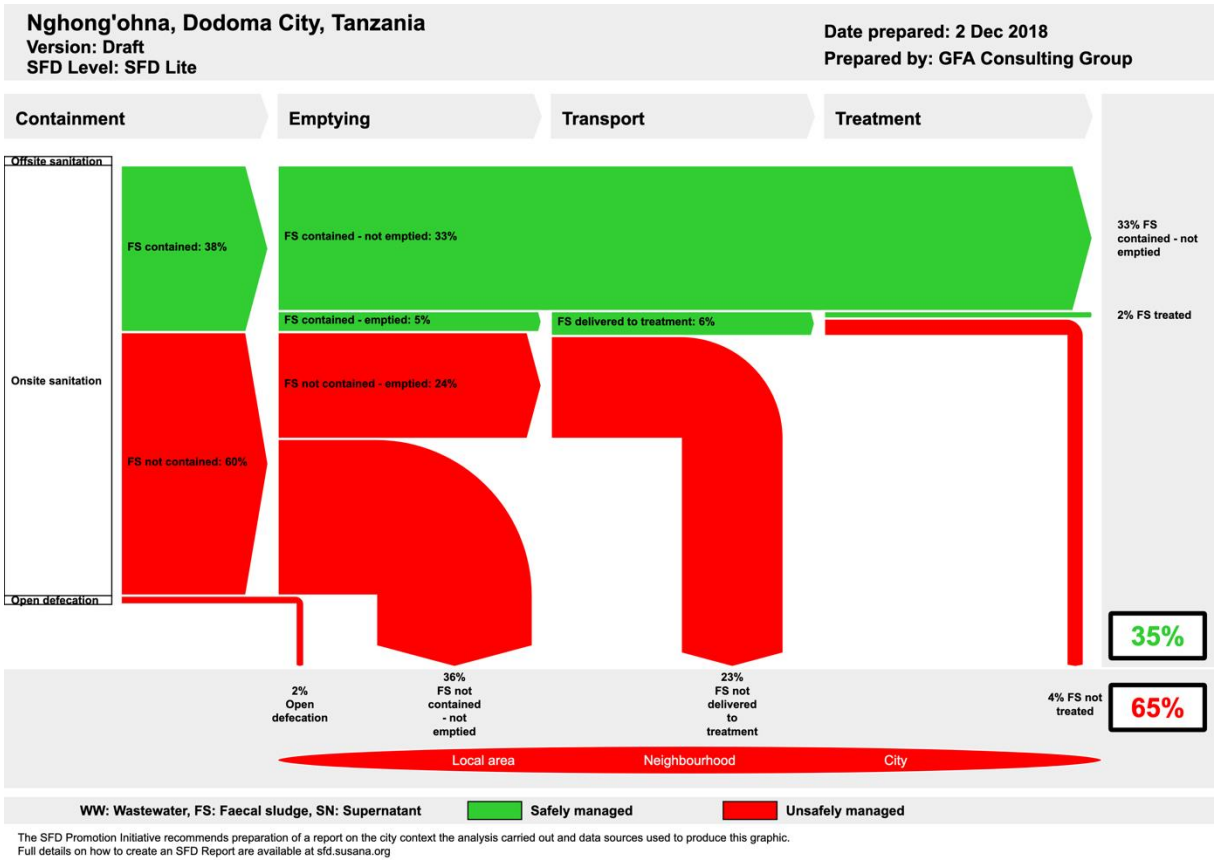
SFD Lite Report

Ng'hong'ohna Mtaa
Tanzania

This SFD Lite Report was prepared by GFA Consulting Group GmbH.

Date of production/ last update: 02/12/2018

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 SFD Lite information

Produced by:

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- We acknowledge the support of Eng. Mgunda, Sewerage Engineer of DUWASA who contributed to the production of the SFD Lite and arranged several site visits and stakeholder meetings.

