket latrine are not contained and disposed of in the open.

The various sanitation technologies have different emptying regimes as follows:

- Septic tanks (T1A3C10 & T1A2C5) are all emptied using cesspit trucks (motorised emptying) (TaMA, 2021p).
- KVIP/VIP (public toilets) are emptied mainly using cesspit trucks and partially by manual emptying (CRS, 2021b).
- KVIP/VIP (household toilets) are emptied manually (CRS, 2021a).
- Pit latrines are not emptied but rather covered with soil or abandoned when full (TaMA, 2021i).

It is estimated that, about 95% of fecal sludge (FS) collected by cesspit trucks are transported to the treatment facility which is a waste stabilisation pond (TaMA, 2021j). The performance of the WSP is calculated to be 70% efficient in its treatment. However, FS emptied by manual emptiers do not reach the WSP as they are disposed of in dugouts, forest reserves, drains and sometimes in central containers (TaMA, 2021m).

A low risk to groundwater pollution from sanitation is deemed to prevail in GTA due to majority of its population being heavily reliant on water supplies from Ghana Water Company Limited (UNICEF, 2018). Also, GTA is known to have a low underground water table and also poorly endowed with water bodies (MESSAP, 2020).

The SFD graphic shows that 45% of excreta generated is safely managed while 55% is unsafely managed within the Greater Tamale Area.

5. Service delivery context

The Ministry of Sanitation and Water Resources (MSWR) is responsible for WASH policy setting, planning and coordination in Ghana while Metropolitan and Municipal Assemblies are responsible for direct implementation of sanitation policies and strategies in Ghana. The WASH sector in Ghana is governed by a number of policies and prominent amongst them with respect to sanitation are the Environmental Sanitation Policy (ESP) 2010 and the National Environmental and Sanitation Strategy and Action Plan (NESSAP) 2010. These policies however are based on MDGs and will have to be updated to reflect the SDG thinking and approach. Local governments like TaMA and SagMA develop and implement sanitation strategies and action plans and these plans conform to the policy objectives of the Environmental Sanitation Policy and NESSAP. Institutions in the WASH sector have well defined roles and responsibility but suffer a lack of institutional ownership of monitoring, enforcement, registration, and licensing of sanitation services. Data collection on sanitation in Tamale and Sagnarigu, which is

rarely done, mostly covers containment systems leaving out the other aspects of the sanitation service chain. Private sector involvement in sanitation is mainly through PPPs with MMAs or MSWR. International development partners and NGOs through projects are helping to bridge the financing gap of the urban poor in accessing a toilet facility in Greater Tamale Area. TaMA and SagMA are mandated to regulate the pricing of public toilets to ensure that the urban poor can afford to pay for the service, yet, much is left to be desired.

6. Overview of stakeholders

Stakeholders engaged during the development of this SFD can be divided under five main groups namely; public institutions; private sector; non-governmental organisations or development partners, donors; and others. The main collaborating partners were the Municipalities of Tamale and Sagnarigu.

- Ten (10) key informant interviews were conducted
- Four (4) focus group discussions were held
- Field visits were made to waste stabilisation pond (WSP), households, public toilets and institutions.

Key informant interviews were conducted in-person and in few instances, virtually.

Focus group discussions ensued among local latrine artisan group, motorised emptiers group, manual emptiers group and the northern RICCS group.

Field visits were made to households, public toilet sites and key institutions within GTA to collect contextual data for enhanced interpretations into the service outcomes. Another field visit was made to the existing WSP as well as the new ongoing construction site of FS treatment plant.

Table 1: Overview of Stakeholders

Key Stakeholders	Institutions / Organizations /
Public Institutions	Tamale Metropolitan Assembly (TaMA), Sagnarigu Municipal Assembly (SagMA), Northern Regional Inter-Agency Coordinating Committee on Sanitation (RICCS)
Non-governmental Organizations, Development Partners, Donors	Catholic Relief Services (CRS), UNICEF, Sama sama (iDE)
Private Sector	Latrine Artisans, Motorised Emptiers, Manual Emptiers, Waste Landfills
Others	Household, Public toilet attendants, Institutions

7. Process of SFD development

The process of the SFD development, included:

- Review of literature
- Identification of relevant stakeholders to be engaged
- Training enumerators to conduct the three surveys i.e. household, public toilet and institutional surveys
- Introduction of SFD team to the identified stakeholders
- Conduct of key informant interviews, focus group discussions with identified stakeholders including meeting with RICCS, Northern region.
- Field visits
- Review of relevant data from the 2010 Population and Housing census reports
- SFD graphic generated using the graphic generator and prepared SFD draft report
- Organised validation workshop to present findings and assumptions and allow for negotiations on the assumptions
- Reviewed draft SFD report

8. Credibility of data

The SFD is largely based on data from the 2010 census together with updates (data) from the Monitoring and evaluation Unit of the regional Inter-agency coordinating Committee on Sanitation (RICCS), Northern region who are mandated to keep and update database on sanitation. The figures were however triangulated through informant interviews, focus group discussions, field observations as well as negotiations with key stakeholders. Data used for contextual details came from three surveys conducted by CRS: household survey; public toilet survey; and institutional survey. The service delivery context has been developed through literature, national and district policies and plans available.

9. List of data sources

- Adjei Ampofo v. Accra Metropolitan Assembly & Attorney-General (No. 2) [2007-2008] 2 SCGR 663
- CRS, 2021a. Catholic Relief Service SFD Household Survey
- CRS, 2021b. Catholic Relief Service SFD Public Toilet Survey
- CRS, 2021c. Catholic Relief Service SFD Institutional Survey
- Ghana Statistical Service, 2012a: 2010 PHC, Sagnarigu Census Report
- Ghana Statistical Service, 2012b: 2010 PHC, Tamale Census Report
- Environmental Sanitation Policy, 2010
- UNICEF, 2018. Final MESSAP Review Report for TaMA.
- TaMA, 2021p. Interview with Director of WMD of TaMA on 25/06/2021.
- TaMA, 2021m. Focus Group Discussions with Manual Emptiers
- TaMA, 2021i. Interview with MEHO of SagMA
- TaMA, 2021j. Interview with Deputy Director of Waste Management Department of TaMA on 23/06/2021.

SFD Greater Tamale, Ghana, 2021

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This Executive Summary and the SFD Report are available from: www.sfd.susana.org

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Abbreviations

CBO	Community-Based Organisation
CLTS	Community-Led Total Sanitation
CLUES	Community-Led Urban Environmental Sanitation
CONIWAS	Coalition of NGOs in Water and Sanitation
CRS	Catholic Relief Services
cum	cubic meter
EHOs	Environmental Health Officers
FS	Fecal Sludge
GoG	Government of Ghana
GTA	Greater Tamale Area
GWCL	Ghana Water Company Limited
HH	Household
HHT	Household toilet
IGF	Internally Generated Fund
KVIP	Kumasi Ventilated Improved Pit
MEHO	Metropolitan/Municipal Environmental Health Officer
MESSAP	Metropolitan/Municipal Environmental Sanitation Strategy and Action Plan
MMA	Metropolitan Municipal Assemblies
MMDA	Metropolitan Municipal and District Assemblies
MSWR	Ministry of Sanitation and Water Resources
MTDP	Medium-Term Development Plan
MTEF	Medium-Term Expenditure Framework
NESSAP	National Environmental Sanitation Strategy and Action Plan
NGO	Non-Governmental Organisation
PPP	Pubic Private Partnership
PT	Public Toilet
RICCS	Regional Inter-Agency Coordinating Committee on Sanitation
SagMA	Sagnarigu Municipal Assembly
SESIP	Strategic Environmental Sanitation Investment Plan
SFD	“Shit” Flow Diagram
SIS	Sector Information System
SSNIT	Social security and National Insurance Trust
TaMA	Tamale Metropolitan Assembly
UNICEF	The United Nations Children's Fund
VIP	Ventilated Improved Pit
WASH	Water, Sanitation and Hygiene
WC	Water closet
WMD	Waste Management Department
WSP	Waste Stabilisation Pond

Exchange rate: US$1.00 = Gh₵6.00 (June 2021)

1 City context

1.1 Location

The Greater Tamale Area (GTA) refers to the geopolitical limits of both the Tamale Metropolitan Assembly (TaMA) and Sagnarigu Municipal Assembly (SagMA) as depicted in Figure 1. The GTA which is located in the Northern region of Ghana covers an area of 922km^2.

TaMA is located at the central part of the northern region and is bounded to the East by Mion District, East Gonja to the South and Central Gonja to the South-West (TaMA MESSAP 2015). Geographically, TaMA lies between latitude $9^0$16 and 9^0 34 North and longitudes 0^0 36 and 0^0 57 West (GSS, 2012). Administratively, Tamale Metropolis is divided into two (2) sub-metropolitan districts which are Tamale Central and Tamale South. These are further zoned into eight (8) to enhance better administration of the metropolis (TaMA MESSAP 2015). The Tamale Central Sub-metro has been zoned as Gukpegu, Dakpema, Sabonjida, Moshie Zongo and Tishigu zones while the Tamale South Sub-metro has also been zoned as Lamashegu/Nyohini, Kakpagyili and Vittin zones.

Sagnarigu Municipal is also located in the central part of the Northern Region of Ghana. It falls between Longitudes $0^0$57" N and 0^0 57" W and Latitudes $9^0$16" N and $9^0$34" N (SagMA DESSAP 2018). It shares boundaries to the North with Savelugu-Nanton Districts, to the South and East with Tamale Metropolis, to the West with West Tolon District, and to North-West with Kumbungu District (SagMA MTDP 2018).

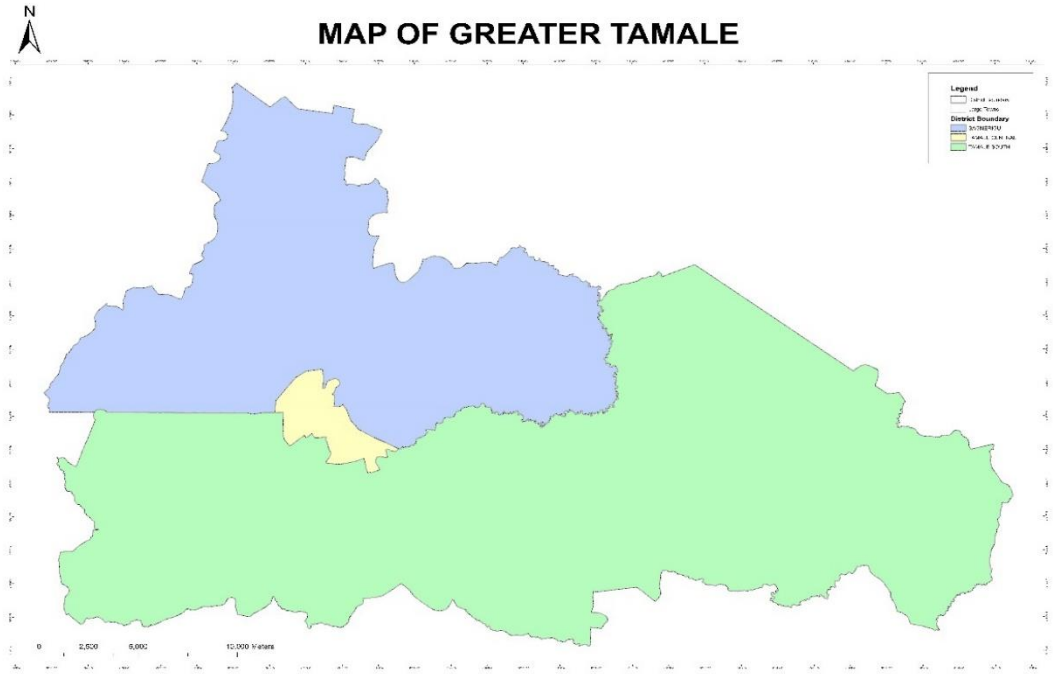

Figure 1: Geopolitical Map of Greater Tamale (Source: GSS, 2021)

1.2 Population

Greater Tamale Areas is one of the largest cities in Ghana with a 2020 projected population of 468,415 which stems from 281,619 for Tamale and 186,796 for Sagnarigu. The GTA has 74% of the population living in urban areas (GSS, 2012).

TaMA's population according to the 2010 census was characterized with (49.7%) males and (50.2%) females. The Metropolis had 115 communities with about 52% of the communities being rural (TaMA MESSAP 2015).

According to the 2010 population and housing census, Sagnarigu Municipal's population constitutes 50.5% males and 49.5% females. SagMA has 83 communities with 32% of them being rural communities (SagMA DESSAP 2018).

1.3 Climate

The Greater Tamale Area is about 180 meters above sea level. There is only one rainfall season in a year and therefore rain-fed agriculture is severely limited. Daily temperatures in the area varies from season to season and could range from as high as 40^0C to as low as 25^0C within the day. During the rainy season there is high humidity, slight sunshine with heavy thunderstorms. The dry season is characterized by the dry North-East trade winds (the Harmattan) from November to February and high sunshine from March to May.

1.4 Temperature

Daily temperature in the GTA varies from season to season. In the rainy season there is high humidity, slight sunshine with heavy thunderstorms, while the dry season is characterized by the dry North-East trade winds (the Harmattan) from November to February and high sunshine from March-May. This climatic feature is a potential for the preservation industry that could use the sunshine as a natural preservative as well as drying fecal sludge (FS) as additional treatment. The high sun rays are a potential that perhaps informed the construction of the waste stabilization pond (WSP) for GTA because it is an effective treatment technology in such areas with high temperatures.

1.5 Key Physical and Geographic Features

The main soil types are sandstone, gravel, mudstone, and shale that have weathered into different soil grades. Due to the effects of seasonal erosion, soil types emanating from this phenomenon are sand, clay and laterite ochrosols which are useful for the building industry.

The Greater Tamale Area is poorly endowed with water bodies and a low underground water table. The only natural water systems are a few seasonal streams which have water during the rainy season and dries up in the dry season.

Greater Tamale Area enjoys frequent water supply from the Dalun and the Nawuni Water Treatment Plants. The main water supply system is pipe borne water which is rationed and managed by the Ghana Water Company Limited in urban areas (TaMA MESSAP, 2015).

2 Service Outcomes

This section presents the range of technologies, methods and services designed to support the management of FS through the sanitation service chain in the Greater Tamale. Greater Tamale has a narrower sanitation landscape as compared to other major cities like Accra and Kumasi. The sanitation systems at the household and public toilet levels are onsite facilities. Offsite sanitation facilities such as a decentralised sewer system only exist at the institutional level at the Tamale Teaching hospital and Bawa military barracks. The combined population within these institutions that rely on these offsite facilities fall below the 1% of population and therefore will not be considered in the SFD but will be discussed briefly.

The 2010 census shows household toilet coverage to be 21.1% and 26.2% for Tamale and Sagnarigu respectively. The technologies of these household toilets were WC, pit latrine, KVIP, bucket/pan latrine and others (GSS, 2012).

2.1 On-site technologies

2.1.1 WC

In the context of the census report, WC (water closet) was used to represent septic tank. However, septic tank has different descriptions among latrine artisans in the area (TaMA, 2021f). These descriptions include; fully lined tank (sealed), no outlet or overflow; and septic tank connected to soak pit. These tanks have varying number of chambers with vent pipes mounted on most of them. They were either constructed using sandcrete blocks or concrete, or culverts or even plastic barrels (see Figure 2) which did not necessarily conform to design guidelines (TaMA, 2021f). An urban sanitation technologies manual prepared under the Ghana-Netherlands WASH programme in 2016 is yet to reap its full benefits among private latrine artisans. It must be noted however that, toilet technologies under donor-funded projects are approved by the local Assemblies before implementation (TaMA, 2021g). The 2010 census reports that private WC were the most used technolology in GTA. About 10.1% of the population in Tamale relied on WC while 16% in Sagnarigu.

