SFD Report

Chingola
Zambia

Final Report

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SFD Report Chingola, Zambia, 2022

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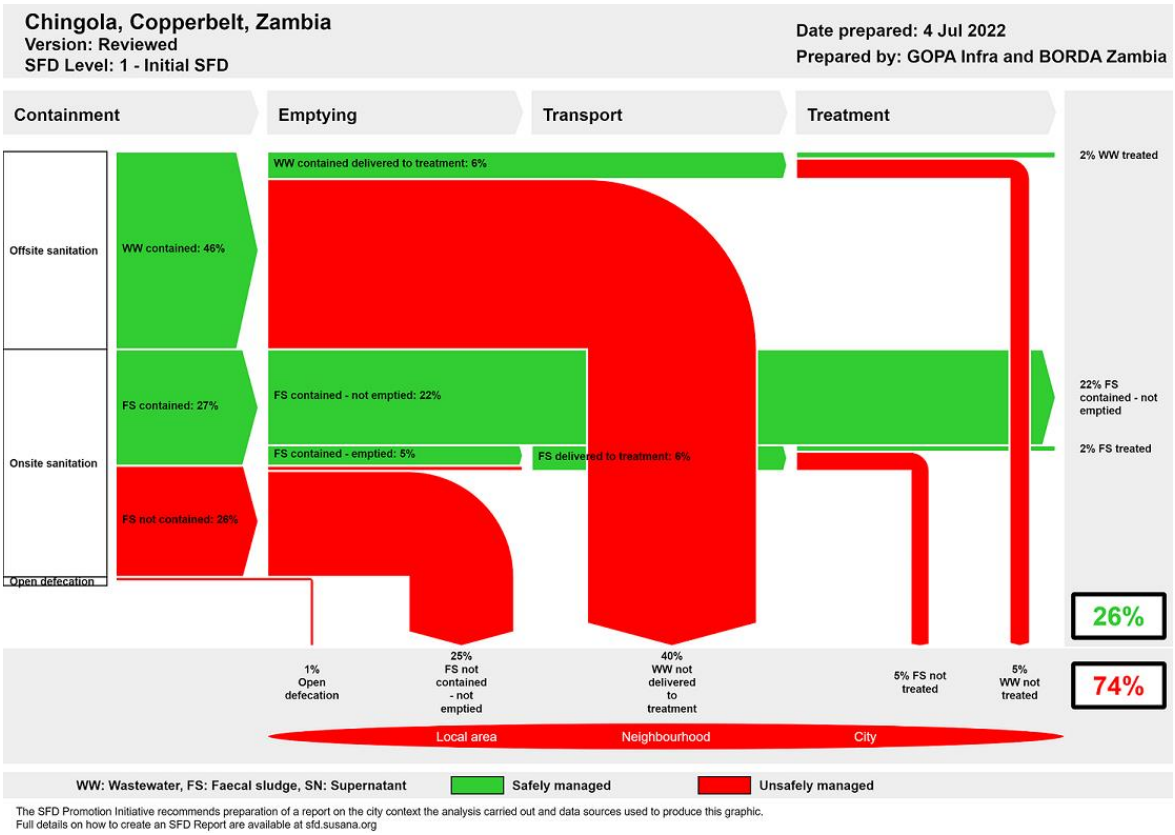
www.sfd.susana.org

1. The SFD Graphic



The SFD Promotion Initiative recommends preparation of a report on the city context the analysis carried out and data sources used to produce this graphic.
Full details on how to create an SFD Report are available at sfd.susana.org

2. Diagram information

SFD Level:

This is an Initial - level 1 - SFD report.

Produced by:

This SFD report was produced by GOPA Infra GmbH and BORDA Zambia on behalf of the GIZ Reform of the Water Sector Programme Phase II.

Collaborating partners:

- GIZ Zambia Water and Energy Cluster.
- Mulonga Water and Sewerage Company Limited (MWSC).
- Chingola Municipal Council (CMC).
- Ministry of Health (MoH) Chingola.

Status:

Final Initial - level 1 - SFD report.

Date of production: 04/07/2022

3. General city information

Chingola is one of the major copper mining towns in Zambia. It is in Chingola District in the Copperbelt Province, and is located at 12°32′S and 27°51′E. The town covers an estimated area of approximately 63 km^2 and development is limited to the Northwest by the Nchanga Mines.

The system boundaries considered in this study was limited on the existing political boundaries, which also define the areas which are serviced by Mulonga Water Supply and Sanitation Company Limited (MWSC). Copper mining is the main economic activity in Chingola and serves as the main source of employment for the residents. In 2016, the Central Statistics Office (CSO) projected Chingola's total population to be approximately at 266,478 with an estimated growth rate of 2.5% and in 2021 the Ministry of Health (MoH) projected the population to be around 300,108. This SFD study adopted the MoH 2021 population figures.

4. Service outcomes

Roughly equal proportions of the population use onsite sanitation (53%) and offsite sanitation (46%) systems.

The reticulated sewerage system is in a dilapidated state and only about 6% of the generated wastewater reaches the Wastewater Treatment Plants (WWTPs). Sewer leakages on the sewer networks and vandalised force mains from the Sewage Pumping Stations (SPS) are the major reasons for the low proportion of wastewater reaching the plants. This results in a situation where, whenever the SPS are operating, sewage is pumped directly into the environment.

The 53% of the population using onsite sanitation (OSS) systems predominantly use septic tanks and pit latrines. Emptying services are limited as there is only one vacuum truck for MWSC available to provide emptying services in all the three towns under the utility's jurisdiction (i.e., Chingola, Mufulira and Chililabombwe). All the emptied faecal sludge is discharged in the inlet channel to the Chiwempala Ponds for co-treatment with the rest of the wastewater.

There is no clear information on what exactly happens to facilities that are never emptied and it was assumed that these facilities are buried and abandoned.

About 25% of the population use onsite sanitation systems in which faecal sludge is not contained and not emptied. These unsafe systems are mainly due to poorly constructed facilities which drain directly into the environment and are predominant in areas that rely on groundwater, and the lack of adequate emptying services.

The 22% of the population using onsite sanitation systems in which faecal sludge is safely contained and not emptied are in areas with both favourable hydrogeological conditions, and where there is adequate lateral separation distances between the sanitation facilities and the water sources. Above all, these are areas where there is limited reliance on groundwater sources for drinking purposes.

Open Defecation (OD) is estimated at 0.4%. The practice is predominant in areas where new construction is ongoing and as such no other sanitation facilities are available.

Overall, the SFD graphic shows that 74% of the population has their excreta unsafely managed while 26% has their excreta safely managed.

5. Service delivery context

The Government of the Republic of Zambia (GRZ) has put up a very clear policy, regulatory and legal framework for water supply and sanitation services to guide the vision to achieve universal access to sanitation by 2030. Important policies that have been put in place include: the Zambia Vision 2030; the 7th National Development Plan 2017 – 2021; National Water Supply and Sanitation Policy of 2020, and all these are being aided by the UN Sustainable Development Goals 2015 – 2030. These policy documents set clear objectives and targets on sanitation service delivery and improvement for both urban, peri-urban and rural areas of the country which includes Chingola Town. In addition, the Framework for Provision and Regulation of Urban Onsite Sanitation and Faecal Sludge Management and the Framework for Provision and regulation of Rural Water Supply and Sanitation in Zambia sets a robust institutional arrangement that clearly specifies the roles and responsibilities of all key players in the Sanitation Sector. The following are the major sanitation sector players in the Town of Chingola:

- Ministry of Water Development and Sanitation (MWDS).
- National Water Supply and Sanitation Council (NWASCO).
- Zambia Environmental Management Agency (ZEMA).
- Chingola Municipal Council (CMC).
- Water Resources Management Authority (WARMA).
- Mulonga Water Supply and Sanitation Company (MWSC).
- Cooperating partners such as International Funding Institutions (IFIs) and Non-Governmental Organizations (NGOs).