Collaborating partners:

- Dodoma City Council
- Dodoma Urban Water Supply and Sanitation Authority

Date of production: 02/12/2018

3 General city information

Ng'hong'hona Mtaa is one of the selected project areas for GIZ funded "*Scaling up of access to water supply and sanitation services in under-privileged urban areas*". It is currently implementing a scaling up project to connect the ward to piped water from groundwater source through the Dodoma Urban Water Supply and Sewerage Authority (DUWASA) water supply network. The scaling up of sanitation services is also part of the expected results for this project. Hence, this SFD Report mostly follows a first Baseline Study carried out in June 2018 (GFA Consulting Group GmbH, 2018).

Ng'hong'ohna Ward (which covers practically the same area as Ng'hong'ohna Mtaa) is one of the 41 wards located in Dodoma City. It is located on the south-eastern part of the city covering an area of 130.675 m² (Dodoma Municipal Council, 2017). The area is characterized by a broad upland plain and located between hills bordering the University of Dodoma. The current total population for the project area, Ng'hong'ohna Mtaa ,is projected to **10,400** with an average population annual growth rate of 2.4% (GFA Consulting Group GmbH, 2018). In general, the Dodoma City Council population dynamics is on a growing trend as the "new" capital of Tanzania.

This densely populated ward is composed of informal housing arrangements considered as an unplanned or squatted area. There is a significant diurnal variation of people coming in and leaving for work (KII-1, 2018). It is a medium activity expansion zone with migration (rural to urban) and house construction activities, due to low price for plots and its proximity to Dodoma University (GFA Consulting Group GmbH, February 2018). Most of the residents are low-income people and underserved in terms of water supply (GFA Consulting Group GmbH, February 2018).

Ng'hong'ohna is a semi-arid area, characterized by a marked seasonal rainfall distribution with a long dry season starting from late April to late November and a short wet season starting late November to the end of April. Average rainfall ranges from 550mm to 600mm per annum (Dodoma Municipal Council, 2017). The average temperatures vary from 20^{0}C in July to - 30^{0}C in November. Generally, the Council experiences both high and low temperature. The highest temperature is 31^{0}C while the lowest temperature is 13^{0}C.

Sanitation challenges exist due to the very high groundwater table between 2-10 m. During the dry season, shallow unprotected boreholes are dug for drinking water. During the rainy season, overflow of pits and tanks may occur causing contamination to surface water as a primary source used during that time of the year.

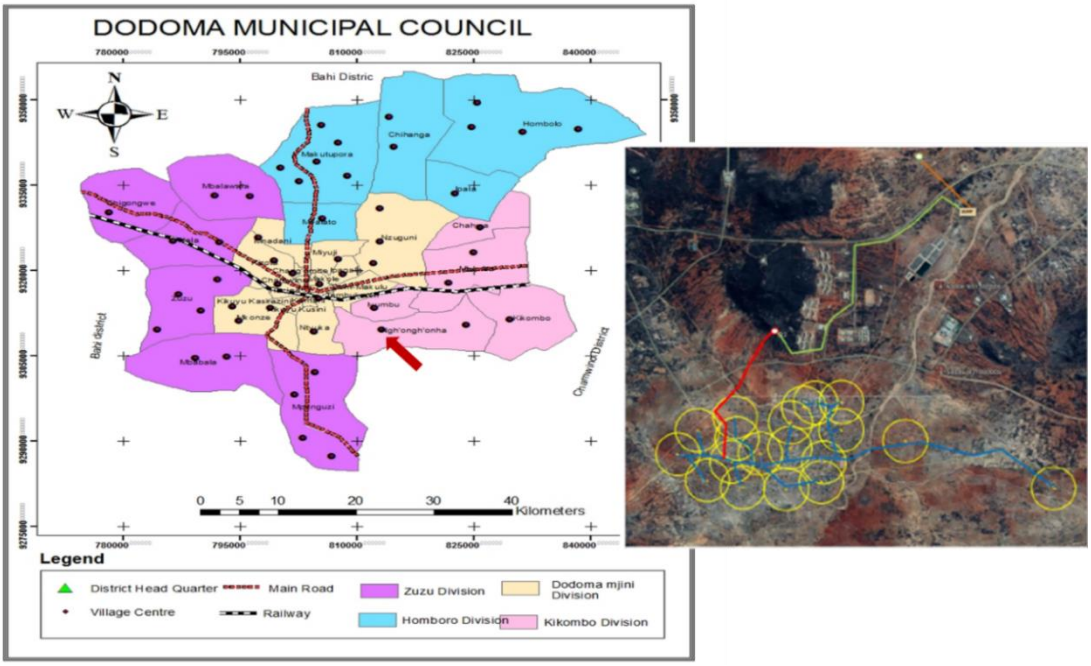

Figure 1 Ng'hong'onha Ward of Dodoma City (GIZ, 2018)