Figure 2: Different types of septic tanks within the GTA

2.1.2 KVIP

KVIP[1] in the census report represented ventilated improved pit latrines distinguished with vent pipe as compared to the traditional pit latrine which had no vent pipes. Only 7% out of the 21.1% household toilet coverage in Tamale and 6.9% out of the 26.2% household toilet coverage in Sagnarigu were reported to use KVIP toilets (GSS, 2012).

Figure 3: Photos of Kumasi Ventilated Improved Pit Latrine (KVIP) in the GTA

2.1.3 Pit latrine

It consists of a pit either deep or shallow (usually square, circular or rectangular in shape) dug into the ground with provision for squatting common in the rural parts of GTA. Unlike the KVIP/VIP, it has no vent pipe. Simple pit latrines are generally covered and abandoned when

[1] Kumasi Ventilated Improved Pit (KVIP) according to census report included ventilated improved pit (VIP) latrines. These technologies are both pit latrines with vent pipes except the KVIP has higher retention time due to its alternating pit principle over the VIP.

full. Some people resort to introducing chemicals into the pits with the aim that it rapidly degrades the fecal sludge so as to prolong the rate of fill (TaMA, 2021i).

2.1.4 Biodigester

This is a fairly new technology option which did not feature in the 2010 census at the time but has become very popular in most urban areas in Ghana including Greater Tamale Area (GTA). This technology is designed to rapidly separate water from FS upon entry. The water is discharged from the biodigester leaving behind the FS which would be digested by worms introduced into the biodigester. This technology is mainly installed at the household level. From its external appearance, the biodigester looks like a mini septic tank but it operates differently.

Figure 4: Images of biodigester toilets in the GTA

2.1.5 Open defecation

The proportion of the population without toilet facilities who defecated in the open were captured in the 2010 census report as 'No facilities' i.e. open defecation, and were reported to be 34.1% for Tamale and 46.2% for Sagnarigu. This category did not include persons who relied on public toilets as their main point of defecation.

2.1.6 Bucket/Pan latrine

These are toilet facilities that basically comprise of a bucket or pan placed under a pedestal which is typically emptied daily. This type of toilet was disbanded in 2010 by the Supreme court of Ghana ruling as a practice that impugned the dignity of persons. The 2010 census reports that 1.4% of the population in Tamale relied on bucket/pan latrine and 0.4% in Sagnarigu.

Figure 5: Images of Bucket/Pan latrine in GTA

2.2 Categories of Origin

2.2.1 Households

The total number of households according to the 2010 census for TaMA is 58,855 and 23,447 for SagMA. The average household size for both TaMA and SagMA is 6.3 while average household per house is 1.8 and 1.4 for TaMA and SagMA respectively (GSS, 2012). A household survey was conducted by CRS in 2021 to determine details on operation and maintenance of household toilets among other things.

2.2.2 Shared or communal toilets

Again, the 2010 census report shows that compound houses constituted the most dominant type of housing, 80.6% in TaMA and 69.3% in SagMA. Also, the MICS report indicates that 80.9% of the population for the entire northern region use shared sanitation facilities either through multiple use of household toilets or through the use of public toilets (MICS, 2017/18). It can therefore be inferred that majority of the population that rely on household toilets share the toilet facility with other households. Not enough data is available on shared toilets for Greater Tamale.

Estates

Two notable estates, SSNIT flats and Norrip village within the GTA were identified and visited during this assessment. The following are the findings:

- SSNIT flats had a population of over 900 inhabitants with about 284 privy rooms all connected to centralised septic tanks. The user interfaces are WCs. The outfall of the final effluent used to terminate into a mini constructed wetland which has now become defunct. As a result, the tanks are emptied once a year by cesspit emptiers (CRS, 2021c).

- Norrip village has about 64 privy rooms fitted with WCs which are connected to centralised septic tanks. These tanks are emptied between one and every three months (CRS, 2021c)

Figure 6: Image of SSNIT centralised septic tanks

Figure 7: Constructed wetland connected to the SSNIT septic tanks

2.2.3 Public toilets

The data from the 2010 census report shows a heavy reliance on public toilets within the GTA. About 44.8% of the population in Tamale relied on public toilets as compared to 27.6% in Sagnarigu, the census report however does not provide any detail on the technologies of these public toilets. It therefore becomes a limiting factor to do any proper analysis or make a determination of the technologies used as public toilets. Due to this, a survey was conducted to ascertain what technologies existed at public toilets in both Tamale and Sanarigu.

Accordingly, the CRS survey revealed a total of 161 public toilets out of which 111 were located within Tamale while 50 in Sagnarigu (CRS, 2021b). All the 161 public toilets visited were found to be either septic tank or KVIP/VIP. Majority of these PTs were KVIP/VIP, the distribution is depicted in Table 2.

Table 2: Summary details of Public Toilets (PTs) within GTA

Assembly	Total No. of PTs	KVIP/VIP	Septic tank	Serves as communal container sites
TaMA	111	103	8	61
SagMA	50	46	4	31
Total	**161**	**149**	**12**	**92**

Source: (CRS, 2021b)

It was observed that all septic tanks used as public toilet had either no soakaways or soakaways were dysfunctional. As a result, the technology acts as fully lined tank (sealed), no outlet or overflow. Also, about 89% of these PTs are owned by the MMDAs, 6% are owned by schools, 4% owned by private individuals, 1% by communities. Those owned by schools operate on the school premises which serve the students as well as the general public. Public toilets are evenly distributed across the length and breadth of the GTA. However, most of the PT sites are

unkempt and messy largely because they also operate as communal container sites for solid waste collection (CRS, 2021b).

2.2.4 Institutional toilets

Populations from the institutions have already been captured as part of the census figures presented in the census reports. However, details on sanitation technologies that existed within institutions were not known. A separate survey was conducted that collected data on the sanitation technologies that are used by institutions and the management systems in place which contributed to the flow of excreta within the city. Institutions were classified under five categories which are education, hotel and orphanages, health, barracks and prisons.

Prisons

The Tamale central prison holds about 400 inmates who rely on ten toilets connected to a central septic tank. The user interfaces comprise of WC and pour flush. The prison has a cesspit emptier which is used to periodically empty fecal sludge from their containment and dispose at the WSP. The population of prisoners are already included in the census population (CRS, 2021c).

Figure 8: Image of septic tank at Tamale central prisons (CRS, 2021c)

Military and Police Barracks

There are two military bases in Greater Tamale – Kamina barracks and Bawa barracks as well as a Police barracks. The septic tanks used at both the Kamina barracks and the Police barracks are centralised septic tanks which serve cluster of households.

The Bawa barracks have a decentralised sewer network connected to its own WSP that serves the entire institution. The Bawa barracks also houses the Tamale airport. About 592 user interfaces within the barracks are connected to this WSP. The final effluent is discharged

through a narrow earth drain onto open fields behind the facility as displayed in Figures 9 and 10.

Figure 9: Images of the Bawa barracks WSP

Figure 10: Images of final effluent discharge onto open fields from the WSP

Kamina barracks unlike Bawa barracks rely mainly on septic tanks and KVIP/VIP toilets. The true population of the barracks could not be ascertained, however there are about 150 privy rooms connected to multiple centralized septic tanks and KVIP/VIP. The septic tanks are emptied between six months and a year (CRS, 2021c) using cesspit emptiers.

Figure 11: Image of a septic tank at Kamina barracks (CRS, 2021c)

The Ghana Police barracks has a population of over 313 households with about 169 WCs connected to multiple centralized septic tanks. These tanks are emptied between six months to a year by vacuum tricks. It must be noted however that, the toilet cubicles are assigned based on ranks, two lower ranked officers with their households share a cubicle while senior ranked officers and their households have one cubicle each.

Figure 12: Image of multiple centralised septic tanks at Police barracks (CRS, 2021c)

Educational Institutions

Just like other large cities in Ghana, GTA also serve as the principal educational hub in Northern Ghana. Below are sampled educational institutions with large populations that were visited in Table 3.

Table 3: Sanitation facilities in educational facilities in Greater Tamale

Name of Educational facility	Stable population	Type of containments	Type of user interface	No. of toilet rooms	Method of emptying	Frequency of emptying
Tamale College of Education	1,841	Septic tank & KVIP/VIP	WC & Concrete slab	110	Motorised	once a year
Bagabaga College of Education	1,944	KVIP/VIP & Septic tank & Bucket/Pan latrine	Concrete slab & WC	159	Motorised	between 6months and a year
Tamale Technical University	480	Septic tank	WC	60	Motorised	between 6months and a year
Technical University College	120	Septic tank	WC	10	Motorised	between 6months and a year
Community Health Nurses Training School	270	Septic tank	WC & Flush squat bowl	18	N/A	Never emptied
Nurses and Midwifery Training School	961	Septic tank	WC	44	Motorised	between 3 and 6 months

Source: (CRS, 2021c)

Hospitals

There are four major hospitals in Greater Tamale with Tamale Teaching hospital being the biggest which has its own wastewater treatment plant. Apart from Tamale Teaching hospital, the others use centralised septic tanks and KVIP/VIP in a few instances. These centralised septic tanks are commonly connected to user interfaces like the WCs, pour flush or flush squat bowls. A summary of the sanitation technologies available in hospitals are depicted in Table 4.

The Tamale Teaching hospital has an aerobic treatment plant that operates on activated sludge technology which was constructed in 2014 and continue to serve their 1,000-bed capacity facility as well as its residencies and offices with a daily operating capacity of 350 cum. It is currently connected to over 300 toilet interfaces which are WCs.

Table 4: Sanitation facilities in hospitals in Greater Tamale

Name of hospital	Stable population	Type of containments	Type of user interface	No. of toilet rooms	Method of emptying	Frequency of emptying
Tamale Teaching Hospital	3,853	Decentralised sewer system	WC	300	N/A	N/A
Tamale West hospital	135	septic tank	WC & Flush squat bowl	49	Motorised	between 3 and 6 months
Tamale Central hospital	135	septic tank & KVIP	WC & Pour flush	31	Motorised	Once a year
SDA hospital	200	septic tank	WC	35	Motorised	between 3 and 6 months

Source: (CRS, 2021c)

The Tamale Teaching hospital has an aerobic treatment plant that operates on activated sludge technology which was constructed in 2014 and continue to serve their 1,000-bed capacity facility as well as its residencies and offices with a daily operating capacity of 350 cum. It is currently connected to over 300 toilet interfaces which are WCs.

Figure 13: Control room of the treatment plant

Figure 14: Image of treatment plant at Tamale Teaching hospital

Hotels and Orphanages

In all, nine (9) hotels and two (2) children's homes (orphanages) were identified and visited as part of this assessment. The findings are depicted in Table 5:

Table 5: Details of sanitation facilities in high-capacity hotels and orphanages in Greater Tamale

Name of hotel/hospitality	Stable population	Type of containments	Type of user interface	No. of toilet rooms	Method of emptying	Frequency of emptying
SOS Children's village, Tamale	115	Septic tank	WC	51	Motorised	Once a year
Radach hotel	62	Septic tank	WC	100	Motorised	between 2 weeks and a month
Tamale Children's home	36	Septic tank & KVIP	WC & Pour flush & Concrete slab	14	N/A	Never emptied
Picorna hotel	10	Septic tank	WC	29	Motorised	Once a year
Mariam hotel	13	Septic tank	WC	72	Manual	Once a year
Mum's hotel	22	Septic tank	WC	22	Motorised	between 1 and 3 months
Reagal hotel	11	Septic tank	WC	25	Motorised	between 2 weeks and a month
Global dream hotel	37	Septic tank	WC	170	Motorised	between 6 months and a year
Nim Avenue hotel	81	Septic tank	WC	81	Motorised	Once a year
Hamdallah hotel	5	Septic tank	WC	25	Motorised	between 6 months and a year
Ghanaa hotel	12	Septic tank	WC	79	Motorised	Once a year

Source: (CRS, 2021c)

2.3 Emptying and Transportation

2.3.1 Motorised Emptying

The emptying situation in both Tamale and Sagnarigu are largely the same, except that in Tamale the emptying of sanitation technologies is not fully outsourced to the private sector. The local assembly (TaMA) also has a cesspit emptier which offers services to private households, public toilets and institutions. TaMA's emptier has however been unserviceable

for almost a year. It charged fees between GhȻ100 to GhȻ150 (US$16 to US$25)[2] depending on the size of the containment which is relatively cheaper than the charges offered by private emptiers (TaMA, 2021k). The private emptying operators are particularly displeased with the emptying services rendered by the TaMA and accuse them of price undercutting (TaMa, 2021m).

SagMA on the other hand do not have any cesspit emptier to their credit and so rely wholly on the private emptying operators to provide emptying services to its population (TaMA, 2021i). Interactions with City Authorities as well as the organized cesspit emptier operators group indicated that there are about nine (9) known companies which offer emptying services but a visit to the WSP revealed that there could be a couple more of unidentified emptying operators plying their trade within the jurisdiction (TaMA, 2021h). Luqman cesspit, an unknown company that owns two (2) emptying trucks had come to dump at the WSP upon our visit. A list of motorized emptying operators is presented in Table 6.

Cost of emptying by private formal trucks range from GhȻ200 to GhȻ250 (US$33 to US$42) per trip depending on proximity to treatment plant and the capacity of the emptying truck. On the contrary, the sama sama emptying vehicle referred to as “shitmaster” which is the smallest with capacity of 2.7 cum charged 120gh (US$20) per trip. The emptying fees charged by all private operators are discretionary and determined by the emptying operators. Both TaMA and SagMA do not have control over the fee-fixing of emptying services yet.

Figure 15: Image of iDE shitmaster

Figure 16: Image of cesspit emptier

There have been few instances where some truck drivers were reported for diverting fecal sludge onto farmlands at the request of the farmers. The truck drivers were apprehended and later discharged on a bond. It has since not come to the attention of the local authorities whether such practices continue to occur. It is understood that the farmers dried and ploughed the FS to enrich their soil condition (TaMA, 2021i).

[2] Exchange rate used is US$1.00 = GhȻ6.00 (June 2021)

TaMA in collaboration with UNICEF has eventually succeeded in organizing and formalizing their relations with the operators by signing a mutual service agreement (TaMA, 2021a). The agreement is intended to regulate the operations of emptying service providers and pave way for full private sector participation as espoused in the 2010 Environmental Sanitation Policy.

Table 6: Details of motorized emptying operators

S/N	Name of Company	No. of trucks	Capacity of truck (cum)	Remarks
1	Bamus cesspit	1	10	All trucks operational
2	Buhasco Enterprise	2	11.5 & 12.5	All trucks operational
3	iDE (SamaSama)	1	2.7	All trucks operational
4	Framcy Services	1	14	All trucks operational
5	Savannah Waste	4	10 each	All trucks operational
6	Environmental Steward	1	9	All trucks operational
7	Harun Cesspit	1	9	All trucks operational
8	Blaise Cesspit	1	9	All trucks operational
9	Mark Akazawe	2	7.5 each	1No. truck operational
10	TaMA	1	9	Not operational
11	Luqman Cesspit	2	9 each	All trucks operational
	Total	**17**		

Source: (TaMA, 2021e)

2.3.2 Manual Emptying

Currently, manual emptying services are carried out clandestinely and informally as they are not recognized and regulated by local authorities. Manual emptying is predominantly carried out on pit latrines or dry toilet technologies especially in low-income areas. Their services sometimes are required also in wet technologies such as septic tanks especially when sludge at the base of the septic tank become hard in cake form where siphoning by the trucks becomes practically impossible. In such instances, the manual emptying personnel enter these containments and loosen the caked sludge with simple tools and devices and fetch them out using buckets. Manual emptying is always done in a team. The team usually comprises of four to five members. The practice is considered high-risk and as such traditional rituals are sometimes performed before work commences.