In addition, several laws and regulatory tools exist which provide a clear legal and regulatory framework for sanitation at both national and local level. These include the following:

- The Water Supply and Sanitation Act No. 28 of 1997.
- Local Government Chapter 281, Volume 16 of the Laws of Zambia.
- The Public Health Act Chapter 295, Volume 17 of the Laws of Zambia.
- The Environmental Management Act No. 12 of 2011.

- Water Resources Management Act of 2011.
- The Statutory Instrument No. 112 of 2013.
- Statutory Instrument No. 100 of 2011.

6. Overview of stakeholders

The Urban Onsite Sanitation and Faecal Sludge Management (FSM) – Framework for Provision and Regulation in Zambia which was launched by NWASCO in 2018 creates an enabling environment for sanitation service provision including OSS and FSM. The framework clearly defines the roles and responsibilities of all the key stakeholders as illustrated in Table 1.

Table 1: Key Actors in Urban Onsite Sanitation (Source: NWASCO, 2018).

Stakeholder		Responsibility
Group	Stakeholder	
Public	MWDS	Policy and Laws
	NWASCO	Service Provision regulation (setting service standards andregulation of emptying andtransportation tariffs)
	ZEMA	Environmental protection regulation (licensing of transportation vehicles/ end use, treatment standards)
	CMC	Enforcement of sanitation systems and public health standards.
Service Providers	MWSC	Sanitation service provision to rural, urban and peri-urban areas.
	Private Operator	Emptying and transportation/O&M of treatment facilitiesunder a delegated management arrangement with MWSC.
Customer	Households, Commercial and Public institutions.	Responsible for investment in OSS facilities e.g., construction of standard containment facilities at a household level and connecting to sewer systems.
Cooperating Partners	GIZ, African Development Bank.	Sanitation improvement financing and capacity building of ZEMA, CMC, WARMA, NWASCO, MWSC and MWDS to effectively manage sanitation services.

7. Process of SFD development

This initial SFD graphic emanated from a combination of desk study and field information and was developed in collaboration with MWSC staff. The desk study mainly concentrated on the assessment of data development for population figures. Population figures were derived by means of known water connections in the specific district management areas, e.g. Nchanga South, Nchanga North, Mporokoso, etc. With the application of the number of water connections and the average number of people per household, as well as the service population, the consultant in cooperation with MWSC was able to calculate the population figures. Encountered difficulties in this approach was in the peri-urban areas and new development areas, as in these areas, it was nearly impossible to estimate population figures as per the above approach as only head counts from the MoH were used. These figures were the latest figures from the year 2021 and they give a very good overview of the current population in Chingola.

Where data were not available on type of facilities used in certain areas, the following assumptions were made:

- Areas with water supply network with no sewer network were on septic tanks; and
- Areas with no water supply network, serviced by hand pumps or hand dug wells were on pit latrines.

8. Credibility of data

Information given by MWSC and MoH was of good quality and therefore assumed to be reliable.

The main assumptions made are on the population figures in regard to the number of people per household. This has a direct influence on the proportions presented in the SFD graphic. However, this assumption is credible enough as assumptions were based on validated demographical data from various studies including the Central Statistics Office (CSO). However, it may be necessary to conduct an in-depth assessment to confirm the assumptions.

9. List of data sources

The list of data resources include the following:

- Nicholas O'dwyer (2020). Detailed Design and Construction Supervision of Water and Sewerage Networks in the Towns of Chingola, Chililabombwe and Mufulira. Final Design Report – Chingola
- CAPIC Team, September 2017, "TA2013008 ZM IF3IF, Technical Assistance to Zambia Water and Sanitation Project"

Chingola, Zambia, 2022

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Abbreviations

BMZ	Federal Ministry of Economic Cooperation and Development
CMC	Chingola Municipal Council
CSO	Central Statistical Office
CU	Commercial Utility
FSM	Faecal Sludge Management
GIZ	Deutsche Gesellschaft fuer internationale Zusammenarbeit
MoH	Ministry of Health
MLG	Ministry of Local Government
MWDSEP	Ministry of Water Development, Sanitation and Environmental Protection
MWSC	Mulonga Water and Sanitation Company Limited
NWASCO	National Water Supply and Sanitation Council
OD	Open Defecation
PUA	Peri-Urban Areas
SFD	Shit Flow Diagram
SPS	Sewage Pumping Station
UN	United Nations
VIP	Ventilated Improved Pit Latrine
WARMA	Water Resources Management Agency
WDC	Ward Development Committee
WHO	World Health Organization
WWTP	Wastewater Treatment Plant
ZWSP	Zambia Water and Sanitation Project

1 City context

Chingola Town is located in Chingola District on the Copperbelt Province of Zambia. It is geographically located at approximately 12°32′S and 27°51′E. The town is bound by Nchanga Mines on the north-western boundary. The boundaries for the area considered for the development of the Shit-Flow-Diagram (SFD) of Chingola town were aligned to the existing political boundaries for urban and peri-urban areas in the district which comprise Chingola Town (Figure 1). These boundaries equally define the areas which are serviced by Mulonga Water and Sanitation Company (MWSC) Limited. The Figure also highlights the different areas within the town and the type of sanitation facilities employed. It should be noted that under the new mandate extension for utilities in the provision of water supply and sanitation services, the whole district is now part of the service area under MWSC although in this study, only the town part was considered.

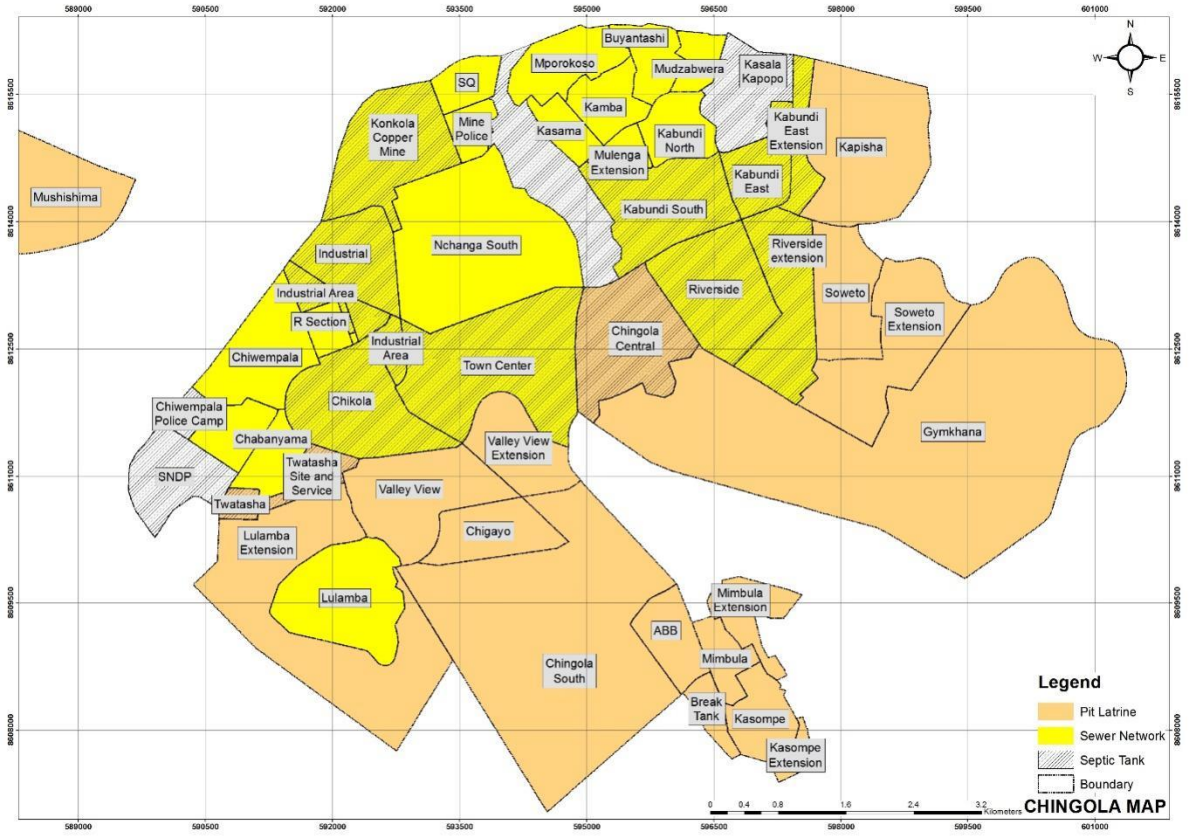

Figure 1: Map of Chingola showing the town boundaries and the different sanitation facilities in different areas of the Town.