4 Service outcomes

Table 1: SFD Matrix for Ng'hong'hona (GIZ 2018)

Nghong'ohna, Dodoma City, Tanzania, 2 Dec 2018. SFD Level: not set
Population: 10400
Proportion of tanks: septic tanks: 100%, fully lined tanks: 100%, lined, open

System label	Pop	F3	F4	F5
System description	Proportion of population using this type of system	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
T1A1C5 User interface discharges directly to soak pit	8.0			
T1A2C5 Septic tank connected to soak pit	1.0	90.0	70.0	30.0
T1A3C5 Fully lined tank (sealed) connected to a soak pit	1.0	90.0	70.0	30.0
T1A3C9 Fully lined tank (sealed) connected to 'don't know where'	7.0	90.0	70.0	30.0
T1A5C10 Lined pit with semi-permeable walls and open bottom, no outlet or overflow	6.0	50.0	0.0	0.0
T1B7C10 Pit (all types), never emptied but abandoned when full and covered with soil, no outlet or overflow	22.0			
T1B8C10 Pit (all types), never emptied, abandoned when full but NOT adequately covered with soil, no outlet or overflow	17.0			
T1B10C10 Containment (unlined tanks, partially lined tanks and pits, and unlined pits) failed, damaged, collapsed or flooded -	36.0	50.0	0.0	0.0
T1B11 C7 TO C9 Open defecation	2.0			

The produced SFD graphic shows that 65% of the population from the area produces Faecal Sludge (FS) that is unsafely managed. A large proportion of this 65% comes from pits never emptied and abandoned when full but not adequately covered by soil (T1B8C10) and onsite systems where containment failed, collapsed or flooded (T1B10C10), representing 17% and 36% of that percentage, respectively. The area depends mostly on On-Site Sanitation (OSS) as it is not connected to the

sewerage line and is underserved with piped potable water. Issues with containment exist mostly from traditional pit latrines, which are not properly lined and may collapse during the rainy season. In addition, there are only emptying services in the area for the very few households with septic tanks, lined tanks and soak pits. This means that Households (HHs) mostly depend on manual emptying and disposal of FS in nearby pits. Most FS from this area is not safely transported to a disposal or treatment site. Nonetheless, 35% of the population is exposed to what is considered as safely managed FS. Traditional Pit Latrines, which are adequately covered and abandoned, represent 22% of those safely managed excreta. With the growing population trend in the area, there will soon not be enough space to practice this form of sanitation. Hence, there are serious needs to improve the sanitation chain from improving containment, implementing proper emptying and transportation services and investing in a proper FS treatment solution.

4.1 Containment

Ng'hong'hona Ward is not connected to the DUWASA Sewerage network. This means that Ng'hong'hona relies mostly on On-Site Sanitation (OSS), particularly traditional pit latrines that are abandoned when full representing 75 % of OSS (GFA Consulting Group GmbH, 2018).

Based on the project area Baseline Survey on Sanitation Report (GFA Consulting Group GmbH, 2018), containment was classified in three general categories such as Improved Latrines, Unimproved Latrines and "No Toilet Facility". Compared to Traditional Latrines, Improved Latrines were defined as "*having an impervious and washable floor e.g. Sanplat, a superstructure with roof and lockable door, stability of both substructure and superstructure, hand washing facilities, fly proofing, lined pit hole***".** In addition, improved sanitation/latrine include Pour-flush/flush latrine, Improved Pit Latrine, Ventilated Improved Pit latrine, Composting latrine, Ecological sanitation. Below are the types of containment that were further classified during the Baseline Study.