Similar to motorized emptying, manual emptying operators offer services to households, public toilets and commercial organizations and institutions. Manual emptying is performed strictly at nights. They are either buried in pit-dugouts around the premises or transported by skip containers or tricycles to nearby forests. Notable among these forests are Aboabo, Nobisco and

Nyohini. They are sometimes disposed into primary drains or packaged and disposed of in central containers. Surprisingly, the motorized emptying is significantly cost-effective than manual emptying. Cost of manual emptying could go as high as Gh₵12,000 (US$2,000) depending on the size of the containment, hardness of FS among others. Also, cost of service is purely discretionary as with motorized emptying. Information gathered showed that, most public toilet attendants work as manual emptiers. Indications are that, there are about twenty-seven manual emptiers within the GTA. Their services transcend Greater Tamale even into other cities and regions of Ghana (TaMA, 2021m).

Their trade which includes emptying, use of equipment and transport of FS are not regulated by local authorities. Currently, manual emptiers are not organized and recognized yet their role is undeniably significant in the sanitation service chain as no alternative emptying option exist for these pit type of toilets.

2.4 Treatment, end-use and disposal

Tamale landfill and waste stabilization ponds (WSP) were constructed in 2004 and officially commissioned in 2006. The funding agency was the World Bank. The total land coverage of the Tamale Landfills and stabilization ponds is 25 hectares (62 acres). The landfill site covers a land area of about 1.5 hectares while the waste stabilization pond covers about one (1) hectare of land area. The waste stabilization pond is the only viable liquid waste treatment facility in GTA that receives liquid waste from households and institutions in the city of Tamale and beyond. The WSP hitherto had seven (7) ponds including two anaerobic ponds, four facultative ponds and one aerobic or maturation pond (TaMA, 2021q). One maturation pond has since been added to the WSP to comprise eight ponds (TaMA, 2021a). The pond has a total capacity of 39,336m^3.

While the landfill facility is managed by a private entity known as the Waste Landfills Company Limited under a Public Private Partnership arrangement, the management of the waste stabilization pond remains the duty of the Waste Management Department of the TaMA (TaMA, 2021q).

The TaMA and UNICEF collaborated to rehabilitate and upgrade the WSP which included desludging the anaerobic ponds, constructing grit chambers at receiving points where the trucks discharge directly and constructing additional maturation pond to further enhance the treatment of the final effluent (TaMA, 2021a)

Figure 17: Gbalahi Waste Stabilization Pond

Hitherto, the WSP has been without any management system at site for over a decade. There had not been any regular or periodic site maintenance works, record-keeping of disposal activities, collection of disposal/tipping fees and others. Cesspit emptiers have for these years disposed of fecal sludge at no cost to them. Due to no record keeping practice at the site, it is difficult to estimate the typical or average number of trucks per day that deliver FS to the WSP (TaMA, 2021e).

Figure 18: Installed grit chamber for truck discharge

Figure 19: Newly constructed maturation pond

2.4.1 Disposal & Effluent Quality

The result of a wastewater quality analysis (see Table 7) was conducted on the final stage of the facultative and the initial maturation pond to enlighten local authorities on the performance

of the WSP and whether there is a possibility of re-using the final effluent for value. Re-use options which utilize final effluent for agriculture or aquaculture were under consideration (TaMA, 2021p).

Table 7: Laboratory results on the Gbalahi Waste Stabilization Pond

Parameters	Facultative Pond	Maturation Pond	GS 1212:2019
Physio-chemical Parameters			
pH (pH units)	8.24	8.27	6.00 - 9.00
Nitrate - Nitrogen (N03-N) (mg/l)	1.15	0.885	50.0
Biochemical Oxygen Demand (mg/l)	195	36.8	50.0
Chemical Oxygen Demand (mg/l)	1,264	285	250
Bacteriological Parameters			
Total Coliform (cfu/ 100ml)	800	720	400
Faecal Coliform (cfu/ 100ml)	20	20	10
£-coli (cfu / 100ml)	0	0	10

Source: (TaMA, 2021r)

The results from Table 7 shows the performance of the WSP to be satisfactory except for COD and Total Coliform levels which do not meet the standard. However, the addition of newly installed maturation pond is expected to further enhance or polish the final effluent. The analysis carried out did not include any test for bioaccumulated heavy metals especially when the WSP is located on a landfill facility. There are suspicions of possible leachate flow from the landfill facility nearby into the WSP. As a result, if TaMA decides to embark on re-using the final effluent especially for agriculture or aquaculture purposes, it will be important to run lab analysis again to check for the presence of heavy metals. As at the time of the field visit, it was difficult to tell whether there are any visible connections from the base of the landfill that channeled leachate into the WSP. In fact, interactions with staff of TaMA and UNICEF consultants could not yield any knowledge on whether any such connections from the landfill to the WSP existed.

From a social perspective, the traditions and customs of the people of GTA are against the consumption and the rearing of catfish which was the original species of fish to be introduced

into the newly constructed maturation pond to test for efficiency of the system and to also generate revenue for operating the facility. That option for the local authorities to re-use the final effluent for aquaculture remains unclear after traditional leaders strongly advised against that idea.

Currently at the same location, there is an ongoing construction works to install a new 1,000 cum capacity state-of-the-art FS treatment plant by the Sewerage Systems Ghana Limited (TaMA, 2021n). Stakeholders are yet to deliberate on the purpose, institutional arrangements and management service agreement (TaMA, 2021o). It is not clear what will become of the current WSP on site after the completion of the new FS treatment plant under construction (TaMA, 2021p).

Figure 20: Ongoing works for new 1000 cum capacity FS treatment plant at the Gbalahi landfill site

2.5 Drinking water supply

The White Volta River with its source from Nawuni is the main source of water for GTA. The GWCL depend mainly on the White Volta for treatment and supply through piped water systems to the urban populace (UNICEF, 2018). According to the 2010 census, over 86% of Tamale's population relied on piped water supply from GWCL whereas over 90% of Sagnarigu's population also relied on same source. Sachet water is a major source of drinking water in the area. Other alternative sources such as dams, boreholes both mechanized and hand-dug are mostly relied upon by the rural population. These alternative sources of water supply are also available in urban areas to augment water availability due to intermittent water supply, high water demand from the rapidly growing urban population, vis-à-vis the limited capacity of GWCL to treat and supply adequate water (Awepuga, 2015).

2.6 Groundwater Pollution Assumption

From section 2.5, it is seen that majority of the populace relied on water supply from GWCL which leaves very few ground water sources used for drinking purposes. The Greater Tamale Area is poorly endowed with water resources and a low underground water table (MESSAP, 2020). Also, because toilet provision interventions are mostly implemented through the local Assemblies, its construction are well regulated and adhered to standards (TaMA, 2021g). In the Ghana building code, "cesspit soakaways, pit latrines or any subsoil dispersion systems shall not be closer than 18m from any of sources of drinking water so to mitigate the possibility of pollution of the water supply; the well shall be located on a site upwards relative to the earth closet" (GBC, 2018). Based on the reasons stated above, a low ground water pollution risk was considered in the generation of the SFD matrix.

2.7 SFD Matrix

This section details the explanation of all assumptions made to derive percentages for the aggregate SFD for GTA.

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B					Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					Significant risk of GW pollution T1A2C5					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					T1A3C10
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution					Significant risk of GW pollution Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution T1A5C10
Unlined pit										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution T1B7C10
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										T1B10C10
No toilet. Open defecation	Not Applicable						T1B11 C7 TO C9			Not Applicable

Figure 21: SFD Selection grid for Greater Tamale

Greater Tamale, Northern Region, Ghana, 20 Aug 2021. SFD Level: 3 - Comprehensive S
Population: 468415
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks

Containment				
System type	Population	FS emptying	FS transport	FS treatment
	Pop	F3	F4	F5
System label and description	Proportion of population using this type of system (p)	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated
T1A2C5 Septic tank connected to soak pit	26.0	35.0	95.0	70.0
T1A3C10 Fully lined tank (sealed), no outlet or overflow	6.0	99.0	95.0	70.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	32.0	99.0	69.0	70.0
T1B10C10 Containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - with no outlet or overflow	8.0	0.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	26.0			
T1B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	2.0			

Figure 22: SFD Matrix for Greater Tamale Area

Containment

The Matrix as shown in Figure 22 is the aggregated percentages for the Greater Tamale after obtaining the individual distribution of percentages for both cities. The aggregate percentages for GTA were derived from the individual cities using the household populations.

The baseline data used were the 2010 census reports for both Tamale and Sagnarigu with updated toilet coverage figures from the Northern Regional Inter-Agency Coordinating

Committee on Sanitation (RICCS). The RICCS data reported total household toilet coverage for Tamale to be 32.2% and Sagnarigu to be 44.1% based on static number of households as seen in the 2010 census report.

Comparing the new household toilet coverage with the 2010 census figure for Tamale, then it could be said that there has been an increase from 21.1% in 2010 to 32.2% in June 2021. The difference of 11.1% was interpreted as the population that gained access to household toilets that were assumed to be WCs (septic tanks) due it being the main toilet option under the ongoing projects. In effect, open defecation would be reduced from 34.1%. to 23%.

Applying same analysis for Sagnarigu, there would be an increase of HHT coverage from 26.2% to 44.1%. The difference of 17.9% will be the population that gained access to household toilets which again were assumed to be WCs (septic tanks). Hence open defecation would be reduced from 46.2% to 28.3%. These modifications are reflected in Table 8. The assumptions made were negotiated and agreed upon with the stakeholders. The matrices for each of the cities, Tamale and Sagnarigu are provided for in the Appendices 4 and 7 respectively.

Table 8: Modified Census data used to generate SFD

	TaMA Census 2010	TaMA Modified Data	SagMA Census 2010	SagMA Modified Data
Total	**100%**	**100%**	**100%**	**100%**
No facility	34.1	23.0	46.2	28.3
Public toilet	44.8	44.8	27.6	27.6
W.C	10.1	21.2	16.0	33.8
Pit latrine	1.7	1.7	1.6	1.6
KVIP	7.0	7.0	6.9	6.9
Bucket/Pan	1.4	1.4	0.4	0.4
Other	0.8	0.8	1.4	1.4

Source: Modification of figures were informed by updates received from the Northern Regional inter-agency Coordinating Committee on Sanitation (TaMA, 2021s)

Table 9 presents the SFD-PI descriptions for the various containments from the census data adopted and used. It was agreed by stakeholders to include the percentages of bucket/pan latrine to open defecation because there are no existing management systems in place for such facilities. Consequently, the FS from these facilities is disposed indiscriminately into the environment (TaMA, 2021i).

Table 9: SFD-PI descriptions for the various sanitation facilities

Categories of sanitation facilities	Containments	SFD Description
No facility	Open defecation	T1B11 C7 TO C9 - Open defecation
	Bucket/Pan latrine	
Public toilet	KVIP/VIP	T1A5C10 - Lined pit with semi-permeable walls and open bottom, no outlet or overflow
	Damaged KVIP/VIP	T1B10C10 - Containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - with no outlet or overflow
	Septic tank (Holding tank)	T1A3C10 - Fully lined tank (sealed), no outlet or overflow
HH toilet	Septic tank	T1A2C5 - Septic tank connected to soak pit
	Pit latrine	T1B7C10 - Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow
	KVIP	T1A5C10 - Lined pit with semi-permeable walls and open bottom, no outlet or overflow

Additionally, the CRS public toilet survey conducted in 2021 provided contextual knowledge into the designs, construction, management and post-usage of the facilities. The survey also presented an opportunity to understand what technologies existed at the public toilet levels since the census report did not provide further details. The findings revealed that only two technologies existed at the public toilet level which are septic tank and KVIP/VIP after visiting all existing public toilets (CRS, 2021b). Upon the visits to public toilets, it was observed that some of the KVIP/VIP public toilets had failed, were damaged, collapsed or in some instances flooded with exposed fecal sludge. It became relevant to provide a separate description to such facilities as seen in Table 10. Public toilets were reclassified into three categories to suit the descriptions provided in the SFD-PI as follows: T1A5C10 - lined pit with semi-permeable walls and open bottom, no outlet or overflow; T1B10C10 - containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - with no outlet or overflow; and T1A3C10 - fully lined tank (sealed), no outlet or overflow. The percentages for the three classes of public toilets are presented.

Table 10: Reclassification of Public toilets

	SFD-PI Description	TaMA (%)	SagMA (%)	GTA (%)
Public toilet	KVIP/VIP (T1A5C10)	30	17	25
	Damaged KVIP/VIP (T1B10C10)	6	10	8
	Holding tank (T1A3C10)	9	1	6

After consolidating proportions of figures in Table 8 and reclassifying them according to the SFD-PI methodology, it resulted in the presentation as shown in Table 11.

Table 11: Final proportions adopted to be used as GTA matrix

SFD Description	TaMA	TaMA Pop.	SagMA	SagMA Pop.	GTA (Total)	Final %
	%	**281,619**	%	**186,796**	**468,415**	**100%**
T1B11 C7 TO C9 - Open defecation	24	67,589	29	54,171	121,759	**26**
T1A5C10 - Lined pit with semi-permeable walls and open bottom, no outlet or overflow	38	107,015	24	44,831	151,846	**32**
T1B10C10 - Containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - with no outlet or overflow	6	16,897	10	18,680	35,577	**8**
T1A3C10 - Fully lined tank (sealed), no outlet or overflow	9	25,346	1	1,868	27,214	**6**
T1A2C5 - Septic tank connected to soak pit	21	59,140	34	63,511	122,651	**26**
T1B7C10 - Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	2	5,632	2	3,736	9,368	**2**

Most of the septic tanks used at the household level were quite new and were yet to be emptied, for that matter only 34% of the respondents during the survey had contracted emptying services at some point in time. The remaining had never emptied their septic tanks yet. A few of them were found to have been connected to drains with an overflow pipe to slow the rate of fill up within the containments. These containments were typically connected to pour flush or water closet interfaces.

2.7.1 Emptying

From the CRS survey, it was revealed that only 36% of septic tanks used at the household level (T1A2C5) had ever been emptied because many of these septic tanks were newly constructed or installed (CRS, 2021a). On the contrary, 99% of septic tanks used at the public toilet level (T1A3C10) were frequently emptied due to high patronage and also because the soakaways or drainfields connected to them had become dysfunctional (CRS, 2021b). Again, the survey revealed that the KVIP/VIP toilets had been emptied at some point. The 99% agreed and used for the KVIP/VIP is to acknowledge that in real life there shall be losses during the emptying process.

2.7.2 Transport

The motorised emptiers engaged during the focus group discussions stated that fecal sludge collected by their trucks are transported to the WSP (TaMA. 2021k). Engagements with the environmental health officers of both TaMA and SagMA hinted that there have been times in the past where some trucks were caught diverting fecal sludge to farmers, however, this malpractice for some time has not come to their notice (TaMA, 2021g and i).

