UNITED REPUBLIC OF TANZANIA

MINISTRY OF WATER

ENERGY AND WATER UTILITIES REGULATORY AUTHORITY (EWURA)

GUIDELINES FOR ONSITE SANITATION AND FAECAL SLUDGE MANAGEMENT FOR WATER AND SANITATION AUTHORITIES, 2020

August 2020

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INTRODUCTORY NOTE

Over the past 10 years, the Energy and Water Utilities Regulatory Authority's (EWURA) regulatory activities in sanitation services have mainly focused on sewerage services (offsite facilities). The faecal sludge from onsite sanitation that constitutes nearly 90% of the total sanitation facilities in Water Supply and Sanitation Authorities (WSSAs) service areas is not adequately regulated. Poor management of faecal sludge has a negative effect to human health and the environment.

The need to prepare Guidelines for On-Site Sanitation (OSS) and Faecal Sludge Management (FSM) for WSSAs emanates from the requirement of the Water Supply and Sanitation Act of 2019 (Act). Under the Act, one of the responsibilities of WSSAs is to provide water supply and sanitation services which include OSS and FSM services. Thus, in order to ensure protection of public health and environmental sustainability it is necessary for EWURA to implement its mandate to regulate OSS and FSM services that are within the mandate of WSSAs.

The OSS/FSM Guidelines are meant to be used by both EWURA and WSSAs performing OSS & FSM activities. Other users of the Guidelines include LGAs, private sector providing OSS and FSM services, Ministries dealing with Sanitation, NEMC, TBS, RUWASA and other stakeholders such as urban planners, housing developers, construction and consulting companies.

EWURA appreciate the efforts of all those who participated in every step of developing these important Guidelines. In particular, grateful to key stakeholders from Government institutions, NGOs and private sector for sharing data and information on OSS and FSM during preparation of the Guidelines.

EWURA further extends sincere gratitude to Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ) GmbH, Eastern and Southern Africa Water and Sanitation (ESAWAS) Regulators Association, for which without their cooperation, guidance and financial support the Guidelines would not have been possible. Also, EWURA takes due cognizance of the intensity and diligence of work undertaken by the Consultants Eng. Romanus A. Mwang'ingo and Eng. Mutaekulwa Mutegeki to compile the Guidelines.

Furthermore, adherence to these Guidelines will provide a safer working environment for OSS/FSM workers thus improving their performance and protecting the public and environment.

……,
Eng. Godfrey H. Chibulunje
Acting Director General,
EWURA

LIST OF ABBREVIATIONS AND ACRONYMS

Abbreviation	Definition
ARU	Ardhi University
ATAWAS	The Association of Tanzania Water Suppliers
BOD	Biochemical Oxygen Demand
BORDA	Bremen Overseas Research and Development Association
BWB	Basin Water Boards
CAP	Chapter
CAPEX	Capital Expenditure
CCC	Consumer Consultative Council
CBO	Community Based Organization
CWIS	Citywide Inclusive Sanitation
DAWASA	Dar es Salaam Water and Sanitation Authority
DCOMM	Design, Construction, Operation and Maintenance Manual
DEWATS	Decentralized Wastewater Treatment System
DPG	Development Partners Group
DPs	Development Partners
DSM	Dar es Salaam
DTF	Decentralized Treatment Facilities
DTWSSAs	District and Township Water Supply and Sanitation Authorities
EMA	Environmental Management Act
EWURA	Energy And Water Utilities Regulatory Authority
FSM	Faecal Sludge Management
FSTP	Faecal Sludge Treatment Plants
GCC	Government Consultative Council
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GN	Government Notice
GPS	Global Positions System
HH	Household
IEC	Information, Education and Communication
ISO	International Standards Organization
JTP	Joint Town Planning
KPI	Key Performance Indicator
LGA	Local Government Authority
MAPET	Manual Pit Emptying Technology
MC	Municipal Council
MHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MoW	Ministry of Water
NAWAPO	National Water Policy
NEMC	National Environment Management Council
NGO	Non-Government Organization

Abbreviation	Definition
NHP	National Health Policy
NPWSSAs	National Projects Water Supply and Sanitation Authorities
NSOCG	National Sanitation Options and Construction Guideline
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OPEX	Operational Expenditure
OSS	On Site Sanitation
PH	Public Health
PO-RALG	President's Office Regional Administration and Local Government
PPE	Personal Protective Equipment
PPP	Public Private Partnership
PSP	Private Sector Partnership
RWSSAs	Regional Water Supply and Sanitation Authorities
S&H	Sanitation and Hygiene
SDG	Sustainable Development Goal
SOP	Standard Operating Procedures
LATRA	Land Transport Regulatory Authority
RAB	Regulatory Asset Base
RS	Regional Secretariat
TRA	Tanzania Revenue Authority
TWA	Trade Waste Agreement.
TZS	Tanzania Standard
SUA	Sokoine University of Agriculture
VETA	Vocational Education and Training Authority
VIP	Ventilated Improved Pit
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WRM&PC	Water Resources Monitoring and Pollution Control
WSS	Water Supply and Sanitation
WSSA	Water Supply and Sanitation Authority
WSP	Waste Stabilization pond
WW	Wastewater
WWTP	Wastewater Treatment Plant

