SFD Lite Report

Mahdia
Guyana

This SFD Lite Report was prepared by CSE, GWP-Caribbean, Mayor and Town Council of Mahdia-Environmental Health Department (MTCMEHD) and Global Environment (GE)

Date of production/ last update: 24/08/2022

1 The SFD Graphic

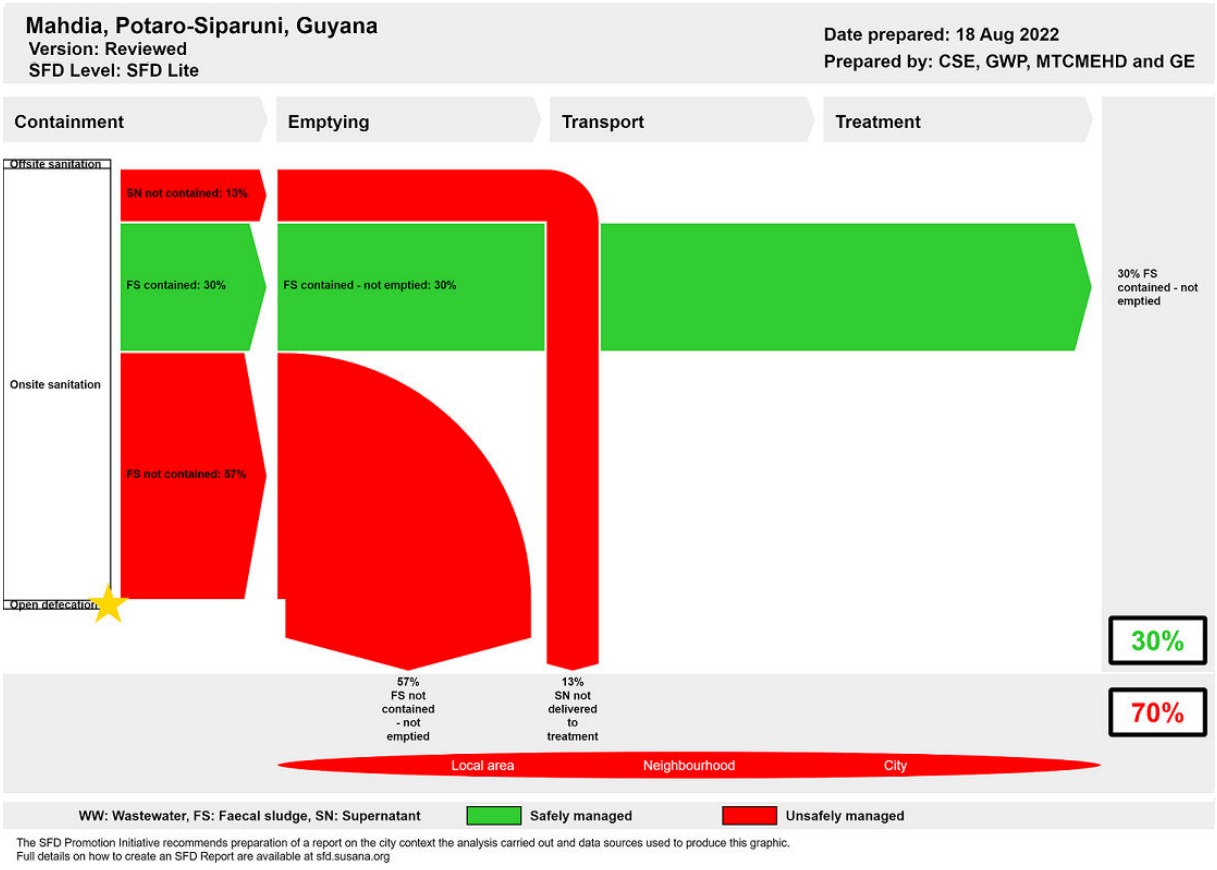

Figure 1: SFD Graphic for Mahdia.

2 SFD Lite information

Produced by:

- This report has been made as part of an International Online Training on Preparation of Shit Flow Diagram (SFD) for Caribbean Countries conducted by Centre for Science and Environment (CSE) in partnership with Global Water Partnership (GWP)- Caribbean from 21/03/2022 to 2/04/2022 and compiled as part of SFD Promotion Initiative (SFD-PI) Project (Phase 3) funded by Bill and Melinda Gates Foundation (BMGF). Further, the report was compiled by Ms Rabicia Niles.
- Special appreciation to Ms Kimberly Jacobs, Environmental Health Officer of Mahdia, Mr Andre Phillips, Statistician at the Bureau of Statistics and all residents who participated in the surveys and Key Informant Interviews. Special thanks to Mr Harsh Yadava (CSE) and Mr Dhruv Pasricha for their patience and support during the preparation of this SFD graphic.