The 69% FS from KVIP/VIP (T1A5C10) transported to treatment facility is influenced by high patronage from public toilet operators as compared to household KVIP/VIP who predominantly rely on manual emptiers for emptying. Fecal sludge emptied by manual emptiers always end up in the environment (TaMA, 2021m) whereas those emptied by the motorised trucks largely are taken to the treatment plant. The 95% recorded for both T1A2C5 and T1A3C10 was to take care of losses during transportation and unlikely diversion of fecal sludge to unauthorised sites.

2.7.3 Treatment

Based on the empirical analysis as seen in Table 12 below, the treatment efficiency obtained is 72%, however, it was negotiated and agreed by the stakeholders to adopt 70% treatment efficiency instead for the SFD.

Table 12: Empirical calculation of treatment efficiency of the Gbalahi WSP

Weighting (W%)	Parameters	Maturation Pond	GS 1212:2019	Score rating (1-2-3-4)	Average Score = (sum of scores for N parameters / N)	Weighted Score = (Average Score * W%)
	Physio-chemical Parameters					
40%	pH (pH units)	8.27	6.00 - 9.00	4	3.75 (N=4)	1.5
	Nitrate - Nitrogen (N03-N) (mg/I)	0.885	50	4		
	Biochemical Oxygen Demand (mg/I)	36.8	50	4		
	Chemical Oxygen Demand (mg/I)	285	250	3		
	Bacteriological Parameters					
60%	Total Coliform (cfu/ 100ml)	720	400	1	2.33 (N=3)	1.4
	Faecal Coliform (cfu/ 100ml)	20	10	2		
	e-coli (cfu / 100ml)	0	10	4		
	Total overall weighted scores = (sum of weighted scores)					**2.9**
	Overall Performance % = (sum of weighted scores/4)*100					**72.5**

***NB**: Weightings show the relative importance of each test category against the other. The purpose of the weightings is to highlight which aspects of the test are relatively relevant to the environment with regards to pollution. A total of 100 percent of the weightings are allocated to the two categories of test i.e. physio-chemical and bacteriological parameters*

2.7.4 Summary of Assumptions

The proportion of FS in septic tanks, fully-lined tanks, lined tanks with Impermeable walls and open bottom and all types of pits were all set to 100% as per the instructions given on the SFD-PI.

Containment

- The total number of households given in the 2010 census was assumed to be stable and remain unchanged except for the population which the projected figure was used.
- As can be seen in Table 8, 0.8% for Tamale and 1.4% for Sagnarigu used “others” type of containments
    - Figures for ‘others’ type of containment were not shown in the SFD graphic eventually because it made up for rounding the decimal places of the various containment proportions to the nearest whole number.
- Also, from same Table 8, 1.4% and 0.4% of the populations relied on bucket/pan latrine in Tamale and Sagnarigu respectively.

- These figures were classified to be practicing open defecation, so they were added onto the initial open defecation figures to become 24% and 29% as seen in Table 11 which produced 26% as open defecation for GTA.

- According to the SFD manual, a typical and well-designed septic tank should have at least two chambers which is connected to a soakaway or drainfield. The 2010 census report does not specify which of the private/household septic tanks are single chambered, neither did it also specify which technologies existed as public toilets. Thus, at the household level it was going to be difficult to split what proportion should be single tanks, therefore all were classified as septic tanks. Also, the proportion of the population that gained access to household toilets were assumed to be WCs (septic tanks).
- However, septic tanks used as public toilets were classified as 'fully lined tanks (sealed), no outlet or overflow' because their soakaways were dysfunctional. This was ascertained during the CRS public toilet survey after visiting all existing public toilets.

Emptying

- From the household survey, 34% of the households interviewed in Tamale had never emptied their septic tanks while 36% had emptied their tanks in Sagnarigu. After calculations, 35% of the population in GTA was arrived at. Thus, F3 for T1A2C5 was 35%.
- The surveys of both household and public toilet, 100% of all interviewees have had their KVIP/VIPs emptied at one point in time. It was agreed at the stakeholder validation meeting to settle on 99%. Therefore, the variable F3 for T1A5C10 was 99%.
- According to the public toilet survey, 99% of all septic tank public toilets had been emptied leaving only 1% that was yet to be emptied. Hence, the variable F3 for T1A3C10 was 99%.
- Again, according to same public toilet survey, the proportion of KVIP/VIP that had been abandoned, damaged, flooded or collapsed were being patronised by people but had no management system in place so it was agreed by stakeholders to indicate no emptying at such sites. Thus, F3 for T1B10C10 was 0%.

Transport

- Because T1A2C5 and T1A3C10 are mainly hauled by cesspit emptiers, the stakeholders agreed that it was safe to assume that 95% of the FS they carried got to WSP.
- The variable F4 for T1A5C10 in Tamale and Sagnarigu produced 75% and 60% respectively, T1A5C10 was assessed at both public toilet and household toilets. At the household level, 100% volume of FS emptied do not reach the WSP while 83% and 67% volume of FS emptied from public toilets are taken to the WSP.
- Aggregating 75% for Tamale with 60% for Sagnarigu for the variable F4, T1A5C10 became 69% for GTA.

Treatment

- Finally, as discussed under section 2.7.5, the negotiated treatment efficiency agreed by stakeholders was 70% for all FS that reach the WSP. This resulted in setting the value for variable for F5 to 70% for systems T1A2C5, T1A3C10 and T1A5C10. For T1B10C10, the variable F5 was set to 0% since this system does not have any emptying services.

2.7.5 Summary of onsite systems

- **T1A2C5 - Septic tank connected to soak pit (Low risk of Groundwater pollution) – 26%**

  F3 – 36% Proportion of this type of system from which fecal sludge is emptied

  F4 – 95% Proportion of fecal sludge emptied, which is delivered to treatment plants

  F5 – 70% Proportion of fecal sludge delivered to treatment plants, which is treated

- **T1A3C10 - Fully lined tank (sealed), no outlet or overflow – 6%**

  F3 – 99% Proportion of this type of system from which fecal sludge is emptied

  F4 – 95% Proportion of fecal sludge emptied, which is delivered to treatment plants

  F5 – 70% Proportion of fecal sludge delivered to treatment plants, which is treated

- **T1A5C10 - Lined pit with semi-permeable walls and open bottom, no outlet or overflow (Low risk Groundwater pollution) – 32%**

  F3 – 99% Proportion of this type of system from which fecal sludge is emptied

  F4 – 69% Proportion of fecal sludge emptied, which is delivered to treatment plants

  F5 – 70% Proportion of fecal sludge delivered to treatment plants, which is treated

- **T1B10C10 - Containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - with no outlet or overflow – 8%**

  F3 – 0% Proportion of this type of system from which fecal sludge is emptied

  F4 – 0% Proportion of fecal sludge emptied, which is delivered to treatment plants

  F5 – 0% Proportion of fecal sludge delivered to treatment plants, which is treated

- **T1B11 C7 TO C9 - Open defecation – 26%**

  F3 – N/A Proportion of this type of system from which fecal sludge is emptied

F4 – N/A Proportion of fecal sludge emptied, which is delivered to treatment plants

F5 – N/A Proportion of fecal sludge delivered to treatment plants, which is treated

- **T1B7C10 - Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow (Low risk of Groundwater pollution) – 2%**

  F3 – N/A Proportion of this type of system from which fecal sludge is emptied

  F4 – N/A Proportion of fecal sludge emptied, which is delivered to treatment plants

  F5 – N/A Proportion of fecal sludge delivered to treatment plants, which is treated

2.8 SFD Graphic

The resulting SFD graphic as presented below in Figure 23 shows an assessment that 45% of the excreta generated is safely managed within the Greater Tamale while the remaining 55% is unsafely managed.

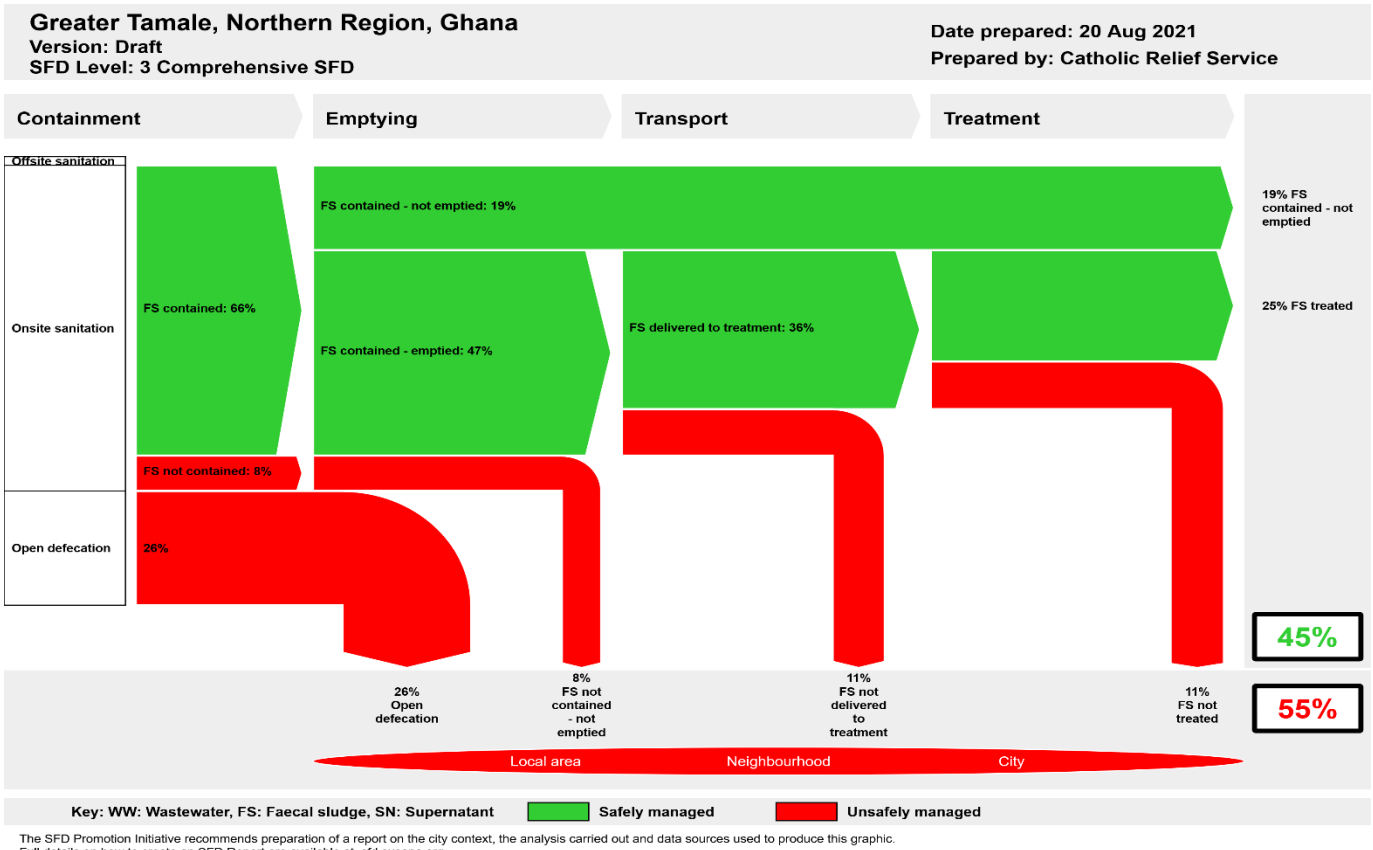

Figure 23: Final SFD graphic of Greater Tamale

2.8.1 Safely Managed Excreta (45%)

Out of 66% of excreta that is contained, 19% of it are contained and not emptied. The remaining 47% of FS that are emptied, only 36% are transported to WSP for treatment upon which only 25% are treated and disposed safely into the environment. It is however important to state that:

- for household septic tanks that have never been emptied, some have connected overflow pipes channeled into drains thereby slowing the fill-up rate within their containments. Therefore, the 19% contained and not emptied before may likely be overestimated.
- also, because there has been a newly installed maturation pond, the performance of the WSP is expected to be enhanced, as a result, the 25% of excreta treated at the WSP is more likely to increase.

2.8.2 Unsafely Managed Excreta (55%)

The 8% of FS not contained specifically emanates from public toilets where the containments have been damaged, collapsed, or flooded with exposed excreta. These damaged, collapsed, or flooded containments defies the logic behind the benefits of containments to separate FS from its users. The FS in such exposed containments were agreed to be classified as not contained. Also, 26% open defecation though a significant improvement from the original 2010 census result of about 39%, still leaves much to be desired and thus, more work needs to be done to eliminate this illegal practice. This somewhat progress can be attributed to the numerous sanitation interventions implemented within GTA which aimed at assisting households to procure improved toilets, continuously educated and sensitised households, enforced by-laws etc. The 11% of excreta emptied are diverted and for that matter does not reach or delivered for treatment. They end up in the environment untreated. Again, about 11% of excreta despite been delivered to treatment are however not treated.

2.8.3 Credibility of Data Sources

The SFD is largely based on the data from the 2010 census which some portions were reviewed based on updates received from the regional office (Northern RICCS) who are mandated to keep and update database on sanitation. The figures were however triangulated through informant interviews, focus group discussions, field observations as well as negotiations with key stakeholders. Data used for contextual details came from three surveys conducted by CRS: household survey; public toilet survey; and institutional survey. The service delivery context has been developed through literature, national and district policies and plans available.

2.8.4 Learnings

- Presence of many informal service providers (manual emptiers) whose FS does not reach the WSP.
- No available records on FS emptied and delivered to treatment plant. And as such, it is impossible to track whether FS collected reaches the WSP.

- Some few septic tanks have connected their outfalls into drains, there is the need for the local Authorities to intensify their enforcement activities.

- No office space at the WSP inhibits the deployment of an officer to manage the site. This directly affects revenue mobilization efforts from disposal fees to be collected from truck drivers. Revenue mobilized will improve on site operations and management.

- RICCS will require support to improve their sanitation database that integrates and updates periodically, data reported to reflect efforts invested in the sector. To this effect the local authorities are to be supported to improve infrastructure needed for managing and updating their sanitation databases.

2.8.5 Recommendations

Containment

- More investment is needed to support TaMA and SagMA to rollout more sanitation projects that aim at assisting households to procure toilet facilities, campaigns on behavioural change communication, intensifying enforcement of by-laws etc. since open defecation rates remain high despite the significant success chalked so far.
- The business model of public toilet needs a critical evaluation to ensure they are sustainably managed which would also lead to improvement of the hygiene conditions at these facilities. In the interim, investment would be required to rehabilitate them for the new business model if fashioned, to take effect. As part of this, discussions concerning the use of public toilet sites as central container points will require equal attention as well. This is critical because huge populations rely mainly on these public toilets as their points of defecation.
- The WASH artisans' group which exists would have to be empowered to enable them to become vibrant and build the required synergies with sector players towards effective coordination and regulation.

Emptying

- All pit latrines used as public toilets should be discouraged because most do not have lining on the bottom of the pit. Also, the rate of use is such that it fills up rapidly, therefore ends up being emptied mechanically. Continuous mechanical emptying over time will damage the base of the pit and may in severe cases lead to the collapse of the structure.
- Due to the critical role manual emptiers play in the sector, it is incumbent on local authorities to engage and integrate manual emptiers by reforming rigid regulations to enable solutions that leverage their strengths for sustainable development. Ignoring the role of manual emptiers amounts to failure to holistically manage the sanitation service chain. Some probable outcomes of this relationship should include the development of technical guidelines for safe manual emptying, capacity-building for all actors and provision of transfer stations or treatment plants within city centres among others.