DEFINITIONS

Building Permit A Building Permit is an official document authorizing the construction of a building issued by the Local Government Authority which enforces construction standards[1].
Business Licence
A business licence is a permit authorising a private operator to provide OSS and FSM services issued by a Local Government Authority based on the Business Licensing Act (1972)[2].
Capture /Toilet
The user interface with the sanitation system, where excreta is captured, and can incorporate any type of toilet seat or latrine slab, pedestal, pan or urinal. There are several types of toilets, for example pour- flush and cistern-flush toilets, dry toilets and urine-diverting toilets[3].
Containment
The containment is only relevant to non-sewered sanitation systems and refers to the container, usually located below ground level, to which the toilet is connected. These include containers that are designed for either[4]: ❍ containment, storage and treatment of faecal sludge and effluent (e.g. septic tanks, dry- and wet-pit latrines, composting toilets, dehydration vaults, urine storage tanks etc.); or ❍ containment and storage (without treatment) of faecal sludge and wastewater (e.g. fully lined tanks, container-based sanitation).
Disposal of Faecal Sludge
End use/disposal refers to the different technologies and methods by which treated products are ultimately discharged into the environment, either as end use products or reduced-risk materials. Where there is an end use for treated products by which (ideally fully treated) wastewater and sludge are ultimately produced, they can be applied or used. Otherwise, additional risk reducing barriers are needed, or the products should be disposed of in ways that are least harmful to the public and environment[5].
Excreta
Urine and faeces[6].
Faecal Sludge
Solid and liquid wastes removed from on-site storage containers, also called septage when removed from septic tanks[7].
Faecal Sludge Management
Faecal sludge management is a system for safe collection, transport, treatment, disposal and/or reuse of faecal sludge[8].

1 *Urban Pla*nni*ng Act (2007)*
2 *Business Lice*nsing Ac*t (1972)*
3 *WHO guidelines on sanitation and health (2018)*, Page 197
4 *WHO guidelines on sanitation and health (2018), Section 3.3.1*
5 *WHO guidelines on sanitation and health (2018), Section 3.6.1*
6 *WHO guidelines on sanitation and health (*2018), Page 194
7 *WHO guidelines on sanitation and health (2018)- Page 19*4
8 *ESAWAS Regulation strategy and Framework for inclusive urban sanitation service provision Incorporating Non-Sewered Sanitation Services (2019*)

Household
Household means premises which are occupied by a family unit for domestic purposes[9].
Offsite Sanitation
A sanitation system in which excreta (referred to as wastewater) is collected and transported away from the plot where they are generated. An off-site sanitation system relies on a sewer technology for transport[10].
Onsite Sanitation
A sanitation system in which excreta and wastewater are collected and stored or treated on the plot where they are generated[11].
Pollute
Means to directly or indirectly alter the physical, thermal, chemical, biological or radioactive properties of water so as to render such water less fit for any beneficial purpose for which it is, or may reasonably be used, or cause a condition which is hazardous or potentially hazardous to public health, safety welfare or to animals, birds, fish or aquatic life, or organism or to plant and "pollution" has corresponding meaning[12].
Re-use (end-use)/Disposal of Faecal Sludge
The methods by which products are ultimately returned to the environment as reduced-risk materials and/or used in resource recovery. If there is an end use for the output they can be applied or used, otherwise they should be disposed of in ways that are least harmful to the public and the environment[13].
Sanitation
The provision of appropriate facilities and services for the collection and disposal of human excreta and wastewater[14].
Service Provider
A service provider appointed in accordance with sections 19 and 37 of Water Supply and Sanitation Act (2019)[15].
Sanitation Service Chain
Sanitation Service Chain means all components and processes comprising a sanitation system, from toilet capture and containment through emptying, transport, treatment (in-situ or offsite) and final disposal or end use[16].