Collaborating partners:

- Centre for Science and Environment (CSE), New Delhi, GWP-Caribbean, Mayor and Town Council of Mahdia-Environmental Health Department (MTCMEHD). Financed by: Global Environment (GE). Co-implemented by: The United Nations Environment Programme (UNEP) and the Inter-American Development Bank (IDB).
- Co-executed by: The Caribbean Environmental Programme (CEP)-UNEP, the German Agency of International Cooperation (GIZ), and Organization of American States (OAS).

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3 General City Information

Mahdia is located in Administrative Region (8) - Potaro Siparuni of Guyana and is also near the centre of the country with an altitude of 415 m and elevation of 1,360 m. The town is approximately 203 km for the country's capital city Georgetown (Figure 2). It was officially declared Guyana's tenth town in October 2018 and is the Regional Administrative Centre of Region (8). The town is mostly known for its gold and diamond operations which is its main economic activity and as such attracts both local and foreign immigrants who benefits from obtaining wealth through mining. The town is divided into three constituencies; namely Central Mahdia, Seven Miles and the Airstrip[1].

Figure 2: Map of Mahdia (Source: Mayor and Town Council Mahdia/2022).

With a population of 4,200 residents at approximately 842 households within the township, the major water supply to households are private catchments/rain water and spring/river and pond water[2]. Separate houses detached and flats/apartments/condominiums are identified as the major types of households by dwelling within the town[3].

For the purposes of this report, the town's geographical coordinates are: 5°16′N 59°9′W. The topography within 3 kilometres of the town contains only modest variations in elevation, with a maximum elevation change of 124 metres and an average elevation above sea level of 106 metres (Figure 3). And the area within 3 kilometres of the town is covered by trees (94%).

The town has two artisanal wells; however, residents still depend on rainfall and water from the Salbura Falls as it major water source[3].

Only moderate quantities of fresh groundwater are available from igneous and metamorphic rocks at depths from 10 to 300m [2]. Meagre to very small quantities of fresh water is available

[1] Bureau of Statistics Guyana, Population Housing Census (2012), [Available from: https://statisticsguyana.gov.gy/wp-content/uploads/2019/10/2012_Preliminary_Report.pdf
[2] World Population Review. Available from: https://worldpopulationreview.com/countries/guyana-population
[3] KII, 2022; Interview with Ms. Kimberly Jacobs (Environmental Health Officer, Ministry of Health Guyana)

from igneous dikes and andesitic flows at depths ranging from 3 to 150m. It has a tropical rainforest climate with heavy rainfall year-round, and the daily mean temperature is 26.5°C, while the average annual rainfall is 140 mm[4].

Table 1: Population Growth rate of Mahdia (Source: Rabicia/org./2022)[1].

Census Year	Population	Source
2002	1,617	Population housing Census 2002
2012	3,017	Population housing Census 2012
2022	4,200	World Population Review (Estimated)

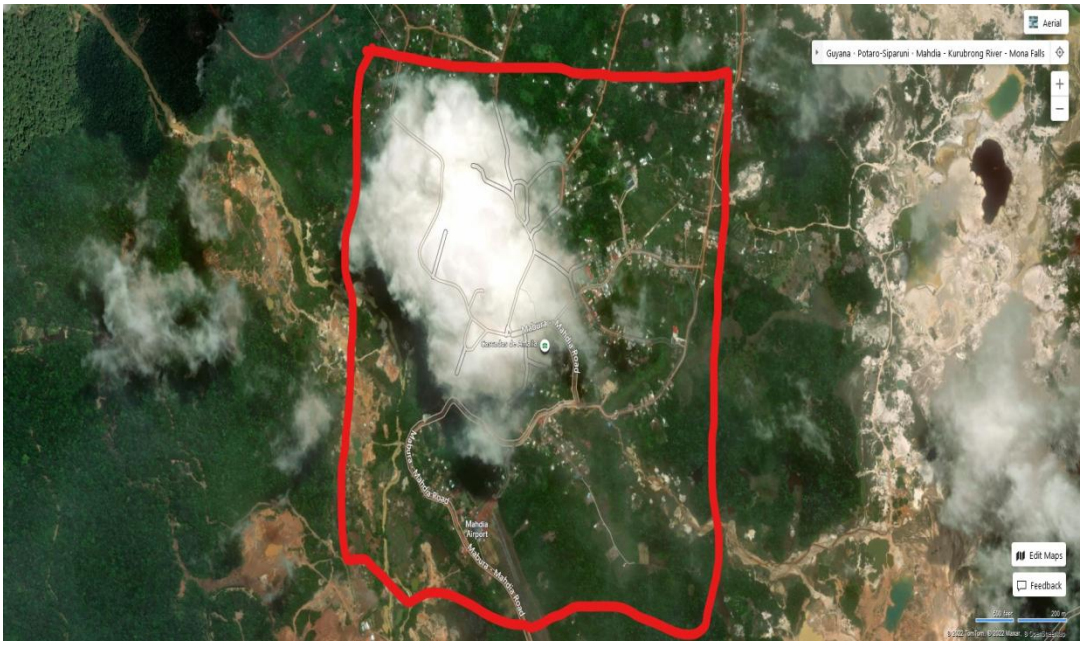

Figure 3: Aerial Map of Mahdia (Source: Bing Map/2022).