1.1 Population

The population of Chingola Town was determined using municipality boundaries for the urban and peri-urban areas serviced by MWSC and was estimated to be about 300,108. The total population within this area was determined by the headcount from the health centres as well as the water supply areas, from MWSC. This population was further delineated according to sanitation facilities employed (Appendix 1).

The main source of income for the people in the town are the Nchanga Mines which is the major employer in the Town. A huge population in Chingola resides in medium and low-cost areas. The Nchanga Mines and its surrounding residential areas have a developed and widespread sewer network and many of the low- and medium-income areas benefit from this development. However, during the many years this network has been in use, it has deteriorated resulting in wastewater conveyance challenges to both the Sewage Pumping Stations (SPSs) and the Wastewater Treatment Plants (WWTPs) (Section 2.1.1). New peri-urban areas are currently coming up. These areas currently face inadequacies in water supply and sanitation services provision.

1.2 Climate

Chingola has four seasons typical to the seasons of the Copperbelt with varying durations as defined below:

- The cool dry winter running from June to August;
- The dry, warmer and more humid pre-rainy season from August to October;
- The wet humid warm weather from November to March; and
- The post rainy season from April to May.

Being a town on the Copperbelt Province, Chingola experiences annual average temperature ranges of between 9 ºC and 31 ºC. The lowest annual mean temperature of 17.9 ºC is recorded in July and the highest annual mean of 25.4°C is recorded in October. According to the Zambia Meteorological Department, the average annual rainfall for Chingola is around 1,169 mm and the majority of precipitation occurs during the months of December to March. The driest month for the town is around October.

2 Service Outcomes

2.1 Overview

This section presents the range of infrastructure technologies, methods and services designed to support the management of wastewater and faecal sludge through the sanitation service chain in Chingola Town (Figure 2). The section also provides general information on the current condition and capacities of the different systems. As shown in Figure 1 and the SFD Selection Grid (Figure 2) the town is serviced by both offsite and onsite sanitation systems.

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		T1A1C2			Significant risk of GW pollution Low risk of GW pollution					Not Applicable
Septic tank					T2A2C5 T1A2C5					
Fully lined tank (sealed)					Significant risk of GW pollution Low risk of GW pollution					
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 Low risk of GW pollution
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										T2B7C10 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										
No toilet. Open defecation	Not Applicable							T1B11 C7 TO C9		Not Applicable

Figure 2: The SFD selection grid.

2.1.1 Off-site sanitation

Sewerage Network

The off-site-sanitation system consists of sewers connected to centralized WWTPs managed by MWSC. The sewer network covers about 47% of the city area and serves 46.2% of the inhabitants. The network comprises approximately 195 km of sewer lines of different sizes and three SPSs. The sewer network is divided into four sewer sheds with each shed covered by its respective Wastewater Treatment Plant (WWTP). Most of the collection system components are more than 40 years old and have not received sufficient maintenance and investment since construction and hence are in a dilapidated state. Due to the dilapidated state of sewer network and ineffective SPSs, it is estimated that only about 6% of the generated wastewater is delivered to the treatment plants with the rest being discharged into the environment without being treated. The most common problems with the sewer network

include: blocked sewer lines, leaking pipes, siltation, and vandalism. High degree of blockages in the sewer system was supported by clear wastewater devoid of solids arriving at pumping stations and treatment plants (Figure 3). Clear wastewater devoid of solids is indicative of solids being retained upstream in the network. This phenomenon in wastewater collection is experienced when there are blockages in the collection system.

Figure 3: Clear wastewater devoid of solids arriving at the Industrial Sewage Pump Station.

The pumping stations, also built over 40 years ago, are also partly compromised by age as well as lack of maintenance and vandalism. All the three SPSs had challenges during the time of the study (Table 1).

Table 1: Status of the Pumping Stations at the time of the survey.

S/N	SPS NAME	STATE OF THE FACILITY
C1	East Mill	Station was not functional as it was flooded with groundwater
C2	Industrial	Station was functional but the force mains was vandalised hence the pumped sewage went into the environment
C3	Misoshi	Station was functional but the force mains was vandalised hence the pumped sewage went into the environment

Other common problems at the pump stations included inadequate capacity, no back-up power, dysfunctional pumping units, flooding and vandalized sewer. For example, the East Mill SPS which services Nchanga North, parts of Nchanga South and high income streets, among others, had pumps that were not functional. The collection chamber was therefore full and was discharging into the environment. For the Industrial and Misoshi SPSs, vandalism of the force mains resulted in wastewater discharging into the environment instead of going to the respective treatment plants (Figure 4).

Figure 4: Vandalised force main at Industrial SPS resulting in wastewater leaking into the environment.

Based on populations contributing to flows going to their respective pumping stations and discussions on leakages within the sewer sheds, it was estimated that only 13.9% of the produced wastewater (total wastewater collected through off-site sanitation systems is 46.2%) is transported to the WWTPs which translates to only 6% of wastewater reaching the wastewater treatment plants.

There are currently construction works that are ongoing for the expansion, rehabilitation and upgrading of the sewer network as well as the rehabilitation of the WWTPs. However, none of the three SPSs are earmarked for rehabilitation and upgrading under the ongoing works.

Wastewater Treatment System

Wastewater collected from the offsite systems is all supposed to be transported to one of the four respective WWTPs namely: Chiwempala, Lulamba, Kasompe, and Eastern sewage treatment plants. These are all non-conventional sewage treatment systems in form of stabilisation ponds comprising anaerobic, facultative and maturation ponds arranged in series. At the time of the survey, the ponds were all in a dysfunctional state from the operational perspective; although their infrastructure/Civil works were in a relatively good state (Table 2).

Table 2: Status of the facilities.

S/N	NAME OF WWTP	STATE OF THE FACILITY
D1	Chiwempela	Plant functional but very little wastewater gets into the ponds
D2	Lulamba	Plant functional but wastewater only gets into first and second ponds. After second pond the partially treated wastewater is redirected into either the stream or to surrounding farms in the area via punctured pipes and excavated flow channels
D3	Kasompe	Plant not functional. There is no wastewater received
D4	Eastern	Plant not functional. There is no water received as the source, Misoshi SPS, has a vandalized force mains

All the plants suffered low wastewater volumes to a level where some of the treatment units were partially or completely dry (Figure 5). A field investigation of the Chiwempala Ponds indicated little wastewater inflow in the receiving channels. For the Lulamba Ponds, the channels were dry and it was reported that the maturation ponds had had no wastewater inflow in the past six years.

Figure 5: Evidence of low wastewater volumes reaching the treatment plants (LHS: A dry section of the channel for the Lulamba Sewage Ponds; RHS: Dry maturation pond at the Lulamba WWTP that has not received wastewater the past six years.