9 *Water Supply and Sanitation Act (2019*)
10 *WHO guidelines on sanitation and health (2018), Page19*6
11 *WHO guidelines on sanitation and health (2018), Page 19*6
12 *Water Supply and Sanitation Act (2019)*
13 WHO guidelines on sanitation and health (2018), Page194
14 *Water Supply and Sanitation Act (2019*)
15 *Water Supply and Sanitation Act (2019*)
16 *WHO guidelines on sanitation and health (2018), Page19*6

Sanitation Works
Means sewers, drains, pipes, ducts or channels, whether open or closed, used for the drainage of human excreta or wastewater from buildings or land, and on-site systems for the reception of human excreta and wastewater which do not connect to a sewer[17].
Sewage
Sewage means liquid waste conveyed in sewers but does not include storm water[18].
Sewerage
The physical sewer infrastructure for conveyance and treatment of sewage[19].
Sewer
Sewer means any pipe or conduit other than a drain used, or for use, for the conveyance of sewage[20].
Sustainable Development Goal (SDG) 6.2
By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations[21].
Toilet
Refers to the user interface with the sanitation system, where excreta is captured, and can incorporate any type of toilet seat or latrine slab, pedestal, pan or urinal. There are several types of toilets, for example pour- and cistern-flush toilets, dry toilets and urine-diverting toilets[22].
Trade Waste Agreement
The trade waste agreement as stipulated under sub-regulation 10(1) & (2) of Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations (2019) may be entered between a water authority and private operator for sucking, transporting and disposing wastewater and sewage to wastewater disposal works, or with a person who is connected or applying to be connected with public sewer as may be determined by the water authority[23].
Transportation of Faecal Sludge (Conveyance)
Conveyance refers to the deliberate movement of wastewater or faecal sludge from a containment technology to off-site treatment, and/or end use/ disposal. Conveyance systems can be sewer-based or based on manual or motorized emptying and transport[24].

17 *Water Supply and Sanitation Act (2019*)
18 *Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations (2019*)
19 *WHO guidelines on sanitation and health (2018), Page 197*
20 *The Water Supply And Sanitation Act, (2019*)
21 *https://sdgs.un.org*
22 *WHO guidelines on sanitation and health (2018) Section 3.2.1*
23 *Water Supply and Sanitation (Provision and Management of Sewag*e and Wastewater Serv*ices) Regulations(2019)*
24 *WHO guidelines on sanitation and h*ealth (2018) Section 3.4.1

Treatment of Faecal Sludge
Treatment refers to the process(es) that changes the physical, chemical and biological characteristics or composition of faecal sludge or wastewater so that it is of a quality that is fit for purpose for the intended next use or disposal taking into account additional barriers in place at the end use/disposal step[25].
User Interface User Interface describes the type of toilet, pedestal, pan, or urinal with which the user comes in contact; it is the way by which the user accesses the sanitation system[26].
Wastewater
Wastewater means liquid waste of excremental and non-excremental nature but does not include storm water[27].
WSSA License
A license issued by EWURA to a WSSA for provision of water supply and sanitation services based on Water Supply and Sanitation Act (2019) and Energy and Water Utilities Regulatory Authority Act CAP 414[28].

25 *David Blockley, 2005 "The New Penguin Dictionary of Civil Engineering" Strande et al, 2014 "Faecal sludge Management" Pg. 98*

26 *WHO guidelines on sanitation and health (2018)*, Page 198

27 *Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations (2019*)

28 *Water Supply and Sanitation Act (2019) and Energy and Water Utilities Regulatory Authority Act CAP 414*

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1. INTRODUCTION

1.1 Background

EWURA is an autonomous multi-sectoral regulatory authority established under the EWURA Act, Cap 414 of the Laws of Tanzania to regulate energy and water sectors. In the water sector, EWURA is responsible for regulating water utilities established under section 9 of the Water Supply and Sanitation Act, Cap 272 the currently regulated water utilities are 26 Regional WSSAs (RWSSAs), 60 District and Township WSSAs (DTWSSAs) and seven (7) National Projects WSSAs (NPWSSAs).

EWURA's functions in water and sanitation regulation are set out in the EWURA Act and the Water Supply and Sanitation Act. The functions include, inter alia, issuing, renewing and cancelling of licences; establishing standards for services; regulating rates and charges; making rules; facilitating the resolution of complaints and disputes; and disseminating information about matters relevant to its functions. Furthermore, EWURA is responsible for monitoring the performance of the regulated utilities in relation to availability, quality, standards of services, cost of services, efficiency of production, investment levels and distribution of services.