Table 2 Type of Toilets/Containment in Ng'hong'onha (GFA Consulting Group GmbH, 2018)

Local containment classification		**Population access (%)**
Improved Latrines/Sanitation	Pour Flush linked to septic system	0.4
	Pour Flush linked to pit	15.2
	VIP Latrine (vent pipe, fly screen and superstructure)	6.5
Unimproved Latrines	Traditional Pit Latrine with slab	41.7
	Traditional Pit Latrine without slab/open pit	33.5
No Toilet Facility		2.6

Another factor in containment is that according to our KII, solid waste is often disposed directly in the latrines or with the final disposal of faecal sludge (KII-1, 2018).

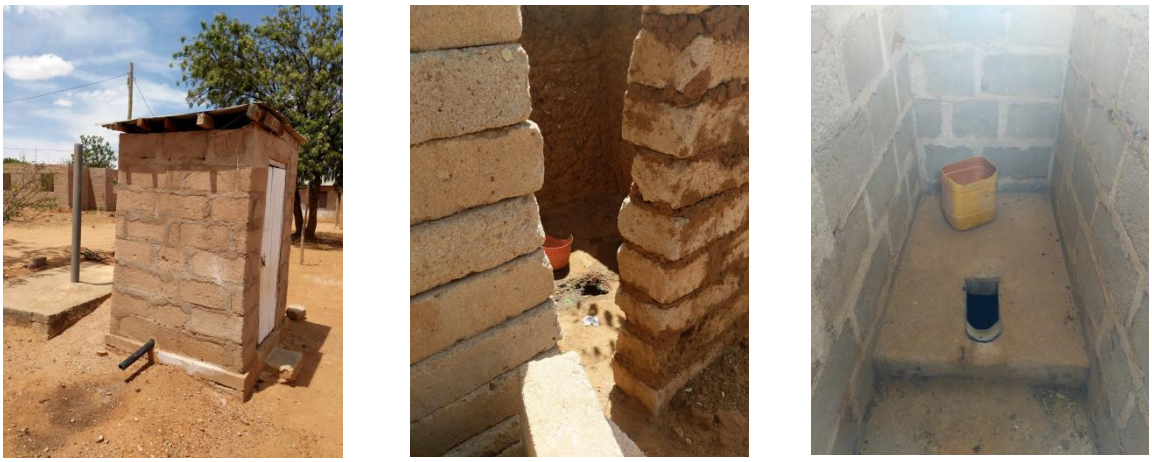

Figure 2 Examples of OSS in Ng'hong'ohna

4.2 Emptying

Based on the GIZ Baseline Survey Report, there were no cases of emptying services, which were reported in Ng'hong'ohna (GFA Consulting Group GmbH, 2018). Households generally empty and dispose manually their faecal sludge in a nearby pit. However, from our site visit, we observed that a few houses with pour flushes connected to a tank, septic tank or soak pit, do empty using cesspit truck emptying services (FGD-4, 2018).

Manual emptying and disposal to nearby pits is mostly practised in low-income areas of Dodoma City such as Ng'hong'ohna. This is very risky to the groundwater especially in areas of high water table (KII-1, 2018).

It is also the case that some households simply do not empty their containments. There have been at least eight cases this year of HHs fined for overflowing containments (FGD-4, 2018).

4.3 Transport

As mentioned above, HHs generally empty and dispose their faecal sludge in a nearby pit (GIZ, 2018). This means there is essentially no transportation and disposal service to a treatment site from these OSS.

There are only a very few households that use emptying and transportation services in the case on tanks and soak pits.

In addition, there are no sewers in this area of Dodoma City, meaning no wastewater-collecting network.

4.4 Treatment

Most of the wastewater and faecal sludge are not transported to a treatment site. Therefore, there is globally no treatment in the project area, except for what is considered as safely disposed from Traditional Pit Latrines, which are covered and abandoned. However, with a growing population, land space will eventually diminish, and this type of "solution" will not be possible anymore as seen in other parts of Dodoma City.

For the small proposition of faecal sludge that is transported to the treatment site, the FS is disposed at the inlet anaerobic pond of the waste stabilization ponds (WSP) at Swaswa area, about 7km north-east of Dodoma city (GFA Consulting Group GmbH, 2018). However, the SWASA WSP was meant to treat wastewater and not sludge. There is a need for dry beds for sludge treatment. In addition, Dodoma City Council allocated a new area for WW Treatment system at Nzughuni with an area of 60 hectares. The design involves the provision of sludge drying beds (GFA Consulting Group GmbH, 2018).