Both the Eastern and Kasompe ponds were not functional. The Eastern Ponds are supposed to receive wastewater from the Misoshi SPS while the Eastern Ponds are supposed to receive wastewater from the Industrial SPS. However, due to the vandalised force mains, all the wastewater from both pump stations ends up in the environment leaving the ponds dry.

It was established that none of the plants was discharging into the environment hence all the wastewater that is received by the treatment plants is indefinitely retained in the ponds and is considered adequately treated. This was on the premise that from the compliance perspective, the facilities are not polluting. Chingola WWTPs experience a unique situation where some of the wastewater that has already reached the plant is abstracted for farming activities. For example, the Lulamba WWTP, which was the only plant receiving relatively adequate wastewater from its sewer shed still ended up with no effluent. This was because farmers abstracted the wastewater from the ponds (by puncturing the existing pipelines and diverting the flows) after the facultative pond. Furthermore, the outlet pipe of the facultative pond has also been lowered to allow the partially treated wastewater to enter the nearby stream. As the wastewater does not reach the maturation ponds before being diverted, it was assumed that the wastewater was not adequately treated. Because of the diversions, it was estimated that only 25% (a quarter) of what gets to all the four ponds gets treated. The quarter that was considered adequately treated translated to only 1.5% (rounded of to 2% in the SFD Graphic) which is a combination from the little flow reaching the other three ponds and what remained in the Lulamba ponds.

2.1.2 Onsite sanitation

Containment

According to data obtained from MWSC, around 53% of Chingola's population rely on on-site sanitation. About 53% of the population on onsite facilities are serviced by septic tanks while about 47% is on pit latrines. The majority of pit latrines can be categorized as traditional and improved latrines and also Ventilated Improved Pit (VIP) latrines. Septic tanks are constructed by individual households. Due to inadequate regulation, some of these facilities do not adhere to prescribed standards of having a compartmentalized tank. Excreta not safely contained in onsite systems is due to a number of factors including hydrogeological conditions, inadequate

lateral separation distances between sanitation facilities and groundwater sources and reliance on groundwater for drinking purposes.

Emptying and Transport

Septic tanks:

Sludge emptying from septic tanks in Chingola is done with the use of a 10 m^3 vacuum truck owned by MWSC. The truck is also used to service other service areas under MWSC which include Chililabombwe and Mufulira. When servicing Chingola, the vacuum tanker empties an average of two household facilities per day. All the emptied sludge is discharged at the Chiwempala WWTP at a designated point along the channel (Figure 6).

Figure 6: The faecal sludge discharge point on the raw wastewater channel leading to the Chiwempala Ponds.

Since the emptying services are provided by the utility, operations adhere to the stipulated Occupation Safety and Health (OSH) guidelines in terms of protective equipment for operators and also in terms of ensuring sanitary operational conditions during and after emptying. Payment for the services is in two categories. There is a category for domestic customers which attracts an emptying fee of five hundred fifty Kwacha (K550) (USD 29) per load. The other category is for the remaining customers (i.e., commercial, public and industrial) which is pegged at six hundred fifty Kwacha (K650) (USD 34) per load. The emptying is estimated to cater for about 6% of the population. It is not clear what happens to the facilities that are not emptied. Since septic tanks get full at one point during their lifespan, there is a possibility of existence of informal emptying services. However, this is an area that requires a detailed study. Furthermore, many of these septic tanks were only constructed in the last 10 years, in the newer development areas and therefore, may have not yet reached the stage where they need to be emptied.

Pit Latrines:

There is no formal emptying of pit latrines in Chingola. Anecdotal data indicates that the pits are buried when they get full and new ones dug to replace them like in the practices found in rural areas. However, this may not be possible for all households especially those in peri-urban areas where space may be a limiting factor. It is therefore possible that informal pit emptying exists. It is therefore recommended that a detailed sanitation survey should be undertaken if this SFD Report is to be upgraded to higher versions.

Treatment and Disposal

As the septic tanks are emptied into the Chiwempala ponds, the treatment is the same as explained under section 2.1.1. All the faecal sludge is discharged in the inlet channel to the Chiwempala Ponds for co-treatment with the rest of the wastewater.

It should be pointed out that faecal sludge is very concentrated and can easily overwhelm the treatment facilities. It is therefore imperative that the utility needs to start thinking about constructing an appropriate treatment plant for faecal sludge.

2.1.3 Open defecation

Open Defecation (OD) in Chingola was estimated at around 0.4% (rounded up to 1.0% in the SFD graphic). According to MWSC, OD is mostly confined to peri-urban areas especially where developments are still on-going. This is because during construction, most people (workers) have no access to facilities and therefore resort to OD.

2.2 SFD Matrix

The SFD Matrix for Chingola Town is presented in Table 3. The Table presents available systems as well as how they discharge their wastewater/faecal sludge.

Table 3: Chingola – SFD Matrix.

Chingola, Copperbelt, Zambia, 4 Jul 2022. SFD Level: 1 - Initial SFD
Population: 300108
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open bottom tanks: 100%

Containment						
System type	Population	WW transport	WW treatment	FS emptying	FS transport	FS treatment
	Pop	W4a	W5a	F3	F4	F5
System label and description	Proportion of population using this type of system (p)	Proportion of wastewater in sewer system, which is delivered to centralised treatment plants	Proportion of wastewater delivered to centralised treatment plants, which is treated	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
T1A1C2 Toilet discharges directly to a centralised foul/separate sewer	46.2	13.9	25.0			
T1A2C5 Septic tank connected to soak pit	22.2			21.5	100.0	25.0
T1B11 C7 TO C9 Open defecation	0.4					
T1B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	5.0					
T2A2C5 Septic tank connected to soak pit, where there is a 'significant risk' of groundwater pollution	5.7			21.5	100.0	25.0
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	20.3					

2.2.1 Distribution of containment technologies

Based on available population data (Appendix 1 in Section 7.1), the delineated town map and discussions with MWSC staff, the following distribution of containment systems in Chingola was arrived at (Table 4).

Table 4: Chingola – Containment Technologies.

Containment technologies	Total	SFD Classification
Off-site	**46.2%**	
Toilet discharges directly to a centralised foul/separate sewer	46.2%	T1A1C2
Septic tanks/ Lined tanks (all types)	**28.0%**	
Septic tanks (correctly constructed) to soak pit	28.0%	T1A2C5 T2A2C5
All Types of Pit Latrines	**25.4%**	
Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	5.0%	T1B7C10
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	20.3%	T2B7C10
Open Defecation	**0.4%**	T1B11C7 to C9

Off-Site: Based on discussions with MWSC staff and referencing information available from MWSC office documents, it was computed that the population connected to the sewerage network is approximately 46.2%. This figure was derived from the number of households connected to the sewerage system and an estimated average household size of 9.5 people per household. The sewer network in Chingola covers a lot of established areas in which the population would otherwise be using pit latrines.

Both the Eastern and Kasompe ponds were not functional. The Eastern Ponds are supposed to receive wastewater from the Misoshi SPS while the Eastern Ponds are supposed to receive wastewater from the Industrial SPS. However, due to the vandalised force mains, all the wastewater from both pump stations ends up in the environment leaving the ponds dry. Thus, It was estimated that only 13.9% of the wastewater is delivered to treatment (W4a = 13.9%) due to the dilapidated state of the sewer network, including blocked sewer lines, leaking pipes, siltation, vandalism and ineffective SPSs.