Treatment

- Key stakeholders like MSWR, TaMA, SagMA and Sewerage systems would have to be brought together to discuss the purpose, management, and institutional arrangements

regarding the ongoing construction of 1,000 cum FS treatment facility and what becomes of the existing WSP.

- Before the by-products from the WSP are re-used, another laboratory analysis should be conducted to check for presence of heavy metals as it shares same site with the landfill.

3 Service delivery context.

3.1 Policy, legislation and regulation

The Ministry of Sanitation and Water Resources (MSWR), which was created in 2017 is responsible for water and sanitation policy setting, planning and coordination in Ghana. Prior to its establishment, water supply and sanitation services fell under two different Ministries namely the Ministry of Water Resources Works Housing and Ministry of Local Government and Rural Development respectively.

Over the years, several polices have been developed to guide the delivery of WASH interventions in the country. The main policies related to management of faecal matter are:

- The Environmental Sanitation Policy (ESP) (revised in 2010) (MLGRD, 2010a)
- The National Water Policy (NWP) 2007.
- The National Environmental and Sanitation Strategy and Action Plan (NESSAP) (MLGRD, 2010b)
- The Strategic Environmental Sanitation Investment Plan (SESIP).

3.1.1 Policy

The Environmental Sanitation Policy (ESP) identifies and defines the major components of environmental sanitation as well as the specific objectives and corresponding actions/measures necessary for addressing the challenges of the sector. It also delineates roles and responsibilities of the various stakeholders particularly individuals (citizens), communities, Community-Based Organisations (CBOs), Non-Governmental Organisations (NGOs), MMDAs and the relevant Ministries.

The NESSAP (2010) translates the measures derived from the objectives of the ESP (2010) into strategies and action plans. The document provides the basis for systematic implementation of programmes for improving environmental sanitation infrastructure and services in the country as well as proposing clear strategies and action plans that provide guidance for all the stakeholders.

Derived from the NESSAP, the SESIP (2011) is a strategic and sustainable financing plan for implementing the NESSAP. It determines the financial gap, which, if not provided for, will impact adversely on the delivery of expected outputs/targets.

At the district level, plans are developed by the respective MMDAs that reveal local and national priorities, direct decision-making and allocation of resources with a view to providing environmental sanitation services. The plans include:

- The District (or Municipal) Medium-Term Development Plan (DMTDP or MMTDP)
- The District (or Municipal) Environmental Sanitation Strategy and Action Plan (DESSAP or MESSAP)

- The District (or Municipal) Water and Sanitation Plan (DWSP or MWSP)

The MESSAP and the MWSP are sector plans of the various MMAs (Tamale and Sagnarigu inclusive) that outline programmes and projects that seek to achieve goals the MMDAs set for the sector. The plans essentially conform to the DMTDP and national sector plans (i.e ESP, NESSAP, and SESIP). The MESSAP, the most authoritative plan for environmental sanitation service provision at the local level, ensures active participation and ownership at the district and local levels. The document encompasses the following broad components:

- Solid waste management
- Liquid waste management
- Storm water drainage and sullage conveyance
- Environmental sanitation education and enforcement management; and
- Healthcare and special industrial wastes

3.1.2 Institutional roles

The Ministry of Sanitation and Water Resources (MSWR) is the lead agency responsible for environmental sanitation and water supply. The Ministry derives its core mandate primarily from article 190 of the 1992 constitution of the Republic of Ghana, the Civil Service Law, 1993 (PNDCL 327) and the Civil Service (Ministry) Instrument, 2017 (MTEF, 2020). The laws establishing the Ministry mandates it to amongst other things to:

- Initiate and formulate water, environmental health and sanitation policies taking into account the needs and aspirations of the people
- Undertake water and environmental sanitation sub sectors development planning in consultation with the National Development Planning Commission (NDPC)
- Co-ordinate, monitor and evaluate the efficiency and effectiveness of the performance of the sanitation and water sub sectors
- Facilitate private sector participation in the provision of safe water and adequate improved sanitation services and infrastructure
- Promote creative and innovative research in the production and use of improved technologies and approaches for effective provision of water and sanitation services; and
- Promote Environmental Health and Hygiene Education.

The Environmental Health and Sanitation Directorate (EHSD) at the Ministry coordinates programmes of the sanitation sector while the Water Directorate is mandated to coordinate the activities of the water sector. The major functions of the EHSD are to:

- Provide guidance to MSWR on environmental sector planning, policy and regulation

- Provide technical assistance to Metropolitan, Municipal and District Assemblies (MMDAs) and service providers
- Regulate all service providers both public and private; and
- Coordinate and disseminate research results on environmental sanitation.

At the regional level, the Metropolitan and Municipal Assemblies (MMAs) such as Tamale and Sagnarigu are responsible for urban sanitation. The MMAs discharge this responsibility through direct provision of centralised sanitation infrastructure and via their regulatory powers over on-site sanitation systems and private sanitation service providers. Infrastructure delivery and management is usually done through partnerships with the private sector.

Table 13: Roles and responsibilities of Institutions in the WASH Sector in Ghana (Adapted from MSWR Institutional Masterplan for GAMA, 2020)

Institution	Roles and Responsibilities
Ministry of Sanitation and Water Resources (MSWR)	1. Formulation of environmental sanitation policies and guidelines 2. Coordination of environmental sanitation policy (technical guidelines, monitoring and evaluation); 3. Promulgation of national legislation and model bye-laws; 4. Technical assistance to Metropolitan, Municipal and District Assemblies (MMAs) and service providers; 5. Monitoring and evaluation of activities of stakeholders (sector departments, government agencies and private service providers)
Ministry of local government and rural development	1.Formulation of policies on Governance (decentralisation policies, rural/urban development and environmental sanitation guidelines, etc.) and acquisition /hiring and deployment of human and financial resources by MMAs. 2. Facilitation of mobilisation of funds for sector programme implementation and procurement of logistics (vehicles, office equipment, etc). 3. Coordination, supervision and monitoring of activities of MMAs.
Ministry of Finance	1.Formulate and implement fiscal and financial policies 2. Preparation and implementation of annual budget and economic and financial statement of Government 3. Effective mobilisation and efficient allocation of resources to all sectors of the economy

Northern Regional Coordinating Council	1. Monitoring, co-ordination and evaluation of the performance of the MMDAs (including environmental sanitation plans and activities); 2. Monitoring the use of funds by the MMDAs. 3. Approval of by-laws of MMAs
Metropolitan and Municipal Assemblies (Tamale and Sagnarigu)	1.Formulation of development policies based on national policies/ development agenda; 2. Institution of PPP arrangements with solid waste private service providers (PSPs) for solid waste collection; 3. Ensuring guidelines and standards for liquid waste collection/treatment are complied with by PSPs 4. Facilitation /holding of hygiene education/promotion through the Environmental Health Units (EHUs) 5. Collaboration with development partners and NGOs in the formulation and implementation of environmental sanitation improvement projects;
Environmental Protection Agency (EPA)	1. Advice MSWR on the formulation of policies on the environment and as well make recommendations for the protection of the environment. 2. Development of environmental protection standards and guidelines in collaboration with the MMDAs. 3. Joint monitoring and evaluation of environmental sanitation activities at the local levels with MMDAs and other stakeholders.

In addition to these institutions, there are several non-governmental organisations (NGOs) and civil society organisations (CSOs) delivering WASH services and piloting new approaches and reaching remote areas and groups. The Coalition of NGOs in Water and Sanitation (CONIWAS) is an umbrella CSO established to contribute to water resource management, sustainable provision of water and sanitation services and hygiene promotion in Ghana (Development aid, 2021).

The goal of the coalition is to present one voice of NGOs in the water and sanitation sub-sector to feed into policies and guidelines both nationally, and globally and to remove barriers and promote access to potable water, safe sanitation and improved hygiene for the poor and vulnerable (Wash Ghana, 2003).

3.1.3 Service provision

The Environmental Sanitation Policy (ESP) 2010 mandates MMAs to "ensure the availability of facilities for the safe handling and disposal of human excreta including excreta disposal facilities and systems for conveyance (sewerage, vehicular, manual), treatment, and final disposal". The ESP also recognizes the roles of households and communities in ensuring good sanitation but fails to specify what exactly communities and households are to do to ensure good sanitation on their premises.

The ESP 2010, requires that "the bulk of environmental sanitation services shall be provided by the private sector, including NGOs and community-based organizations with MMAs maintaining an in-house capacity to provide at least 20% of the services directly." Private sector involvement is mainly through public private partnership (PPPs) with MMAs or the Ministry of Sanitation and Water Resources. WASH-related functions designated in ESP 2010 to be undertaken by the private sector include:

- Management and maintenance of public toilets
- Desludging of septic tanks and pit latrines
- Operation and maintenance of sewerage collection and treatment systems

The Ministry of Finance Public Private Partnership Policy 2011, states that all PPPs are to be governed in accordance with clear objectives and output requirements, accountability and transparency. The policy encourages the development of PPPs for infrastructure and services, including those required for excreta management. The policy establishes six guiding principles for PPPs within Ghana which are: value for money, transfer of risk to the private party, ensuring end users ability to pay, promotion of local companies and technologies, safeguarding the public and conforming to national laws (MoFEP, 2011).

A number of faecal sludge treatment plants such as Lavender Hill and Kotoku fecal sludge treatment plants were constructed through PPP arrangements with central government.

At the MMA level, PPP contracts are also employed for provision and management of public toilet facilities.

3.1.4 Service standards

WASH information at the city level is difficult to access and this includes basic data on coverage, functionality and investment. The MSWR is working on establishing a sector information system (SIS) that will be linked to the management information systems (MIS) for the sub-sectors. All the sub-sector MIS are functional but some are yet to be deployed nationwide due to financial constraints.

Table 14: MIS under the Sector Information System. Adopted from Ghana Wash Development Plan 2021-2030

MIS	Description
BaSIS	Basic Sanitation Information System (BaSIS) for Rural Sanitation
DiMES	District Monitoring and Evaluation System (DiMES) for rural and small-town water services
ERM	Enterprise Resource Management (ERM) system to monitoring of GWCL process,
EMIS	Education Management Information System (EMIS) for WASH in schools
DHIMS	District health information management system (DHIMS)

There is presently no credible provider-based data for access and coverage in the sanitation sector, so data from Ghana Statistical Service (GSS) has to be used. There is little systematic monitoring of the number and quality of WASH facilities at households or equity within the sector (WSP, 2011).

3.2 Planning

Tamale Metropolitan and Sagnarigu Municipal have each prepared an Environmental Sanitation Strategy Action Plan (MESSAP) for the periods 2015-2020. The Plans are based on the baseline data gathered within their respective areas. The MESSAPS are tailored along the national guidelines such as the ESP, the Medium-Term Development Plan (MTDP) and the Ghana Shared Growth and Development Agenda (GSGDA-II). Both MMAs have also developed a Medium-Term Development plan for the period of 2018 to 2021. The plan has clear objectives adopted from the national policy objectives and focuses on four development dimensions namely: Economic Development; Social Development; Environment, Infrastructure and Human Settlement; and Governance, Corruption and Public accountability.

3.2.1 Service targets

The Multiple Indicator Cluster Survey (2017/2018) reports that only 21% of households in Ghana have access to basic sanitation services. Majority of households rely on shared and public toilet facilities. The Northern region, where the Greater Tamale area is located has a lower basic sanitation coverage of 12%. The UNICEF WASH Baseline report (2016) reported that only 11% of the urban population of TaMA have access to improved household toilet facilities. Most of the populace rely on unimproved facilities with78% accessing public/shared facilities and 10% practicing open defecation. For SagMA, 66% of households do not have any form of toilet facilities (SagMA DESSAP 2018).

The ESP 2010 provides a WASH service goal of improving access to safe water supply and sanitation to reduce the proportion of population without access to basic water supply and sanitation by 50% in 2015 and 75% in 2025.

The Greater Tamale Metropolitan Area like other regions in the country could not attain the MDG goals for Sanitation and is still considerably behind SDG Goal 6.

Both MMAs have set targets for increasing access to sanitation and excreta management in their respective MESSAPs as provided in Tables 15 and 16 below. The sanitation targets and strategies for TaMA covers containment, transportation, and treatment of faecal sludge in line with requirements of SDGs while that of SagMA focuses on containment.

Table 15: Summary of Sanitation Targets and Strategies for TaMA (MESSAP 2018-2020)

Component	Target/Objectives	Strategies and Activities
Excreta (Liquid Waste) management	1.To increase access to latrine facilities to 75% by the end of year 2020	1. Purchase a cesspit emptier
		1.1 Allocate funds from the District Assembly common Fund to procure cesspit emptier.
	2. To reduce indiscriminate defecation to 75% by the end of year 2020	2. Construct a Waste Stabilization Pond
		2.1 Allocate funds for the construction of a waste stabilization pond for liquid waste treatment, disposal and composting.
		3. Promotion of Household Latrines
		3.1 The CLTS approach will be used to 'Trigger' all communities to stop the practice of Open Defecation and facilitate the construction of household latrines.
		3.2 The MA will facilitate capacity building for MWST and EHAs to facilitate the CLTS Approach.
		3.3 Sanitation Markets (SANIMARTs) will be constructed in the metro capital and two other small towns to facilitate the uptake of household latrines.
		3.4 Total Sanitation and Social Marketing approaches will be used to aggressively promote the uptake of household latrines in small towns within the Metro.
		3.5 The MA will facilitate the training and registration of a core of Latrine Artisans for the construction of latrines.
		3.6 Strict enforcement of regulations on household toilets will be pursued.

Table 16: Summary of Sanitation Targets and Strategies for SagMA (DESSAP 2018)

GOAL	OBJECTIVES	STRATEGIES
To ensure that residents of Sagnarigu Municipality adopt best environmental health practices so as to improve their health conditions	To achieve 70% of adequate and safe toilets in households (W/C, KVIP, VIP) by the end of 2019	• To improve household toilets through C.L.T.S strategy • Strengthen zonal council staff in the area of facilitation skills • Provide training for Hygiene volunteers
	To achieve 76% safe water to all populations (pipe borne, bore hole/covered deep wells, rain harvesting, etc) by the end of 2019	• To increase the provision of safe water (pipe borne, borehole or covered well) in collaboration with CWSA. • Strengthen Public-Private and NGO partnership in water provision
	To Promote hand washing with soap under running water in schools	• To strengthen the capacity of Teachers in the area of environmental hygiene and sanitation • Periodic organization of sanitation durbars in JHS/Primary schools Promotion of the use of iodated salt in house holds
	To Promote food and meat hygiene	• Intensified health education on food and drink vendors • Periodic screening of food handlers
	To improve environmental sanitation in health institutions in the municipality	• Attach Environmental Health staff to Health Institutions. • Encourage the recruitment of adequate laborers in health institutions

The Ministry of Sanitation and Water Resources has also set short-term sanitation targets to be achieved in 2024, in its Medium-Term Expenditure Framework (MTEF) as shown in Table 17 below.

Table 17: National sanitation goals in the MSWR MTEF 2021 - 2024

Indicator	Target (2024)
Percentage of population with access to improved liquid waste management	38.5%
Proportion of communities achieving open defecation-free (ODF) status	26%
Proportion of liquid waste (faecal sludge) safely disposed on site or properly collected, transported and treated off site	35%

3.2.2 Investments

The ESP, 2010 does not provide specific financing objectives for water and sanitation, but rather sets objectives for environmental sanitation which includes solid waste management (Castalia, 2021). Actions to achieve the objectives include applying full cost recovery charges (covering all operating and capital costs) wherever possible, subsidies where full cost recovery is not possible, and greater budgetary allocations.