[4] Weather Spark [Accessed August 18 2022]. Available from: https://weatherspark.com/y/28934/Average-Weather-in-Mahdia-Guyana-Year-Round

4 Service outcomes

All sanitation systems available in the town are classified as onsite systems (there is no sewerage network[5]. The main types of toilet facilities are flush toilets linked to lined and unlined pits, ventilated pit latrines and traditional pit latrines with and without slabs[6].

Table 2 summarises the sanitation systems in use, as well as estimates of the population connected to each system. For the onsite sanitation systems it shows the proportions of each from which faecal sludge is then emptied, transported to treatment and treated.

Mahdia, Potaro-Siparuni, Guyana, 18 Aug 2022. SFD Level: SFD Lite
Population: 4200
Proportion of tanks: septic tanks: 100%, fully lined tanks: 50%, lined, open bottom tanks: 100%

Containment						
System type	Population	FS emptying	FS transport	FS treatment	SN transport	SN treatment
	Pop	F3	F4	F5	S4e	S5e
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	Proportion of supernatant in open drain or storm sewer system, which is delivered to treatment plants	Proportion of supernatant in open drain or storm sewer system that is delivered to treatment plants, which is treated
T1A3C6 Fully lined tank (sealed) connected to an open drain or storm sewer	25.0	0.0	0.0	0.0	0.0	0.0
T1A4C10 Lined tank with impermeable walls and open bottom, no outlet or overflow	15.0	0.0	0.0	0.0		
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	15.0	0.0	0.0	0.0		
T1B10C6 Containment (septic tanks, fully lined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded - connected to open drain or storm sewer	5.0	0.0	0.0	0.0	0.0	0.0
T2A6C10 Unlined pit, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	30.0	0.0	0.0	0.0		
T2B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow, where there is a 'significant risk' of groundwater pollution	10.0					

Table 2: SFD Matrix for Mahdia (Source: Rabicia/2022).

[5] KII-I, 2022; Interview with Mr Rensforde Joseph (Sanitation Manager, Sanitation Department-Guyana Water Incorporated GWI).
[6] KII, 2022; Interview with Ms. Kimberly Jacobs (Environmental Health Officer, Ministry of Health Guyana).

4.1 Onsite Sanitation systems (OSS)

Containment:

The town is classified as a non-sewered sanitation system[7]. Key Informant Interviews (KIIs-1,2,3, 2022), field observations, focus group meetings (FDG1, 2022), sample Household (HH) survey records as well as census information from the Bureau of Statistics Guyana indicated that 100% of the population is dependent on Onsite Sanitation Systems (OSS). Household onsite sanitation systems includes; fully lined tanks (sealed) connected to an open drain (T1A3C6), lined tanks with impermeable walls an open bottom, no outlet or overflow (T1A4C10), lined pit with semi-permeable walls and open bottom, no outlet or overflow (T1A5C10), unlined pit, no outlet or overflow where there is a significant risk of groundwater pollution (T2A6C10), containment that failed, damaged, collapsed or flooded connected to open drain or storm water (T1B10C6) and pits, never emptied but abandoned when full and covered with soil, no outlet or overflow, where there is a significant risk of groundwater pollution (T2B7C10). Figure 4 shows a pipe connected from a toilet to an open drain.

Septic tanks (ST) are not prevalent in town as there is no private or public desludging company or a treatment plant[8]. However, unlined pits with no outlet or overflow (commonly referred to as pit latrines, Figure 5) utilized by (30%) of HHs and fully lined tanks (Figure 6) connected to an open drain utilized by (25%) of HHs, are popularly used within the town. There is no consensus on the size of fully lined tanks or unlined pits which are usually constructed based on the household size and purpose of use. Public and shared toilets (Figure 7) throughout the town are non-sewered and connected to fully lined tanks. Figure 8 and Figure 9 show the housing settlement and a household connected to a lined pit, respectively.

Emptying and transport:

There are no public or private desludging tankers operating within the town, and therefore emptying and transport is not practised. When tanks and pits fill up, households use other methods, for example the fully lined tanks constructed of concrete, blocks and water-tight mortar floorings (T1A3C6) are emptied through pipes leading to an open body of water/drainage canal, which is not a safe method of disposal.