It was established that none of the plants was discharging into the environment hence all the wastewater that is received by the treatment plants is indefinitely retained in the ponds and is considered adequately treated. This was on the premise that from the compliance perspective, the facilities are not polluting. Chingola WWTPs experience a unique situation where some of the wastewater that has already reached the plant is abstracted for farming activities. For example, the Lulamba WWTP, which was the only plant receiving relatively adequate wastewater from its sewer shed still ended up with no effluent. This was because farmers

abstracted the wastewater from the ponds (by puncturing the existing pipelines and diverting the flows) after the facultative pond. Furthermore, the outlet pipe of the facultative pond has also been lowered to allow the partially treated wastewater to enter the nearby stream. As the wastewater does not reach the maturation ponds before being diverted, it was assumed that the wastewater was not adequately treated. Because of the diversions, it was estimated that only 25% (a quarter) of what gets to all the four ponds gets treated. The quarter that was considered adequately treated translated to only 1.5% (rounded of to 2% in the SFD Graphic) which is a combination from the little flow reaching the other three ponds and what remained in the Lulamba ponds.

Thus, wastewater treatment efficiency was estimated at 25% (W5a = 25%) since some ponds were not functional due to vandalised episodes preventing the wastewater from reaching the maturation ponds before being diverted, ending up in the environment untreated.

Septic tanks: During meetings with MWSC, areas within Chingola relying on septic tanks for their sanitation needs were identified and confirmed. Septic tanks in Chingola are mainly in areas with water supply networks and also having a good water supply and in high-cost developmental areas with own boreholes. The population on septic tanks in the town is approximated at 28% (Appendix 1). By considering households on septic tanks in vulnerable hydrogeological conditions (i.e. areas in high water tables zones) including interviews with MWSC Staff and physical surveys, it was estimated that 22.2% of the population have facilities posing low risk of groundwater pollution while 5.7% have facilities with high risk to groundwater pollution. This estimation is crude. For higher versions of the SFD reports, detailed hydrogeological studies of Chingola Town will be required.

Pit latrines: Pit latrines in Chingola are mostly in areas developed with no municipal water network or in new developmental areas around Chingola. Pit latrines in Chingola service approximately 25.4% of the population and are mainly found in low-income development areas with established low-cost areas being connected to the existing sewer network. The pit latrines in Chingola were said to be the simple type which are abandoned when they get full. Due to poor hydrogeological conditions (including porous soils) in most areas where pit latrines are located, together with minimal lateral separation distances between groundwater sources and the latrines, most of the pit latrines do not allow full safe containment of faecal sludge. As such, an estimated 20.3% of the population abandon their pits when full, and cover them with soil, in places where there is a significant risk of groundwater pollution while 5.0% of the population do the same practise but in places where there is a low risk of groundwater pollution (Table 4).

2.2.2 Emptying of onsite technologies

The emptying is estimated to cater for about 6% of the population, which translates into setting variable F3 to 21.5% for all septic tanks (T1A2C5 and T2A2C5). This value was estimated based on the fact that septic tanks have been constructed in the last 10 years (they may not need emptying services yet) and the possibility of existence of informal emptying providers, both facts cross-checked with the Key Informant Interviews (KIIs) conducted.

2.2.3 Transport of FS from onsite technologies

It was estimated that 100% of emptied FS reaches treatment (variable F4 = 100%) since the emptying services are provided by the utility and the vacuum trucks deliver all the emptied FS to the WWTP (Chiwempala Ponds).

2.2.4 Treatment of FS from onsite technologies

Since all the FS sludge from septic tanks is co-treated with wastewater in the same WWTP (Chiwempala Ponds), the F5 value (the FS that is treated), is the same as that for wastewater and hence, variable F5 is set to 25% for faecal sludge from septic tanks (i.e., T1A2C5 and T2A2C5).

Open Defecation: Open defecation is not very common in Chingola and accounts for only 0.4% of the population. The population practising open defecation mainly reside in peri-urban areas on the southern parts of the town as well as in areas with new developments.

2.2.5 Risk of groundwater contamination

Nearly 34% of Chingola's population is not connected to municipal water network and relies on household groundwater abstraction which includes mechanized boreholes (mainly in the high-cost areas), and shallow wells and handpumps which are found both in the peri-urban areas). Laterite soil formation is characteristic of the Copperbelt soils, which has sandy topsoil overlying loamier clay subsoils. This type of soil easily erodes when soil conservation measures are not applied during land use systems. The soils alluded to here are porous hence posing a danger to groundwater contamination from the context of pollution. The high number of pit latrines in the areas which are affected with no access to potable water are also vulnerable to groundwater contamination.

Based on the available information, approximately 80% of the population relying on pit latrines are in areas with high risk of groundwater pollution. In cases where it is difficult to determine whether the area is in a low or high-risk area, the decision was made towards the high-risk areas, especially that these areas mainly rely on unsafe water resources. This assumption led to the following theoretical distribution of onsite sanitation facilities used for the generation of the SFD graphic (Table 5).

Table 5: Chingola – Type of onsite sanitation – Ground water pollution rate (GPR).

Type of onsite containment	Total	Low GPR	High GPR
Septic tanks/ Lined tanks (all types)			
Septic tanks (correctly constructed) to soak pit	28.0%	22.2%	5.7%
All Types of Pit Latrines			
Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	25.4%	5.0%	20.3%

2.2.6 Data uncertainties

There are a number of uncertainties with some data used to generate the SFD graphic for this report. The major areas where there are uncertainties which may need further verification include:

- The distribution of population throughout Chingola may differ as the overall population has been used only as a guideline; Hence, the percentage of people on sewer network, septic tanks and pit latrines in this report may differ to the actual situation on the ground.
- The proportion of the population on OD.
- Hydrogeological characteristics of the different areas of Chingola. Several assumptions were made for the study areas in this study report.
- Sanitation practices with regards the emptying of pit latrines and septic tanks.
- Assessment of actual volumes of wastewater that is treated and the treatment efficiency.

2.3 Summary of assumptions

Offsite sanitation systems:

✓ 46.2% of the population are connected to the sewer system. It was estimated that only 13.9% of the wastewater is delivered to treatment (W4a = 13.9%) out of which, 25% is treated (W5a = 25%).

Onsite sanitation systems:

✓ The proportion of Faecal Sludge (FS) in septic tanks was set to 100% and the proportion of FS in lined tanks with impermeable walls and open bottom and pits was set to 100% according to the relative proportions of the systems in the municipality, as per the guidance given in the Frequently Asked Questions (FAQs) in the Sustainable Sanitation Alliance (SuSanA) website.

✓ Variable F3 for all onsite sanitation systems (T1A2C5 and T2A2C5) was cross-checked from KIIs conducted and set to 21.5% in both cases.

✓ It is assumed that all FS emptied is delivered to treatment (F4 = 100%) and a quarter of the FS delivered to treatment is treated (F5 = 25%).