The current funding and source of investment for sanitation and water includes Government of Ghana (GoG) allocations, internally generated fund (IGF) from MMAs like TaMA and SagMA, loans and grants from international Development Partners (DPs) and other sources like private sector funding, individual households, and community funding. The dominant source of investment however remains the government and international development partners.

Trackfin initiative provides indicative figures on public expenditure on sanitation. TrackFin estimated that the total expenditure on WASH, including domestic funds allocated by the Government of Ghana, international transfers by development partners, household expenditure on tariffs and self-supply, was GhȻ 4,509 million (US$751.5million) in total in 2014 (Mansour & Esseku, 2017).

3.3 Equity

3.3.1 Current choice of services for the urban poor

In the Greater Tamale Area, there are no mainstream sewerage systems except at the institutional level, rather the general populace is served entirely by on-site sanitation. Common on-site toilet facilities available are pit latrines, KVIP/VIP, septic tank systems and pockets of pan latrines (GSS, 2012).

Although it is a requirement for every household to have a toilet facility, stakeholder consultations revealed that majority of the urban poor cannot afford to construct one and rely mostly on public latrines and open defecation. However, a number of interventions from development partners and NGOs targeting the urban poor is helping to bridge the financing gap of the urban poor.

These interventions include the rollout of the urban community led total sanitation programme and the Basic Sanitation Fund (BSF) by UNICEF to support poor households obtain soft loans to fund the construction of toilet facilities. It is estimated that over 10,000 household toilets have been provided so far for the poor in Tamale through UNICEF Urban Sanitation Project (TaMA, 2021a).

Catholic Relief Services (CRS), an NGO rehabilitated seven government-owned public toilets in communities with high open defecation incidence. It trained personnel managing these public toilets on how to improve services delivery to their users which led to an increase in patronage (from an average of 200 to 500 users per day); high user satisfaction of 87.5% compared to a baseline of 32%; increased hand washing practice after exiting the toilet from 0% to 61%; improved interior lightening; reduced odour, improved management (accountability, financial management, records keeping, etc.). CRS then rolled out sanitation marketing campaigns to facilitate the acquisition of household toilet. Toilet sales agents were trained to create demand for household toilets while sensitising household on improved hygiene and sanitation behaviours. Additionally, sanitation entrepreneurs were trained and they provided affordable toilets to households at flexible payment terms and in installment. CRS estimates that over 500 household toilets have been constructed so far (TaMA, 2021c). CRS also partnered with Sinapi Aba Savings and loans and Vision Fund Ghana by leveraging on WASH loans being provided by Sinapi Aba Savings and loans and Vision Fund Ghana to bridge the financing gap in obtaining household toilets.

The Sama Sama project by iDE is also supporting the poor in Greater Tamale obtain a toilet by providing the toilet facility upfront and spreading the payment over a period of 2 years. This has resulted in the Sama Sama project facilitating the construction of over 1,705 household toilets in Tamale and 1,291 in Sagnarigu as of June 2021 (TaMA, 2021b). The on-site toilet facility provided by Sama Sama Project is a circular septic which provides the option of emptying overtime when the tanks are full.

The commonality between all three projects is that, provision of toilets to beneficiaries are demand-driven. This approach promotes equity in service provision that is responsive rather than prescriptive and one in which stakeholders are drawn into decision making at all stages, including assessments of sanitation demand (Niwagaba et al., 2014).

3.3.2 Plans and measures to reduce inequity

TaMA and SagMA regulate the pricing of public toilets to ensure that the poor can afford to pay for the service. The MMAs put a price cap on how much operators of public toilet facilities can charge. As it stands, the price cap remains at Gh₵1 and as low as Gh₵0.2 (US$ 0.17 and US$ 0.03)(CRS, 2021b). Also, some public toilets do not collect user fees from the elderly and children (TaMA, 2021d).

The Ministry of Sanitation and Water Resources has also developed guidelines for targeting the poor and vulnerable for basic sanitation services in Ghana. The guidelines stipulate that poor and vulnerable households will benefit from direct support from the Government (MSWR,

2018a). The support can be in the form of materials for the sub-structure, materials for superstructure, cost of labor, sale of customized or specialized toilets at subsidized rates amongst other things (MSWR, 2018a).

3.4 Outputs

3.4.1 Capacity to meet service needs, demands and targets

The household toilet deficit in Greater Tamale is large and will require enforcement of by-laws, behavioural change campaigns, innovative financing and business development to attract the needed investments to address the deficit. TaMA and SagMA currently do not have policies in place to attract business development in the area of excreta management (UNICEF, 2018). Most of the trained artisans under the UNICEF programme have lost interest in the business due to low fees paid for their services (UNICEF, 2018). The low demand and inability to pay for toilet facilities are huge setbacks to the MESSAP target of increasing latrine access coverage to 75% by the end of year 2020.

Artisans generally are not interested in providing emptying services for dry toilets such as KVIP and VIP (UNICEF, 2018). The number of manual emptiers operating in the area is generally limited and comes with higher costs for the services.

The Greater Tamale Area has a Waste Stabilization Pond (WSP) for receiving and treating faecal sludge. The WSP now consists of eight ponds with a total capacity of 39,336 cum (TaMA, 2021e).

3.4.2 Monitoring and reporting access to services

Majority of WASH interventions in the Greater Tamale are project-based and therefore comes with its own monitoring, reporting systems and logistics which is not sustained after the projects close. Aside the project-based M&E, there is limited continuous monitoring and reporting of sanitation services by the MMAs which is attributed to absence of needed logistics for monitoring and reporting.

The Northern RICCS serve as a coordinating structure to ensure the avoidance of project duplication among partners, see to knowledge management and disseminate information among others. Within its mandate, they receive periodic sanitation reports from all Assemblies within the region which is integrated and interpreted to impact policy decisions.

Census exercises which include sanitation coverage and preferences among populace are carried out by national government through the Ghana Statistical Service.

3.5 Expansion

3.5.1 Stimulating demand for services

Demand creation for water and sanitation services in the Greater Tamale Area has mainly been led by NGOs working in the area. Demand creation approaches such as sanitation marketing and Community Led Urban Environmental Sanitation (CLUES) have been implemented by various NGOs to stimulate demand for sanitation services. The NGOs mostly engage and train the Environmental Health Officers (EHOs) in Tamale and Sagnarigu for demand creation activities. The EHOs have the mandate of promoting household sanitation and good hygiene practices within their local Assemblies. Toilet sales agents are also available to create demand for toilets and facilitate business linkages to sanitation entrepreneurs to ensure sustainability. The toilet sales agents are private individuals who work on a commission basis. Household toilet financing through soft loans is available by way of the UNICEF funded Basic Sanitation Fund (BSF) to bridge the financing gap of poor households.

3.5.2 Strengthening service provider roles

Sanitation service providers in Greater Tamale especially those under Tamale Metropolitan have benefitted from a number of training and capacity building activities by the numerous NGOs operating in the area (TaMA, 2021f). The capacity building activities have mostly focused on construction of containment systems such as septic tanks, KVIP, and bio-digester and latrine maintenance and management. Service providers involved in the transport and treatment of faecal sludge have been trained on faecal sludge management and identification of technical options that will optimize their operations.

4 Stakeholder Engagement

Separate virtual meetings with the Senior Project Officer (WASH) of Catholic Relief Services, director of the waste management department of Tamale Metropolitan Assembly as well as an environmental health officer of Sagnarigu all contributed immensely to the identification of key stakeholders relevant to the development of this report. The stakeholders varied from government officials, development partners and private institutions. Following the stakeholder mapping, introduction letters were prepared and dispatched to all identified stakeholders to inform them of upcoming engagements. The letter briefly explained the purpose of developing SFD and of the assignment and also to introduce prospective enumerators who may visit their facilities especially in the case of the state and private institutional facilities. In the letter was stated a tentative date proposed for interviewing them.

Stakeholder	Institution type	Containment	Emptying	Transport	Treatment	Reuse/ Disposal
TaMA	Local Government					
SagMA	Local Government					
Catholic Relief Services	Development Partner					
UNICEF	Development Partner					
Sama Sama	Social Enterprise					
Vacuum Truck Operators (VTOs)	Private players					
Manual Operators	Private players					
Zoomlion Ltd	Private players					
Latrine Artisans	Private players					
Tamale Prisons	Government Institution					
Tamale Teching Hospital						

Figure 24: Stakeholder involvement in the sanitation sector of the Greater Tamale

4.1 Key Informant Interviews

Key informant interviews were conducted with ten (10) key stakeholders along the service chain within the GTA. These stakeholders are government officials, officers of non-governmental organisations, development partners and private operators (see Appendix 2). Unstructured interviews conducted was guided by the City-wide Inclusive sanitation checklist for the various categories of stakeholders.

4.2 Focus Group Discussions (FGD)

Four (4) focus group discussions were separately conducted with the owners and operators of Cesspit emptiers, local latrine artisans, manual emptiers and the northern RICCS team.

The meeting with the owners and operators of cesspit emptiers bordered on description of the containment systems, emptying methods, service fees, disposal sites, clientele, demand for services and relationship with regulators. The engagement with the latrine artisans dwelled largely on detailed descriptions of the various latrine technologies that they provided and their relationship with the regulators. This was useful to clarify definitions for common understanding and obtain information not readily available in the literature, including

information on the design of onsite sanitation technologies and whether or not they may be engaged in manual emptying as well.

Meeting with manual emptiers provided information into their operations, demand of service, service fees, clientele, safety precautions, transport and disposal. This interaction exposed the risks and benefits involved in this line of business and their relevance to the sector. Lastly, meeting with RICCS team was to seek clarification on the credibility of sanitation data available to them with their contextual interpretations.

4.3 Observation Tools

Six enumerators were recruited and trained to augment the data collection methods through the observation of the availability, type and condition of sanitation facilities at households, public toilets and some selected institutions. The enumerators were selected EHOs already working with the TaMA and SagMA who by virtue of their work schedule have adequate knowledge of the sanitation sector. The training equipped the enumerators with the skill to observe and record the facilities encountered during the interview. The GTA was divided into zones which were assigned to each of them.

Field visit was made to the current WSP site at Gbalahi used for treatment of FS and the ongoing construction of a 1,000 cum FS plant by a private company.

4.4 Stakeholder Validation Meeting

A stakeholder meeting was held that brought together all stakeholders relevant to the development of SFD for GTA. It presented an opportunity to showcase the extent of work done so far with its extensive consultations, it sought to present preliminary findings to them. At some points, stakeholders were required to negotiate and agree on what figures were realistic to use especially for the SFD matrix. The meeting exposed some data inconsistencies among stakeholders, which offered an opportunity to reconcile with the interested parties at separate meetings.

5 Acknowledgements

Catholic Relief Services Ghana is grateful and wishes to acknowledge the valuable contributions of the following persons and institutions towards the preparation of this SFD report:

- Ing. Godfred Fiifi Boadi and Ing. Kwadwo Antwi Gyasi (Consultants), for leading the data collection process, development of the SFD and preparation of the report.
- The leadership of the Tamale and Sagnarigu Assemblies for their support and cooperation towards this assignment.
- The six EHOs from TaMA and SagMA for their dedication and diligence in the collection of data towards the development of this report. They are: Issah Abdulai, Masalachi Muniru, Seidu Saani, Suoseg Nurudeen, Atindaanbire Mary and Jacob Amanor.
- The CRS Ghana WASH team, under the leadership of Emmanuel Kogo and Chimbar Laari, for supporting the data collection process and reviewing all documents and reports. Special acknowledgement to Ing. Richard Ntibrey, Senior WASH Project Officer CRS Ghana, for coordinating and making the necessary arrangements to ensure the extensive consultations for this assignment was achieved.

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TaMA, 2021b. Interview with representative of iDE Sama Sama.

TaMA, 2021c. Interview with representative of Catholic Relief Services (CRS).

TaMA, 2021d. Public toilet visits and interviews.

TaMA, 2021e. Interview with Assistant Public Health Engineer from TaMA on 23/06/2021.

TaMA, 2021f. Focus Group Discussions with local artisans on 23/06/2021.

TaMA, 2021g. Interview with Metro Environmental Health Officer (MEHO) of TaMA on 24/06/2021.

TaMA, 2021h. Visit to Gbalahi Waste Stabilization Pond (WSP) on 25/06/2021.

TaMA, 2021i. Interview with Municipal Environmental Health Officer (MEHO) of SagMA on 23/06/2021.

TaMA, 2021j. Interview with Deputy Director of Waste Management Department of TaMA on 23/06/2021.

TaMA, 2021k. Focus Group Discussions with Emptying Service Providers on 23/06/2021.

TaMA, 2021l. Interview with Cesspit emptier Assistant on 24/06/2021.

TaMA, 2021m. Focus Group Discussions with Manual Emptying Service Providers on 24/06/2021.

TaMA, 2021n. Interview with Regional Supervisor for Waste Landfills on 25/06/2021.

TaMA, 2021o. Interview with Metro Works Engineer of TaMA on 25/06/2021.

TaMA, 2021p. Interview with Director of Waste Management Department of TaMA on 25/06/2021.

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7 Appendix

7.1 Appendix 1: Stakeholder identification

Table 18: Stakeholder Identification

Name of Organisation	Name of Contact person	Position	Source of Contact	Influence (H/M/L)	Interest (H/M/L)
Tamale Metropolitan Assembly	Ibrahim Mustapha	Director of Development Planning	Ing. Richard Ntibrey	High	Medium
Tamale Metropolitan Assembly	Martin Ahorlu	Director WMD	Ing. Richard Ntibrey	High	High
Tamale Metropolitan Assembly	Achiri Abdul-Aziz	Deputy Director WMD	Ing. Richard Ntibrey	High	High
Tamale Metropolitan Assembly	Emmanuel Demedeme	Assistant. Public Health Engineer	Ing. Richard Ntibrey	Medium	High
Tamale Metropolitan Assembly	Sumayatu Alhassan	Metropolitan Environmental Health Officer	Ing. Richard Ntibrey	High	High
Tamale Metropolitan Assembly	Ing. James Nunoo	Works Engineer	Ing. Richard Ntibrey	Medium	Low
Sagnaigu Municipal Assembly	Alhaji Alhassan Ziblim	Coordinating Director	Ing. Richard Ntibrey	High	High
Sagnaigu Municipal Assembly	Hon. Salim Abubakari	Presiding Member	Alhaji Alhassan Ziblim	High	Medium
Sagnaigu Municipal Assembly	Alhassan Ibrahim	MEHO for SagMA	Ing. Richard Ntibrey	High	High
Catholic Relief Service	Ing. Richard Ntibrey	Senior WASH Project Officer		Medium	High
Waste Landfills	Stephen Yarrow	Regional Supervisor	Ing. Richard Ntibrey	Low	High
UNICEF	Osman Kere Mumuni	WASH Specialist	Ing. Richard Ntibrey	Medium	High
UNICEF	Issifu Adama	WASH Officer	Ing. Richard Ntibrey	Medium	High
Sama Sama (iDE)	Ebenezer Atsugah	Managing Director	Ing. Richard Ntibrey	Medium	High
Local Latrine Artisans	Kamaldin Imoro	Artisan	Ing. Richard Ntibrey	Low	High
Manual Emptiers	Maxwell Duunbil	Manual Emptier	Seidu Saani	Low	High