Figure 3 Swaswa WSP

According to our KII, there is 70 to 80% treatment efficiency, but the results of the effluent analysis reveal that it does not comply with the Tanzania Standards (GFA Consulting Group GmbH, 2018)

4.5 Reuse and disposal

On manual emptying of sludge, there is no official information on the legal reuse of faecal sludge and wastewater. Households generally manually empty their OSS containments, and dispose the FS in a nearby pit, in which the FS is often not adequately contained. Some untreated faecal sludge and wastewater are unsafely used in agriculture, but details of such practices are not clear.

4.6 Groundwater contamination

Drinking water for Ng'hong'ohna residents is mostly from tanker-trucks, which transport unregulated water from groundwater sources from Dodoma City, which can be from protected or unprotected boreholes. The alternative is water from wells dug within the dead stream in the south of Nghong'ohna. Some households of course, use rainwater during rainy season (66%) for all purposes. Other poor households (21% during rainy season) resort to using some dirty brownish water from the pond in the southwest of Nghong'ohna residential area for domestic use including sanitation and hygiene (GFA Consulting Group GmbH, 2018).

Table 3 Drinking water sources (GFA Consulting Group GmbH, 2018)

Primary Source	**Rainy Season (%HHs)**	**Dry Season (%HHs)**
Piped / Public tap	1.3	1.2
Tube well / borehole	**1.3**	**2.2**
Protected dug well	**0**	**9.1**
Unprotected dug well	**1.3**	**1.3**
Rainwater collection	**66.5**	0.9
Refilled bottled water	0.4	0.4
Small scale water vendors	0	0.4
Tanker truck	**9.6**	**73.9**
Surface water	20.9	10.4

The depth of the groundwater is very shallow between 1.5 and 2 m. during the rainy season and 25 m. during the dry season (FGD-4, 2018). The area has three principal soil types; white sandy soil, red loamy soil, and poorly drained black clay soil called 'mbuga' (Massawe, 2017). The groundwater is mostly found in fractured formation. Despite these fractured aquifers, groundwater is also found in the upper regolith part of the catchment (Massawe, 2017). Studies have shown that for Dodoma City, high values of Nitrate levels and high groundwater pollution risk are also partly linked to pollution from sewage effluents with penetration of the pollution to deep levels in the crystalline aquifer via fractures occur (Massawe, 2017) (British Geological Survey, 2000).

Figure 4 Dug wells during Dry Season

However, considering the risk of groundwater of the specific project area, means that we can only account for the 13% of residents who rely on groundwater from the area. Most boreholes are much further than 10 m from any household. Hence, for the case of the project area, the ground water pollution is considered to be of Low Risk. This does not consider the risk the population might be facing from other drinking water sources.

5 SFD Graphic

The above-described sanitation chain of Nghong'ohna is summarised in the SFD Graphic (Figure 6).