2.4 SFD Graphic

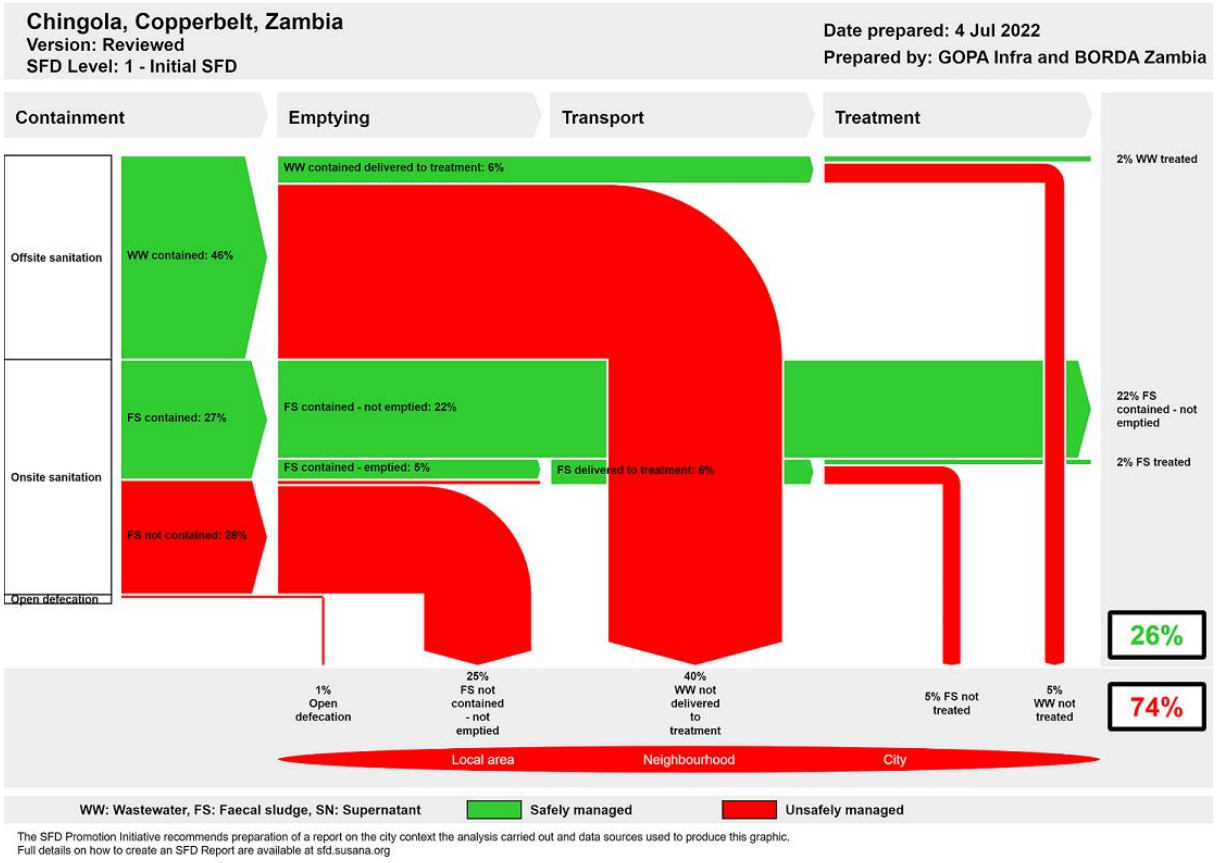

Figure 7: Chingola SFD Graphic.

The SFD graphic for Chingola shows that 74% of the population has their excreta unsafely managed and 26% has their excreta safely managed. The population on onsite and off-site sanitation systems are almost equally proportioned. The sewer network system managed by MWSC covers about 46% of the population and is not in a good condition to transport all the generated wastewater to the treatment plants. Only about 6% of the collected wastewater reaches the WWTPs, of which only about a quarter (1.5% rounded off as 2%) is safely managed. The main reasons why the sewage does not reach the treatment plants include dilapidated networks and vandalised force mains from existing SPS. Some of the sewer infrastructure is also either punctured or stolen and whenever the SPS are operating, sewage is pumped directly into the environment. This is shown in the SFD graphic as wastewater not delivered to treatment (40%) and wastewater not treated (5%).

Approximately, 53% of the population in Chingola relies in onsite sanitation containments, such as septic tanks and pit latrines. Of the total FS accumulated in onsite containments, 27% of the FS is contained. However most of it does not get emptied and transported to the treatment plants partly due to lack of emptying facilities. The proportion that is said to be safely contained on site is for the population whose facilities are sited in areas with favourable hydrogeological conditions (i.e., areas with low water table and low porosity soils) and generally with adequate lateral separation distances between the water sources and sanitation facilities. In some cases, these are areas where there is no reliance of groundwater sources. This translates into a 22% of FS contained - not emptied. However, onsite sanitation systems (septic tanks) would require

emptying services as those systems fill up. Another 6% corresponds to FS delivered to treatment and co-treated at the WWTP (Chiwempela Ponds), out of which 2% is treated.

The population on facilities considered to unsafely contain the faecal sludge on site is estimated at 26%, out of which 25% is FS not contained - not emptied.

Open defecation is estimated at 0.4% of the population and is mainly practised in areas where new constructions are ongoing as there are no sanitation facilities available yet in these areas.

3 Service delivery context

3.1 Policy, legislation and regulation

The Government of the Republic of Zambia (GRZ) has put up in place clear policies, regulations and legal frameworks for water supply and sanitation services to create an enabling environment to attain universal access to sanitation for all by 2030. The sections below outline the policy, institutional/ regulatory and legal frameworks for sanitation which applies at both national and local levels.

3.1.1 Policy

The following policies have been put in place to provide direction and guidance on the vision to achieve the universal access to safely managed sanitation for all by 2030:

The Zambia Vision 2030: the vision identifies inadequate access to safe water supply and sanitation as one of the human well-being and social development aspect that needs to be improved for Zambia to attain the aspiration to become a prosperous middle-income country by 2030. In this regard, the vision sets target to improve access to adequate, appropriate and environmentally friendly sanitation for at least 90% of Zambians by 2030.

The 7th National Development Plan 2017 – 2021: Outlines the intended five-year developmental outcomes and goals to achieve the vision 2030. Thus, the plan outlines strategies and programs that are aimed at improving access to safely managed sanitation at all levels in Zambia.

National Water Supply and Sanitation Policy of 2020: The policy was developed based on the vision 2030 and the sustainable development goals and its implementation shall be through the National Development Plans. The policy sets clear and coherent policy measures that guide the improvement of access to adequate and safely managed sanitation for all. One of the objectives of the policy is to provide the legal and institutional framework for sanitation service delivery in Zambia.

National and Local Programs: The National Urban Water Supply and Sanitation Program (NUWSSP, 2011 – 2030) enables all urban residents, commerce, institutions and industry to have access to sanitation and utilize it in an efficient and sustainable manner for improved health, well-being and livelihood by 2030. Specifically, the National Urban and Peri-Urban Sanitation Strategy (NUSS, 2015- 2030) provides a framework for financing and implementing the sanitation component of the NUWSSP and has set a target to “provide adequate, safe and cost-effective sanitation services to 90 percent of the urban population by 2030”. To achieve this target, one of the objectives will be to improve access to sanitation and safely manage sanitation systems so as to reduce the incidence of water borne diseases outbreaks such as cholera.

At the local level, MWSC is currently undertaking various infrastructure projects to improve service delivery to its customers with the two major projects under the Zambia Water and Sanitation Project (ZWSP). Both projects are funded by the European Investment Bank and deal with both water and sanitation aspects of Chingola, Chililabombwe and Mufulira. On sanitation, one of the projects has its focus on rehabilitating and upgrading the existing sewage treatment facilities. The other project has its focus on upgrading and extending of the sewer

networks. However, none of these projects include a component on rehabilitation of the existing sewage pump stations which is one of the key issues in improving the status of sanitation in Chingola.

United Nations (UN) Sustainable Development Goals 2015 – 2030: Zambia is a member of the UN and all developmental programs and policy documents in the water supply and sanitation sector are aligned to the Sustainable Development Goal (SDG) No. 6 and its targets.

All these policy documents and programs have set clear objectives, targets and an enabling environment on sanitation service improvement for both urban, peri-urban and rural areas which include Chingola District.

3.1.2 Institutional roles

The Framework for Provision and Regulation of Urban Onsite Sanitation (OSS) and Faecal Sludge Management (FSM) and the Framework for Provision and Regulation of Rural Water Supply and Sanitation in Zambia sets a robust institutional arrangement that clearly specifies the roles and responsibilities of all key players in the Water Supply and Sanitation Sector in Zambia. Figure 8 shows the institutional and regulatory framework and outlines the various roles and responsibilities of the key sector players in Zambia.