Motorised Emptiers	Francis Apor	Association member	Achiri Abdul-Aziz	Low	High

7.2 Appendix 2: Tracking of Engagement

Table 19: Tracking of Engagement

Name of Organisation	Name of Contact person	Position	Date of Engagement	Purpose of Engagement
Tamale Metropolitan Assembly	Ibrahim Mustapha	Director of Development Planning	23-Jun-21	Courtesy Call
Tamale Metropolitan Assembly	Martin Ahorlu	Director WMD	25-Jun-21	KII
Tamale Metropolitan Assembly	Achiri Abdul-Aziz	Deputy Director WMD	23-Jun-21	KII
Tamale Metropolitan Assembly	Emmanuel Demedeme	Assistant. Public Health Engineer	23-Jun-21	KII
Tamale Metropolitan Assembly	Sumayatu Alhassan	Metropolitan Environmental Health Officer	23-Jun-21	KII
Tamale Metropolitan Assembly	Ing. James Nunoo	Works Engineer	25-Jun-21	KII
Sagnaigu Municipal Assembly	Alhaji Alhassan Ziblim	Coordinating Director	22-Jun-21	Courtesy Call
Sagnaigu Municipal Assembly	Hon. Salim Abubakari	Presiding Member	22-Jun-21	Courtesy Call
Sagnaigu Municipal Assembly	Alhassan Ibrahim	MEHO for SagMA	23-Jun-21	KII
Catholic Relief Service	Ing. Richard Ntibrey	Senior WASH Project Officer	23-Jun-21	KII
Waste Landfills	Stephen Yarrow	Regional Supervisor	25-Jun-21	KII
UNICEF	Osman Kere Mumuni	WASH Specialist	28-Jun-21	KII
UNICEF	Issifu Adama	WASH Officer	28-Jun-21	KII
Sama Sama (iDE)	Ebenezer Atsugah	Managing Director	25-Jun-21	KII
Local Latrine Artisans	Kamaldin Imoro	Artisan	23-Jun-21	FGD
Manual Emptiers	Maxwell Duunbil	Manual Emptier	24-Jun-21	FGD
Motorised Emptiers	Francis Apor	Association member	23-Jun-21	FGD
Northern RICCS team			8/19/2021	FGD

7.3 Appendix 3: Tamale SFD Selection Grid

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B					Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					Significant risk of GW pollution T1A2C5					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					T1A3C10
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution					Significant risk of GW pollution Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution T1A5C10
Unlined pit										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution T1B7C10
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										T1B10C10
No toilet. Open defecation	Not Applicable						T1B11 C7 TO C9			Not Applicable

Figure 25: Tamale SFD Selection Grid

7.4 Appendix 4: Tamale SFD Matrix

Tamale, Northern Region, Ghana, 20 Aug 2021. SFD Level: 3 - Comprehensive SFD
Population: 281619
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks

Containment				
System type	Population	FS emptying	FS transport	FS treatment
	Pop	F3	F4	F5
System label and description	Proportion of population using this type of system (p)	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated
T1A2C5 Septic tank connected to soak pit	21.0	34.0	95.0	70.0
T1A3C10 Fully lined tank (sealed), no outlet or overflow	9.0	95.0	95.0	70.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	38.0	99.0	75.0	70.0
T1B10C10 Containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - with no outlet or overflow	6.0	0.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	24.0			
T1B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	2.0			

Figure 26: Tamale SFD Matrix

7.5 Appendix 5: Tamale SFD Graphic

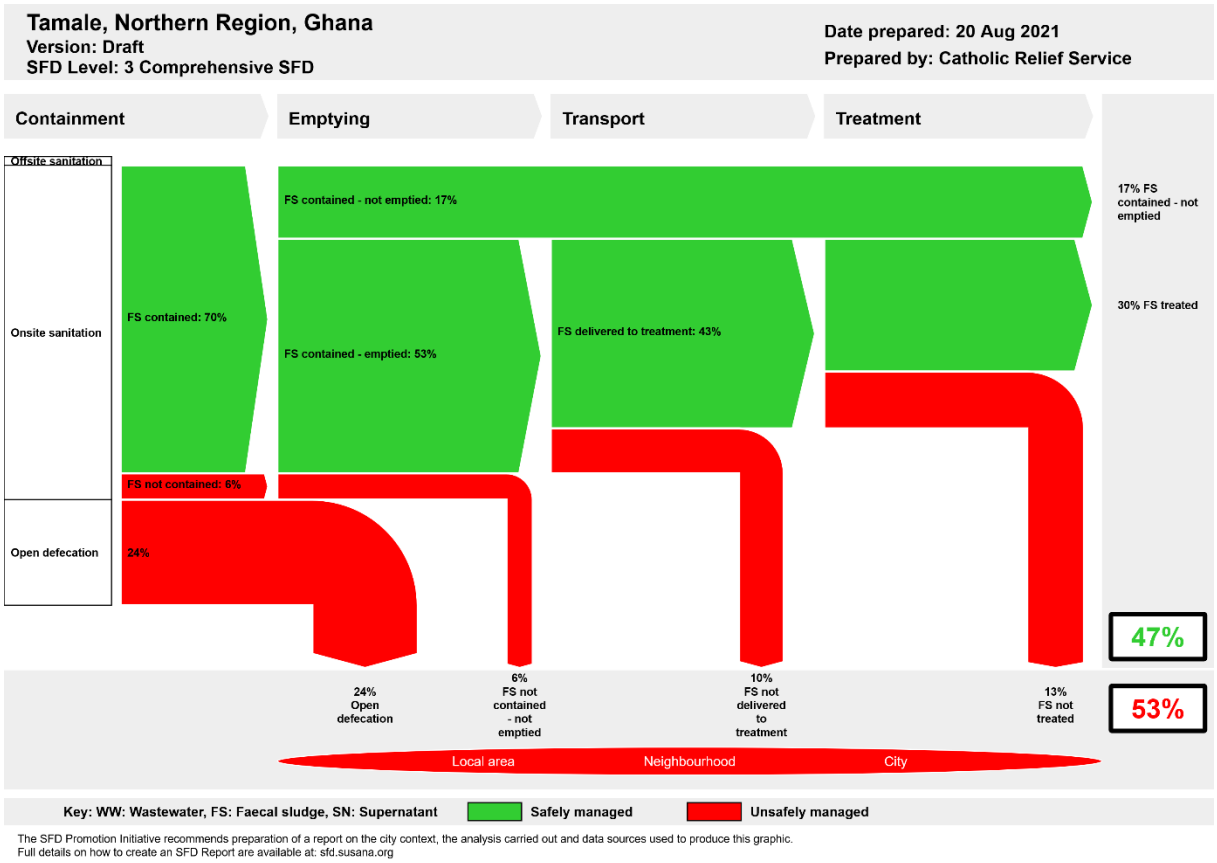


Figure 27: Tamale SFD Graphic

7.6 Appendix 6: Sagnarigu SFD Selection Grid

List A: Where does the toilet discharge to? (i.e. what type of containment technology, if any?)	List B: What is the containment technology connected to? (i.e. where does the outlet or overflow discharge to, if anything?)									
	to centralised combined sewer	to centralised foul/separate sewer	to decentralised combined sewer	to decentralised foul/separate sewer	to soakpit	to open drain or storm sewer	to water body	to open ground	to 'don't know where'	no outlet or overflow
No onsite container. Toilet discharges directly to destination given in List B					Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					Significant risk of GW pollution T1A2C5					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					T1A3C10
Lined tank with impermeable walls and open bottom	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution	Significant risk of GW pollution Low risk of GW pollution					Significant risk of GW pollution Low risk of GW pollution
Lined pit with semi-permeable walls and open bottom	Not Applicable									Significant risk of GW pollution T1A5C10
Unlined pit										Significant risk of GW pollution Low risk of GW pollution
Pit (all types), never emptied but abandoned when full and covered with soil										Significant risk of GW pollution T1B7C10
Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil										
Toilet failed, damaged, collapsed or flooded										
Containment (septic tank or tank or pit latrine) failed, damaged, collapsed or flooded										T1B10C10
No toilet. Open defecation	Not Applicable						T1B11 C7 TO C9			Not Applicable

Figure 28: Sagnarigu SFD Selection Grid

7.7 Appendix 7: Sagnarigu SFD Matrix

Sagnerigu, Northern Region, Ghana, 20 Aug 2021. SFD Level: 3 - Comprehensive SFD
Population: 186796
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks

Containment				
System type	Population	FS emptying	FS transport	FS treatment
	Pop	F3	F4	F5
System label and description	Proportion of population using this type of system (p)	Proportion of this type of system from which faecal sludge is emptied	Proportion of faecal sludge emptied, which is delivered to treatment plants	Proportion of faecal sludge delivered to treatment plants, which is treated
T1A2C5 Septic tank connected to soak pit	34.0	36.0	95.0	70.0
T1A3C10 Fully lined tank (sealed), no outlet or overflow	1.0	99.0	95.0	70.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	24.0	99.0	60.0	70.0
T1B10C10 Containment (fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - with no outlet or overflow	10.0	0.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	29.0			
T1B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	2.0			

Figure 29: Sagnarigu SFD Matrix

7.8 Appendix 8: Sagnarigu SFD Graphic

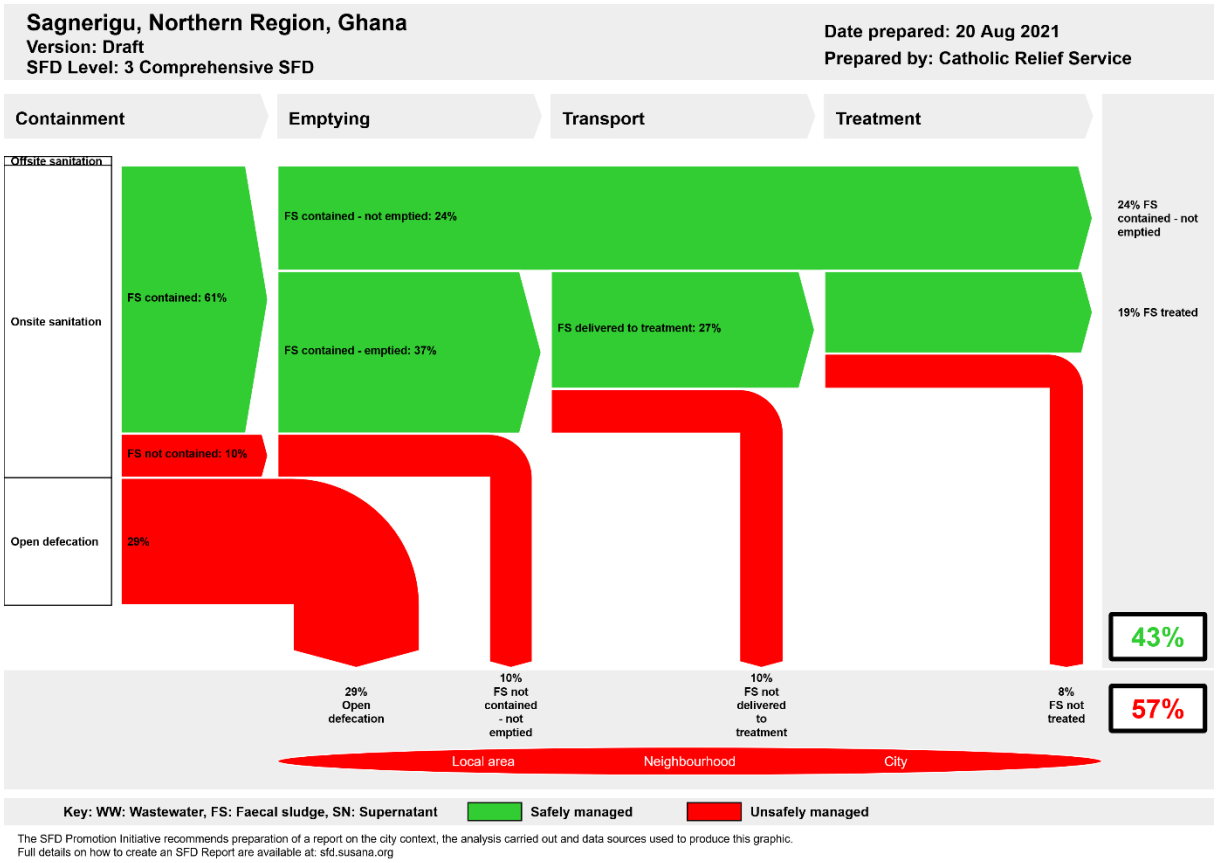


Figure 30: Sagnarigu SFD Graphic

7.9 Appendix 9: Gbalahi Waste Stabilisation Pond Analysis Report

Analysis Results

Water Research Institute, Environmental Chemistry Division
CSIR Premises, Airport Res. Area
P. O. Box M. 32
Accra, Ghana
Phone: (+233-302) 775351/52 Fax: (+233-302) 777170 E-mail: info@csir-water.com

***Sample ID*:** ***Company Name*: Tamale Metropolitan Assembly**

Contact First Name ***Contact Last Name***
Postal Code ***City:***

Lab Code ***Site Name***
Analysis start date: 24/12/20 **Analysis stops date: 31/01/20**

Parameter	Facultative Pond	Maturation Pond	GS 1212:2019
pH (pH units)	8.24	8.27	6.00 – 9.00
Nitrate – Nitrogen (NO_3-N) (mg/l)	1.15	0.885	50.0
Biochemical Oxygen Demand (mg/l)	195	36.8	50.0
Chemical Oxgyen Demand (mg/l)	1,264	285	250
Total Coliform (cfu/100ml)	800	720	400
Faecal Coliform (cfu/10ml)	20	20	10
E-coli (cfu/100ml)	0	0	10

Approved by:

Dr. Isaac O. A. Hodgson (Head, ECSED)

CSIR WATER RESEARCH INSTITUTE HEAD-ECSED 31 DEC 2020 P.O Box AH 38, ACCRA

Figure 31: Gbalahi Waste Stabilisation Pond Analysis Report

7.10 Appendix 10: SFD Validation Workshop Attendance Lists

Staff

CRS

Funded by CRS Discretionary Fund
Event Registration Form

Please tick the right activity as appropriate: Training ☐ Workshop ☐ Meeting ☐ Other (Specify) ☐ Field Monitoring

Duration of the event in Day(s). If less than a day, indicate hours

Start Date: End Date:

Venue: Tamale and Sagnerigu

Title of the Event: Validation Workshop _SHIT FLOW DIAGRAM FOR GREATER TAMALE

Objective(s) of the Event: To share and Validate the findings of SFD with Key Stakeholders

ATTENDANCE LIST

S/N	Name	M/F	Position	Name of Org/Project	E-mail address	Telephone No.	Signature
1	Festus Bayi Fofie	M	SPO - WASH	CRS	festus.fofie@crs.org	0501535452	[signature]
2	Emmanuel S. Kogo	M	WASH Prog. Man.	CRS	emmanuel.kogo@crs.org	0209978280	[signature]
3	Evans Alhassan	M	SPO - MEAL	CRS	evans.alhassan@crs.org	0203457203	[signature]
4	Richard Ntibrey	M	SPO - WASH	CRS	richard.ntibrey@crs.org	0249444233	[signature]
5	Barikisu Dahamani	F	PA - WASH	CRS	barikisu.dahamani@crs.org	0508745238	[signature]
6	CHIMBAR Louis L	M	PM - WASH	CRS	laari.chimbar@crs.org	0244924823	[signature]
7	Ubaidatu Ibrahimah	F	PO - WASH	CRS	ubaidatu.ibrahimah@crs.org	0248728475	[signature]
8	Caroline Dery	F	SPO-SILC/livelihoods	CRS	caroline.dery@crs.org	0205062880	[signature]
9	Daniel Yakubu	M	MEAL - Coordinator	CRS	daniel.yakubu@crs.org	0242729557	[signature]
10	Abass Abukari	M	Driver	CRS		0243928057	[signature]
11	LAWRENCE QUARCOO	M	Communications Officer	CRS		0242932345	[signature]
12							