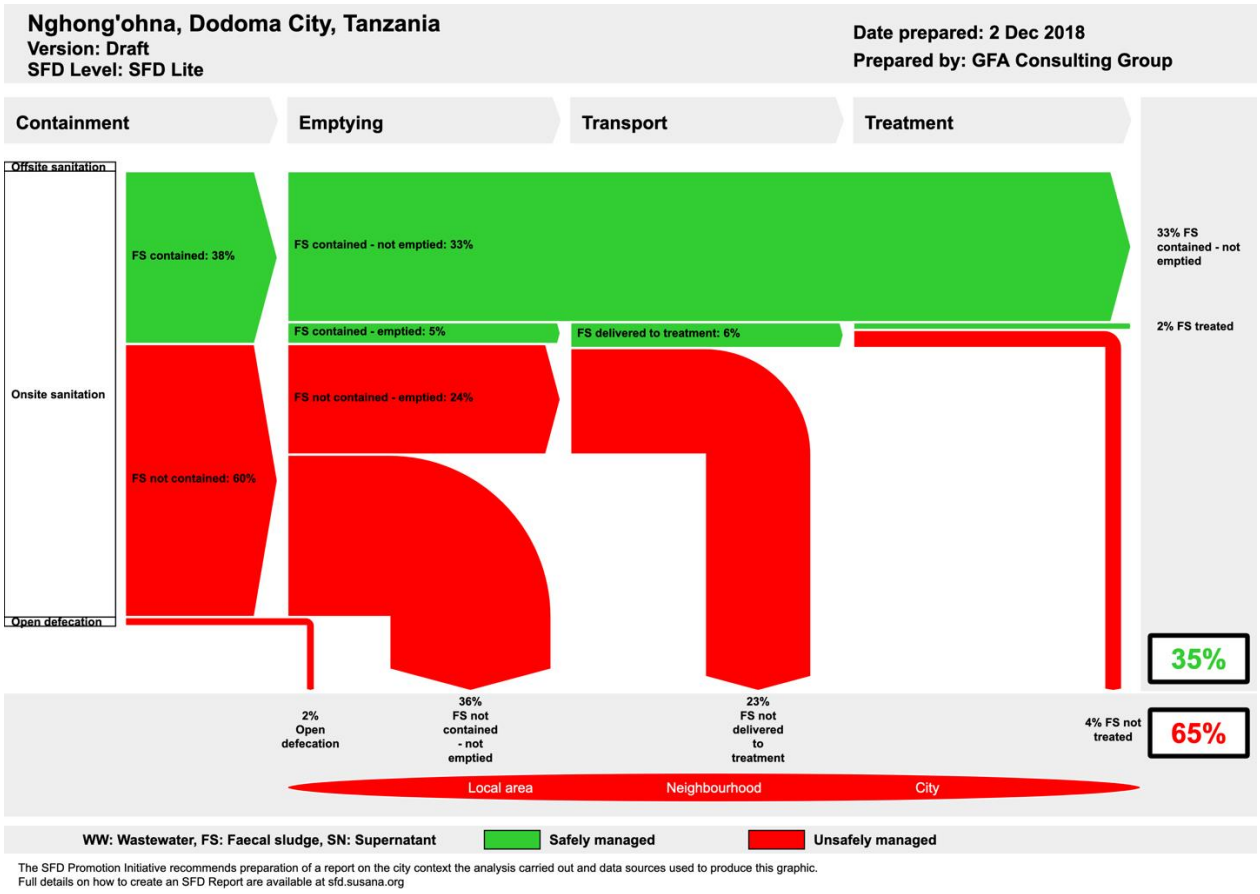

Figure 5:SFD Graphic for Ngong'ohna

The safely managed excreta (35%) originate from FS contained but not emptied from onsite systems located in areas of low groundwater pollution risk. Most of that safely managed FS (22%) is from the practise of covering and digging new pits when the old one gets full. In the medium- to long- term, this practise may not be sustainable and FSM improvements to emptying, transport and treatment services will be required in the future.

The balance (65%) of excreta are unsafely managed. Most of which is from FS not contained and not emptied from unsafe pits (36%), and FS emptied but not delivered to treatment (23%).

6 Data and assumptions

Due to on-going project activities in Ng'hong'onha, most of the information was easily available through project reports such as a feasibility study and a sanitation baseline report (see list of data sources). To produce this SFD, a 10-day expert mission on site was carried out to complete the missing information mainly through Key-Informant-Interviews and site visits.

6.1 Major assumptions

Table 4 Type of Toilets/Containment in Ng'hong'hona and SFD assumptions (GFA Consulting Group GmbH, 2018)

Local containment classification	Surveyed (%)	SFD Classification	SFD (%)
Pour Flush linked to septic system	0.4	Septic tank to soak-pit (T1A2C5)	1
		Fully lined tank to soak-pit (T1A3C5)	1
Pour Flush linked to pit	15.2	No onsite container to soak-pit (T1A1C5)	8
		Fully lined tank to "don't know where" (T1A3C9)	7
VIP Latrine (vent pipe, fly screen and superstructure)	6.5	Lined pit (T1A5C10)	6
Traditional Pit Latrine with slab	41.7	Pit abandoned and covered (T1B7C10)	22
		Containment collapse (T1B10C10)	20
Traditional Pit Latrine without slab/open pit	33.5	Pit not adequately covered (T1B8C10)	17
		Containment collapse (T1B10C10)	16
No Toilet Facility	2.6	No toilet. Open defecation (T1B11 C7 TO C9)	2