Most of the tanks and pits are not emptied but abandoned when full and covered with soil. This method is considered safe when the groundwater used for drinking is not polluted, and it is estimated that 30% of the population use lined tanks and pits systems where there is no or only a 'low' risk (T1A4C10 = 15% and T1A5C10 = 15% on Table 2). However, this method is only safe while there is space for households to cover full tanks pits and replace with new ones. In areas where housing density is increasing, alternative safe solutions will need to be found that may include safe emptying, transport and treatment before reuse or disposal.

Treatment:

The town has no private or public faecal sludge treatment facilities.

[7] KII-I, 2022; Interview with Mr Rensforde Joseph (Sanitation Manager, Sanitation Department-Guyana Water Incorporated GWI)

[8] FGD-1, 2022; Focus Group Discussion with Deputy Regional Chairman of Mahdia Mr Peter Ramotar.

4.2 SFD Graphic

The outcome of the SFD graphic shows that only 30% of the excreta flow is classified as 'Safely Managed' while 70% of all excreta flow is classified as 'Unsafely Managed' (Figure 1).

The unsafely managed excreta originate from: Supernatant (SN) not contained- not delivered to treatment (13%) and faecal sludge (FS) not contained- not emptied (57%).

The safely managed excreta is all from the lined tanks and pits that are not emptied but abandoned when full and replaced. These are in an area where there is a low risk of groundwater pollution. However, this method is only safe while there is space for households to cover full tanks and pits and replace with new ones. In areas where housing density is increasing, alternative safe solutions will need to be found that may include safe emptying, transport and treatment before reuse or disposal.

Figure 4: Pipe connected to Open Drain (Source: Rabicia/EPA./2022).

Figure 5: Unlined Pit with permeable wall and open bottom (Source: Rabicia/EPA./2022).

Figure 6: Fully Lined Tank (Source: Rabicia/EPA./2022).

Figure 7: Shared Community Toilet (Source: Rabicia/EPA./2022).

Figure 8: Housing Settlement (Source: Rabicia/EPA./2022).

Figure 9: Household connected to a Lined Pit (Source: Rabicia/EPA./2022).

5 Data and assumptions

Considering the World Bank (2018) Country Report and World Population Review (2022), as the baseline data for all stages of the sanitation chain, updates were also made based on data collected from: field visits through KIIs, FGDs, field observations and secondary sources made available by relevant stakeholders. However, some data required to complete this SFD graphic was not readily available. Thus, some data were not up to date and the following assumptions were made based on information received from primary survey in developing the SFD graphic:

- Assumptions were made on the percentage of citizens using the various types of onsite sanitation services based on information received from the Environmental Health Officer[9].
- 80% of water supplied is wastewater generated.
- The proportion of faecal sludge in septic tanks, fully lined tanks, and lined, open bottom tanks are considered 100%, 50%, and 100% respectively as per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website.
- Based on observations, containment systems present in Central Mahdia, a congested area of the town, are in close proximity to the river and creek where groundwater level is high which poses a significant risk to groundwater contamination.
- The town has no private or public transportation system for the emptying and treatment of faecal sludge. Thus, values for variables F3, F4 and F5 for all sanitation systems were set to 0%. Similarly, values for variables S4e and S5e for systems T1A3C6 and T1B10C6 were also set to 0%.

[9] KII, 2022; Interview with Ms. Kimberly Jacobs (Environmental Health Officer, Ministry of Health Guyana)

6 List of data sources

Reports and literature

1) World Population Review. [Accessed August 20 2022] Available from: https://worldpopulationreview.com/countries/guyana-population
2) Geo-Ref.net [Accessed August 20 2022]. Available from: http://www.geo-ref.net/en/guy.htm
3) World Bank, 2018. Country Report. [Accessed 16 August, 2022]. Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and- lending-groups.
4) Weather Spark [Accessed August 18 2022]. Available from: https://weatherspark.com/y/28934/Average-Weather-in-Mahdia-Guyana-Year-Round
5) Bureau of Statistics Guyana, Population Housing Census (2012), [Accessed August 20 2022]. Available from: https://statisticsguyana.gov.gy/wp-content/uploads/2019/10/2012_Preliminary_Report.pdf

Key informant interviews (KII)

6) KII-I, 2022; Interview with Mr Rensforde Joseph (Sanitation Manager, Sanitation Department-Guyana Water Incorporated GWI).
7) KII-2, 2022; Interview with Ms. Kimberly Jacobs (Environmental Health Officer, Ministry of Health Guyana).
8) KII-3, 2022; Interview with Ministry of Public Health Officers.

Focus group discussions

- FGD-1, 2022; Focus Group Discussion with Deputy Regional Chairman of Mahdia Mr. Peter Ramotar.

Field Observations

- Random household surveys.
- Observations of containment systems.
- Visit to fully lined tanks supernatant discharge pipelines into drainage.
- Observation of various toilet facilities.

Mahdia, Guyana, 2022

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SFD Promotion Initiative