Name of Cordinator: Richard Ntibrey   Organisation: CRS-WASH   Signature: [signature]

V 1.0

Figure 32: Stakeholder meeting attendance list 1

CRS

Funded by CRS Discretionary Fund
Event Registration Form

Please tick the right activity as appropriate: Training ☐ Workshop ☐ Meeting ☐ Other (Specify) ☐ Field Monitoring

Duration of the event in Day(s). If less than a day, indicate hours

Start Date: 10/08/2021 End Date: 10/08/2021

Venue: Tamale and Sagnerigu

Title of the Event: Validation Workshop _SHIT FLOW DIAGRAM FOR GREATER TAMALE

Objective(s) of the Event: To Validate the findings of the Shit Flow Diagram for Greater Tamale

ATTENDANCE LIST

S/N	Name	M/F	Position	Name of Org/Project	E-mail address	Telephone No.	Signature
1	Pius Abapol	M	Branch Manager	ARB Apex Bank	pabapol@yahoo.com	0206821468	[signature]
2	Justus W. Bambason	M	Project Mgr	TADO	jbambason@yahoo.com	0206744528	[signature]
3	Sanusi Issahaku	M	Project Officer	INTAGRAD	sanusi.issahaku@yahoo.com	0240382873	[signature]
4	Yussah Desmond	M	Head Operation	IBE - Sama Sama	dyussah@ide global.org	0243800518	[signature]
5	Ahmed Musa	M	Asst. Director	SagMA	musam@yahoo	0544495[illegible]	[signature]
6	Bowi Yahaya	M	M&E Officer	NRCC - FtSU	legendyahaya@gmail.com	0543131204	[signature]
7	Abdul-Latif Yakubu	M	Network Coordinator	AFG - GHANA	lateefafg@gmail.com	0242283319	[signature]
8	Issifu Adama	M	WASH officer	UNICEF	iadama@unicef.org	024327[illegible]	[signature]
9	Patience Adong	F	M-SHEP	GES, Tamale	peadong25@yahoo.com	054995771	[signature]
10	Mohamed Munkaila	M	Business Unit Man	Zoomlion Ghana	mmunkaila@zoomlion	0501433[illegible]	[signature]
11	Akanyani Beatri A	F	Programmes Director	AIDO Tamale	awinpokass@yahoo.co.uk	0277336[illegible]	[signature]
12	Joyce Yeri	F	Unit head	SirCD	joyceyeri@yahoo.com	024485[illegible]	[signature]

Name of Cordinator: Richard Ntibrey   Organisation: CRS_WASH   Signature: [signature]

V 1.0

Figure 33: Stakeholder meeting attendance list 2

SFD – Validation of findings.

CRS

Funded by CRS Discretionary Fund
Event Registration Form

Please tick the right activity as appropriate: Training ☐ Workshop ☐ Meeting ☐ Other (Specify) ☐ Field Monitoring

Duration of the event in Day(s). If less than a day, indicate hours

Start Date: 10/08/2021 End Date: 10/08/2021

Venue: Tamale and Sagnerigu

Title of the Event: Validation Workshop _SHIT FLOW DIAGRAM FOR GREATER TAMALE

Objective(s) of the Event: To validate the findings of the shit flow Diagram for Greater Diagram.

ATTENDANCE LIST

S/N	Name	M/F	Position	Name of Org/Project	E-mail address	Telephone No.	Signature
1	Aminatu Abdallah	F	Assist. EH.A	NMAGEMA	aminatua333 @gmail.com	0541436600	
2	Baba Issah Suleimana	M	SagMA Engineer	SAGNARI GU	[illegible]@gmail.com	0248971036	
3	Eric MOUKORO	M	Programme Manager	UN-Habitat	eric.moukoro@un.org	0544791862	
4	Thomas Ayemiga	M	B. Manager, Vi	Missionfund	thomas_ayemiga@wvi.org	0501577992	
5	Joseph Cholsong	M	APO	KKCA	joechols@gmail.com	0243457960	
6	Alhassan Sumaya	F	MEHO/WASH F.	TaMA	sumanus14@gmail.com	0244153548	
7	Abdul-Haq S. Alhassan	M	ABHA	NRCC	sungumo88@gmail.com	0246524027	
8	Anchaba Faustine	M	CLTS FP	EHSD – NRCC	anchabaf@yahoo.com	0246209894	
9	Gilbert Nuuri-Teg	M	MCD	TaMA	nuuriteg@yahoo.com	0244830012	
10	Abdul-Latif A.	M	Head of San.	Central Mosque	abdullatif@gmail.com	0242264419	
11	Amadu Mustapha	M	PRO	TaMA	[illegible]@gmail.com	024[illegible]765	
12	Alu Fauzia	F	Policy Officer	WaterAid GH.	fauziaalu@wateraid.org	0205585755	

Name of Cordinator: Richard Ntiboy Organisation: CRS_UWASH Signature:

V 1.0

Figure 35: Stakeholder meeting attendance list 3

CRS

Funded by CRS Discretionary Fund
Event Registration Form

Please tick the right activity as appropriate: Training ☐ Workshop ☐ Meeting ☐ Other (Specify) ☐ Field Monitoring

Duration of the event in Day(s). If less than a day, indicate hours

Start Date: 10/08/2021 End Date: 10/08/2021

Venue: Tamale and Sagnerigu

Title of the Event: Validation Workshop _SHIT FLOW DIAGRAM FOR GREATER TAMALE

Objective(s) of the Event: To validate the findings of a Shit Flow Diagram for Greater Tamale.

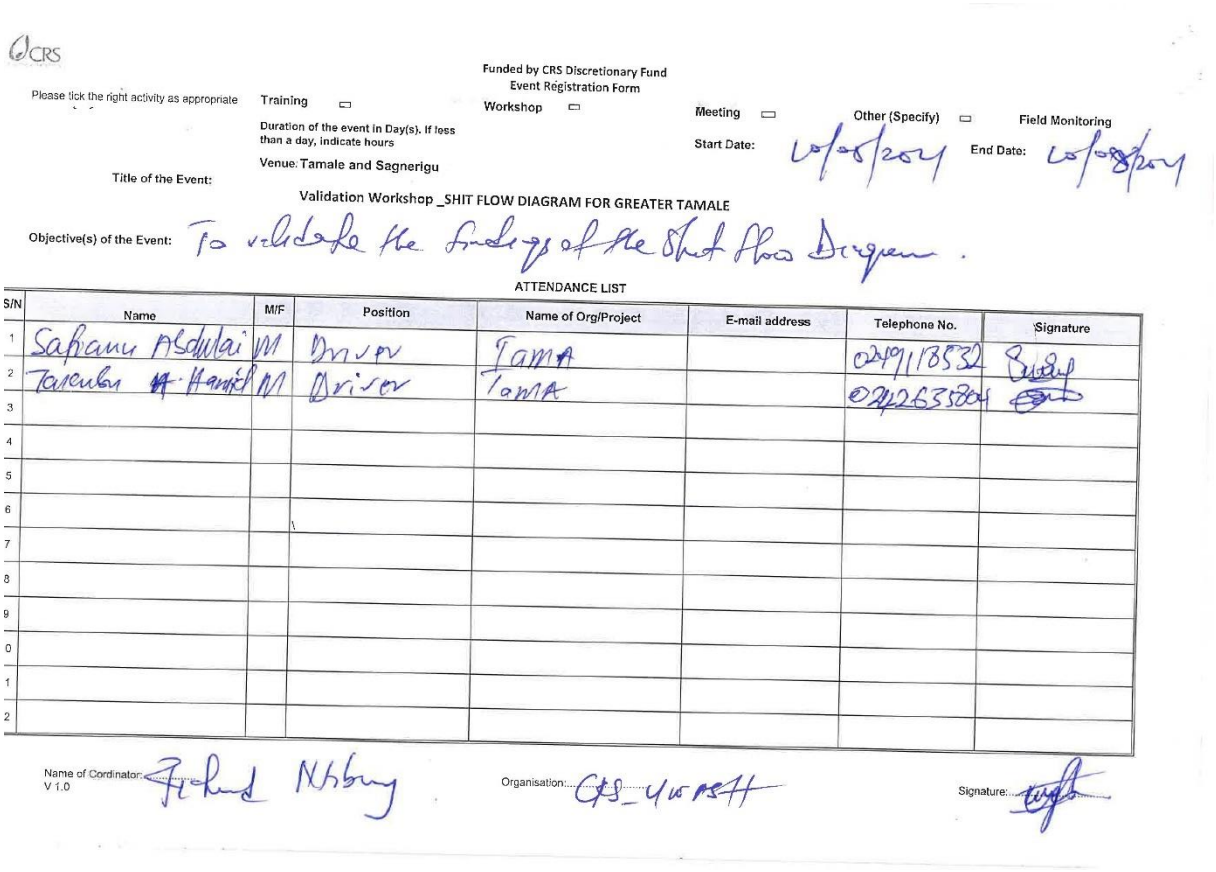
ATTENDANCE LIST

S/N	Name	M/F	Position	Name of Org/Project	E-mail address	Telephone No.	Signature
1	Ruhaima Salisu	F	G.D.O / AD1	TaMA	ruhyma2002@yahoo.com	0547132132	
2	Adivi Abdul-Aziz	M	Deputy	WIMB / TaMA	mirikaltd@gmail.com	0244728864	
3	Ruka Al-Hassan Ibrahim	F	SHEP	GES – Sagnarigu	rukaalhassan5@gmail.	0204282279	
4	Emmanuel Sumani	M	Manager	Christian Council	emmanuelsumani@yahoo.com	0246292405	
5	Fuseini Ukasha	M	Sani Chair TaMA	TaMA	fukasha@[illegible]	0245574470	
6	Seidu M. Sagmi	M	TaMA/EHO	TaMA	seidusagmi@yahoo.com	0246238344	
7							
8							
9							
10							
11							
12							

Name of Cordinator: Richard Ntiboy Organisation: CRS UWASH Signature:

V 1.0

Figure 34: Stakeholder meeting attendance list 4



CRS

Funded by CRS Discretionary Fund
Event Registration Form

Please tick the right activity as appropriate: Training ☐ Workshop ☐ Meeting ☐ Other (Specify) ☐ Field Monitoring

Duration of the event in Day(s). If less than a day, indicate hours

Start Date: 10/8/2021 End Date: 10/8/2021

Venue: Tamale and Sagnerigu

Title of the Event: Validation Workshop _SHIT FLOW DIAGRAM FOR GREATER TAMALE

Objective(s) of the Event: To validate the findings of the Shit flow Diagram.

ATTENDANCE LIST

S/N	Name	M/F	Position	Name of Org/Project	E-mail address	Telephone No.	Signature
1	Sahanu Abdulai	M	Driver	TAMA		0249118532	
2	Tanemba M. Hanif	M	Driver	TAMA		0242633804	
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Name of Cordinator: Richard Nsiboy Organisation: CRS-Ghana Signature:

V 1.0

Figure 36: Stakeholder meeting attendance list 5

7.11 Appendix 11: Household Toilets

Figure 37: Septic tank connected to drain

Figure 38: Biodigester connected to drain

7.12 Appendix 12: Public toilets

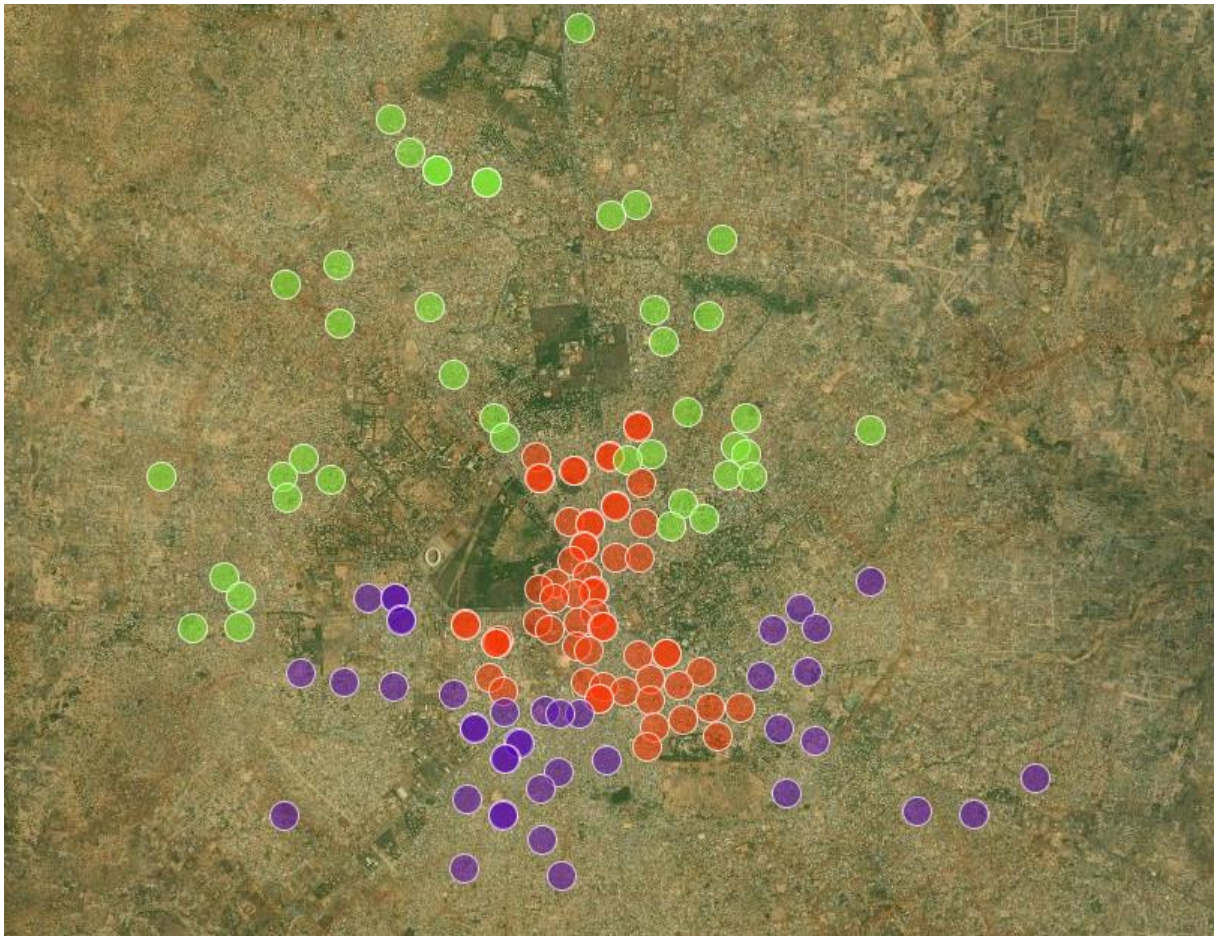


Figure 39: GPS locations of public toilets in Greater Tamale (CRS, 2021b)

Figure 40: Filthy slab at a public toilet

Figure 41: Clean pour flush at a public toilet

Figure 42: A public toilet in good condition

Figure 43: Public toilet containment filled with solid waste

Figure 44: Damaged KVIP/VIP public toilet

Figure 45: Exposed FS at public toilet site

7.13 Appendix 13: Institutional toilets

Figure 46: Centralised Septic tank at the SOS Children's home

Figure 47: Centralised septic tank at the SDA hospital

SFD Promotion Initiative

SFD Greater Tamale, Ghana, 2021

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