- It was observed that HHs refer only to septic tanks connected to soak pits, when in reality some were actually lined tanks connected to a soak pit. We assume **70**% are septic tanks (FGD-1, 2018), but since the SFD graphic does not allow for numbers less than 1%, we then assume 1% for each of these two types (T1A2C5, and T1A3C5) .
- We also observed many Pour flush toilets connected to a lined tank with no outlet. We assume that 50% of the pour flush linked to pit, are these cases.
- Most of the traditional pit latrines – without or without a slab - have no roof, no privacy doors, have weak slabs (soft wood used), that imply inadequate safety to users, superstructures are not stable, made up of mud bricks (48.6%), no lining for the pit thus susceptible to collapse during the rainy season forcing households' members to seek permission from neighbours to share their sanitation facilities or go for open defecation (GFA Consulting Group GmbH, February 2018). Hence, we can assume that **50**% of traditional pit latrines' containment collapse (T1B10C10 = 36%).
- We also observed that some households cover their traditional pits with cement and others with soil improperly. We have then assumed that what is categorized as Traditional Pit Latrine without slab/open pit are not necessarily properly covered (T1B8C10 = 17%). This assumption especially considers the risk of poor coverage and consequences during rainy season. This should be further investigated.
- It has been observed that "no toilets" can also include in addition to Open Defecation (ODF), a percentage of the population that has no toilet, but uses toilets from neighbours (KII-2, 2018). Some HHs with toilets might even practice open defecation due to poor maintenance and hygiene of toilets. Hence, the T1B11C7 to C9 = 2% can represent all these scenarios.
- We also know form the Baseline Report that there were hardly any emptying services observed. Hence, we assume there is no transportation and no treatment from manual emptying households. Households generally empty and dispose their faecal sludge in a nearby pit (GFA Consulting Group GmbH, 2018). We assume this is not an adequate transportation of FS to a treatment or disposal facility. We assume 50% manually empty their pits. This should be further investigated (FGD-1, 2018).
- However, for the small proportion of septic and fully lined tanks, we assume about **90%** of households empty their tanks through emptying services, of which **70%** are transported to the treatment site (KII-3, 2018). Illegal dumping may occur, especially during the rainy season.
- We assume only **30**% of faecal sludge delivered to treatment are treated as the WSP is not appropriate for treating sludge – see comments in section 4 on treatment.

7 List of data sources

British Geological Survey, 2000. *Ground Water Quality: Tanzania,* s.l.: WaterAid.

Dodoma Municipal Council, 2017. *Dodoma Profile,* Dodoma, Tanzania: Dodoma Municipal Council.

FGD-1, 2018. *Solid & Liquid Waste Officer, Dodoma City Council & Sewerage Engineer, Duwasa* [Interview] (November 2018).

FGD-2, 2018. *Sewarage Engineer (DUWASA), Muyengo Mtaa Sanitation Committee and GIZ Dodoma Focal Point* [Interview] (November 2018).

FGD-4, 2018. *Ng'hong'ohna Ward and Mtaa Chairmans and Officers* [Interview] (December 2018).

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GFA Consulting Group GmbH, February 2018. *Final Feasibility Study,* Dodoma-Nghong'ohna: GIZ-funded project "Improvement of urban water supply and sanitation services in under-served areas in Tanzania".

KII-1, 2018. *DUWASA, Sewerage Engineer* [Interview] (November 2018).

KII-2, 2018. *DUWASA, Technical Manager* [Interview] (November 2018).

KII-3, 2018. *Kelly Drain Maintenance Services, Truck Manager* [Interview] (November 2018).

Massawe, S., 2017. Impact of human activities on groundwater vulnerability in hombolo catchment: Dodoma, Tanzania. *African Journal of Environmental Science and Technology*, December, pp. 609-621.