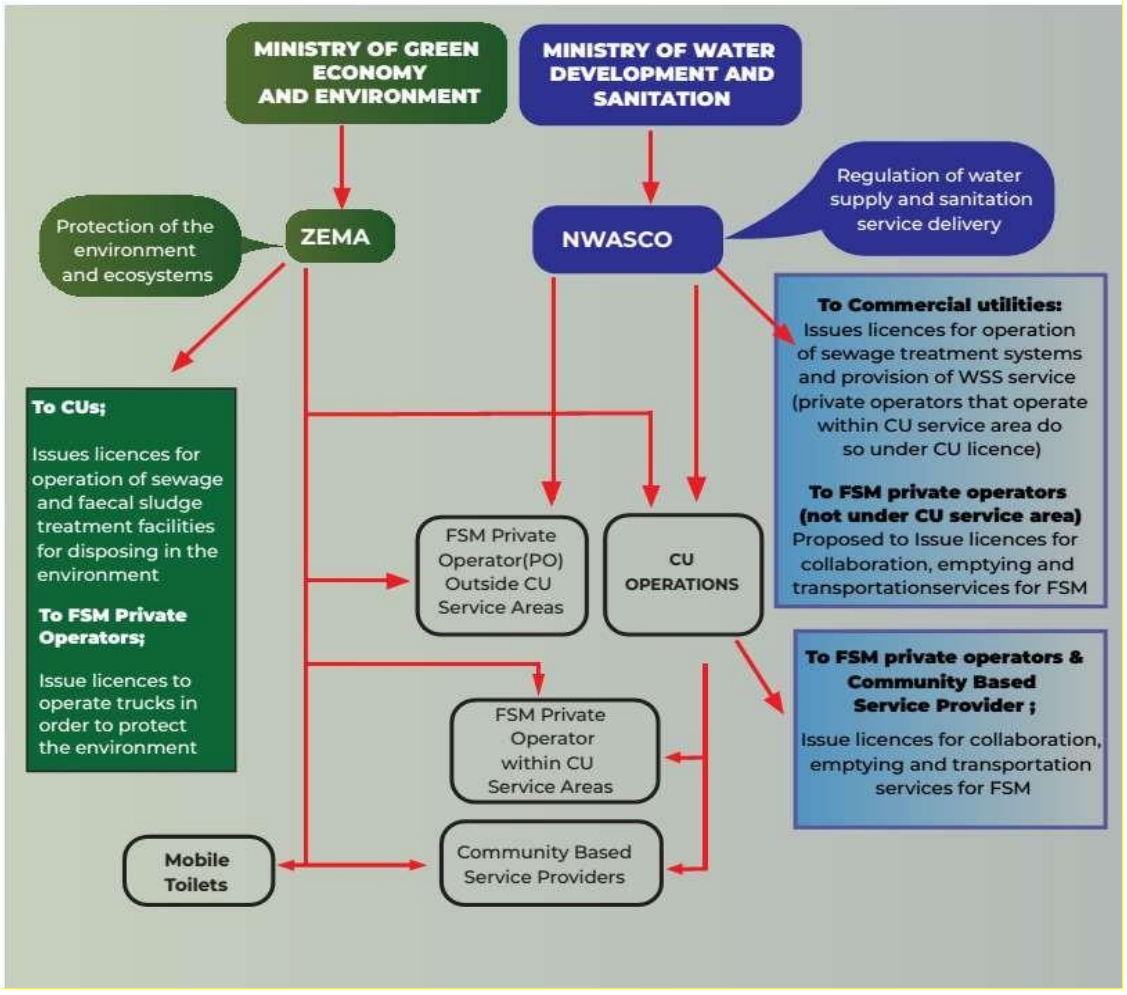

Figure 8: Regulatory Framework for Provision of Sanitation Services (Adapted from NWASCO, 2018).

At the local level, the following are the key players:

Chingola Municipal Council (CMC): Under the direction of Ministry of Local Government (MLG), CMC focuses on the enforcement of Ministry of Health's Hygiene regulations and, development of by-laws on sanitation service provision through the Public Health Departments. CMC also holds the majority of the shares in MWSC and sits on the board as well as delegates water supply and sanitation services provision to MWSC, as per the Water Supply and Sanitation (WSS) act No. 28 of 1997. Through Environmental Health Officers and Health Inspectors, CMC enforces and regulates the sanitation laws related to the Public Health Act (Drainage and Latrine), Regulation 1994 (Amended 2006) related to collection, transportation and treatment of wastewater. The council also has a mandate for other services that relate to the quality of the urban environment and therefore has a broader responsibility for sanitation that also includes solid waste management and storm-water drainage system of areas within Chingola District.

CMC also issues business levy licenses to businesses operating in the city. However, there is a weak enforcement when it comes to registration of businesses providing OSS and FSM services in the city.

Mulonga Water Supply and Sanitation Company (MWSC): MWSC is the commercial Utility delegated by CMC to provide water supply and adequate sanitation services to rural, urban and informal areas of Chingola District and the two other Districts under the jurisdiction i.e., Chililabombwe and Mufulira. MWSC is overseen and regulated by NWASCO and manages the current water supply and sanitation infrastructure for the city.

National Water Supply and Sanitation Council (NWASCO): According to the Framework for Provision and Regulation of Urban Onsite Sanitation and Faecal Sludge Management, regulation of sanitation service provision (including OSS and FSM) in Chingola town is done through new licensing conditions of 2018 issued to MWSC by NWASCO. Under the licensing conditions, any private operator providing sanitation services (e.g., emptying of OSS facilities) within the MWSC's designated service area will do so under a delegated management contract with MWSC. Private operators providing services outside the service areas of MWSC need to obtain a permit directly from NWASCO (NWASCO, 2018).

Zambia Environmental Management Agency (ZEMA): ZEMA is responsible for applying the legal framework for the protection of the environment and the control of pollution. Under the Environmental Management Act, no 12 of 2011, ZEMA regulates discharges into the environment and promotes water pollution monitoring and prevention programs based on enforceable water quality guidelines and standards. ZEMA is also responsible for issuance and enforcement of waste management licenses to any individual or entity who wishes to collect and transport domestic and commercial waste in the city for environmental protection.

3.1.3 Standards

Several laws and regulatory tools exist which provide a clear legal framework for sanitation at both national and local level. These include the following:

The Water Supply and Sanitation Act No. 28 of 1997: Mandates NWASCO to regulate water supply and sanitation provision in urban, peri-urban and rural areas as well as provides for the

formulation of utility companies who are responsible for water supply and sanitation service provision.

Local Government Chapter 281, Volume 16 of the Laws of Zambia: Mandates local authorities for provision of water supply and sanitation services in the respective districts. Service provision is delegated to the utility companies who are owned by the local authorities.

The Public Health Act Chapter 295, Volume 17 of the Laws of Zambia: Mandates local authorities to enforce public health protection.

The Environmental Management Act No. 12 of 2011: Mandates ZEMA to license, regulate and enforce environmental safeguards which includes treated wastewater effluent discharge standards.

Water Resources Management Act of 2011: Establishes the Water Resources Management Authority) WARMA to set, regulate and enforce standards on surface and groundwater quality which are often receiving bodies of treated effluent. It further prescribes the minimum distances for structures including onsite sanitation facilities from natural water resources.

The Statutory Instrument No. 112 of 2013: Sets limits and standards for environmental protection including licensing of vehicles for transportation of faecal sludge and treatment facilities.

Statutory Instrument No. 100 of 2011: Provides for local authorities to manage solid waste in the areas of operation. Poorly managed solid waste systems lead to indiscriminate disposed of municipal waste into onsite sanitation facilities, making emptying services challenging.

4 Stakeholder Engagement

The major stakeholders in this assignment were MWSC, Ministry of Health (MoH) and the Chingola City Council who were contacted for population figures. It was intended to contact the Ward Development Committees (WDCs) for sanitation and population figures in low-income areas during the assignment, but it was found that they were appointed a month before the field visits and the data provided by them was questionable and hence, considered not reliable. The former WDCs could also not be contacted due to political tensions.

As there is only one driver for the vacuum trucks, who is employed by MWSC, an interview was made to get information on the process of the works, from desludging the septic tanks to emptying the vacuum truck. After getting the information, the Sanitation Engineer for MWSC was contacted to review the processes of how the emptying of the vacuum trucks is done.

5 Acknowledgements

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6 References

-Nicholas O'Dwyer, January 2020, "Detailed design and construction supervision of water and sewerage networks in the towns of Chingola, Chililabombwe and Mufulira, Final Design Report – Chingola"

-CAPIC Team, September 2017, "TA2013008 ZM IF3IF, Technical Assistance to Zambia Water and Sanitation Project"

-Six KIIs to stakeholders from the MWSC, CMC and MoH conducted in 2022 (further information in Appendix 2.

7 Appendix

7.1 Appendix 1: Excel Computation Sheer for Population Data

AREA/ASPECT	AREA CLASSIFICATION	POPULATION	ON-SITE SANITATION					OPEN DEFAECATION	EMPTYING		OFFSITE SANITATION	
Area	Area Classification	Total population	Population on onsite sanitation	Population with pit latrines	Pit latrines Emptied	Population with septic tanks	Septic tanks emptied	Population practicing open defaecation	Containment Facilities emptied	Faecal Sludge emptied	Population on off-site sanitation	Estiamted Wastewater generation
BUYANTASHI(124)	LC/MC	5,878	1,230	-	n.a.	1,230	n.a.	-	n.a.	n.a.	4,648	50,895.60
CHABANYAMA(100)	LC	11,293	1,893	-	n.a.	1,893	n.a.	-	n.a.	n.a.	9,400	102,930.00
Chigayo	Informal	750	750	743	n.a.	8	n.a.	-	n.a.	n.a.	-	-
CHIKOLA(101)	MC	11,242	3,759	-	n.a.	3,759	n.a.	-	n.a.	n.a.	7,483	81,938.85
CHINGOLA CENTRAL(119)	HC	3,839	3,216	-	n.a.	3,216	n.a.	-	n.a.	n.a.	623	6,821.85
CHINGOLA SOUTH(130)	MC	10,149	10,149	1,015	n.a.	9,134	n.a.	-	n.a.	n.a.	-	-
CHIWEMPALA(102)	LC	24,750	4,630	3,380	n.a.	1,158	n.a.	93	n.a.	n.a.	20,120	220,314.00
GYMKHANA(129)	HC	2,200	2,200	44	n.a.	2,156	n.a.	-	n.a.	n.a.	-	-
INDUSTRIAL(103)	Industrial	1,400	698	-	n.a.	698	n.a.	-	n.a.	n.a.	702	7,686.90
KABUNDI CENTRAL(104)	HC	5,957	2,737	-	n.a.	2,737	n.a.	-	n.a.	n.a.	3,220	35,259.00
KABUNDI EAST(105)	MC	10,227	2,807	561	n.a.	2,246	n.a.	-	n.a.	n.a.	7,420	81,249.00
KABUNDI NORTH(106)	MC	8,229	2,566	-	n.a.	2,566	n.a.	-	n.a.	n.a.	5,663	62,009.85
KAMBA(121)	LC/MC	8,645	861	-	n.a.	861	n.a.	-	n.a.	n.a.	7,784	85,234.80
KAPISHA(107)	Informal	27,471	27,471	23,350	n.a.	4,121	n.a.	-	n.a.	n.a.	-	-
KASAMA(125)	LC/MC	6,588	1,338	-	n.a.	1,338	n.a.	-	n.a.	n.a.	5,250	57,487.50
KASOMPE(108)	Informal	4,428	3,620	2,896	n.a.	688	n.a.	36	n.a.	n.a.	808	8,847.60
LULAMBA(109)	MC	19,810	9,730	3,406	n.a.	6,325	n.a.	-	n.a.	n.a.	10,080	110,376.00
Lulamba Extension	Informal	25,000	25,000	12,500	n.a.	12,500	n.a.	-	n.a.	n.a.	-	-
MAITENEKE(110)	LC	2,327	1,247	748	n.a.	499	n.a.	-	n.a.	n.a.	1,080	11,826.00
MIMBULA(111)	LC	7,806	4,190	419	n.a.	3,771	n.a.	-	n.a.	n.a.	3,616	39,595.20
MPOROKOSO(123)	LC/MC	7,134	2,607	130	n.a.	2,476	n.a.	-	n.a.	n.a.	4,527	49,570.65
MUZABWERA(122)	LC/MC	7,702	1,276	-	n.a.	1,276	n.a.	-	n.a.	n.a.	6,426	70,364.70
MUSHISHIMA(126) - indiv	LC	90	90	-	n.a.	90	n.a.	-	n.a.	n.a.	-	-
MUSHISHIMA(126) - kiosk	Informal	1,000	1,000	950	n.a.	-	n.a.	50	n.a.	n.a.	-	-
NCHANGA SOUTH(113)	HC	10,688	368	-	n.a.	368	n.a.	-	n.a.	n.a.	10,320	113,004.00
NCHANGA NORTH(112)	MC	18,392	5,784	-	n.a.	5,784	n.a.	-	n.a.	n.a.	12,608	138,057.60
RIVERSIDE(114)	HC	8,876	5,208	104	n.a.	5,104	n.a.	-	n.a.	n.a.	3,668	40,164.60
MIKILONI(127)	LC	7,133	6,943	4,166	n.a.	2,777	n.a.	-	n.a.	n.a.	190	2,080.50
SOWETO	Informal	15,290	15,290	13,149	n.a.	1,529	n.a.	612	n.a.	n.a.	-	-
SOWETO EXTENSION	Informal	9,900	9,900	8,514	n.a.	990	n.a.	396	n.a.	n.a.	-	-
TOWN CENTRE(115)	Commercial/ HC	6,563	1,571	-	n.a.	1,571	n.a.	-	n.a.	n.a.	4,992	54,662.40
TWATASHA SITE AND SERVICE(116)	LC	9,351	1,231	123	n.a.	1,108	n.a.	-	n.a.	n.a.	8,120	88,914.00
TOTAL		300,108	161,360	76,199	-	83,975	-	1,186	-	-	138,748	2,025,720.80
PERCENTAGES COVERED BY PARTICULAR SYSTEMS			53.8	25.4		28.0		0.4			46.2	

7.2 Appendix 2: Stakeholder identification

Table 6: Chingola – Stakeholder Identification.

Name of Organization	Name of Contact Person	Position	Influence (High/Medium/Low)	Interest (High/Medium/Low)
MWSC	Aselo Soko	GIS Engineer	Medium	High
MWSC	Bruce Kabuka	Engineer Peri-Urban	High	High
MWSC	Cecilia Nyirenda	Engineer	Medium	High
MWSC	Alex Musonda	Engineer Sanitation	High	High
CMC	Johnson Kang'ombe	Mayor	Low	Medium
MoH	Simon Chilufya	District Health Officer	Medium	High

7.3 Appendix 3: Tracking of Engagement

Table 7: Chingola – Tracking of Engagement.

Stakeholders Engaged	Date of Engagement	Purpose of Engagement
MWSC staff working in the GIS department.	03/02/2022	Agreement on city boundaries and map for Chingola district. Definition of water and sewerage networks.
MWSC staff – Focal Point Persons	02/02/2022 to 10/02/2022	Agreement on population figures, extent of the water network and Sewer network.
MWSC staff – Sanitation Engineer	02/02/2022 to 10/02/2022	Information on status of sewer network, sewer pump stations, ponds, distribution on septic tanks and pit latrines. Information on Vacuum truck.
Ministry of Health – Chingola	07/02/2022 to 09/02/2022	Information on total population for Chingola.

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