According to the Water Supply and Sanitation Act, sanitation services include both offsite and onsite sanitation. However, over the past 10 years, EWURA regulatory activities in sanitation services have mainly focused on sewerage services (offsite facilities). The faecal sludge from onsite sanitation facilities, which constitute nearly 90% of the total sanitation facilities in the service areas of WSSAs, is not adequately regulated. Most of the latrines do not comply with non sewered sanitation standards hence posing environmental pollution and negative effects to human health. Currently, no segment of the sanitation service chain is safely managed. The sanitation service chain comprises of five segments which are:

(1) capture and containment;
(2) emptying;
(3) transportation;
(4) treatment; and
(5) disposal and enduse/reuse.

The main challenges of sanitation include low standard toilets which are not emptiable ("non emptiable toilets), leaking containments, unsafe emptying and transportation practices and facilities, inadequate faecal sludge treatment facilities, and unsafe disposal practices. In addition, in each segment of the non sewered sanitation service chain the institutional and regulatory monitoring and enforcement of quality of service are ineffective.

The participation and involvement of the private sector in the provision of sanitation services, e.g. via public private partnerships or private sector participation, is challenged by inadequate capacity (financial, technical, human resources). Moreover, their operation is uncoordinated and not effectively supported by LGAs or WSSAs.

In view of the above, EWURA has considered it necessary to implement its mandate to regulate onsite sanitation facilities and faecal sludge management both of which are part of sanitation services that are

within the mandate of WSSAs; so as to ensure protection of public health and the environment. In this consideration, EWURA in partnership with Deutsche Gesellschaftfür Internationale Zusammenarbeit (GIZ) GmbH has prepared these Guidelines for OSS and FSM for WSSAs.

These Guidelines are based on the results of a study in which the current status of OSS and FSM was reviewed and existing gaps and challenges in the provision and regulation of OSS and FSM services were identified. The study furthermore allowed for recommendations to be included in the Guidelines. The study comprised of both literature review and field visits. Field visits were conducted in Dar es Salaam, Dodoma, Mwanza, Shinyanga, Kahama, Geita, Korogwe and Kibaigwa, whereby interviews were held with the respective key stakeholders: WSSAs, LGAs and Private operators. Other key stakeholders that were involved in the study were Ministry responsible for Water, Ministry responsible for Health and Ministry responsible for Local Government, EWURA, WB, AfDB, TBS, NEMC, GIZ, PDF, BORDA, and Ardhi University. The literature review considered relevant regulatory and policy instruments and literature on OSS and FSM.

1.2 Rationale for the Guidelines

The provision and regulation of sanitation services targets a protection of environment. It is also in line with Sustainable Development Goals (SDG) indicator 6.2.1, which targets the "proportion of population using safely managed sanitation services, including a hand washing facility with soap and water. This indicator takes into consideration the sanitation service chain perspective comprising of capture and containment, collection and transport, faecal sludge treatment and disposal and/ or reuse of fecal sludge (FS). In Tanzania, while the capture and superstructure component of the toilet is well reported and monitored, there are still gaps and challenges relating to containment systems, faecal sludge collection and conveyance, treatment and disposal and/ or reuse. Most toilet containment systems are temporarily constructed and non-emptiable, FS collection services are often provided by informal service providers without adequate technology, regulations and safety precautions, FS is disposed untreated or in treatment plants which are not designed for receiving such a load, and options for resource recovery are seldom considered.

In addition, key institutions providing services and regulating various components of the service chain namely WSSAs, local government, EWURA and NEMC are not well coordinated. These Guidelines aim at streamlining the provision and regulation of OSS and FSM focusing within the mandate of WSSAs and EWURA as stipulated in the Water Supply and Sanitation and EWURA Acts.

1.3 Objectives

The main objective of the Guidelines is to provide guidance for the provision and regulation of OSS and FSM in an environmentally sound manner and focusing on the mandate of WSSAs and EWURA as stipulated in the Water Supply and Sanitation and EWURA Acts. These Guidelines have been developed to assist service providers and EWURA through the regulatory requirements for effective OSS & FSM services in the country. The Guidelines complement the regulatory instruments of EWURA which aim at improving the provision and regulation of OSS and FSM services (in Figure 1-1 Segments of Sanitation Service Chain (Adapted from Design, Construction, Operation, Maintenance Manual, MoW (2020)) in areas of service of WSSAs through:

(a) enhancing synergy among the actors in sanitation provision and regulation including Ministries, LGAs, EWURA, NEMC, the private sector, NGOs, and others;
(b) creating a conducive environment for private sector initiatives in the development and operation of sanitation services;
(c) promoting awareness of health and hygiene behavior while creating demand for better sanitation services;
(d) employing appropriate technologies that are suitable to user needs, while ensuring that they are relevant to an area's actual conditions, comply with technical standards, and prevent potential impacts and contribute to safely managed sanitation; and
(e) developing sanitation in all parts of an urban area (citywide), prioritizing poor residential areas where the health risks are highest.

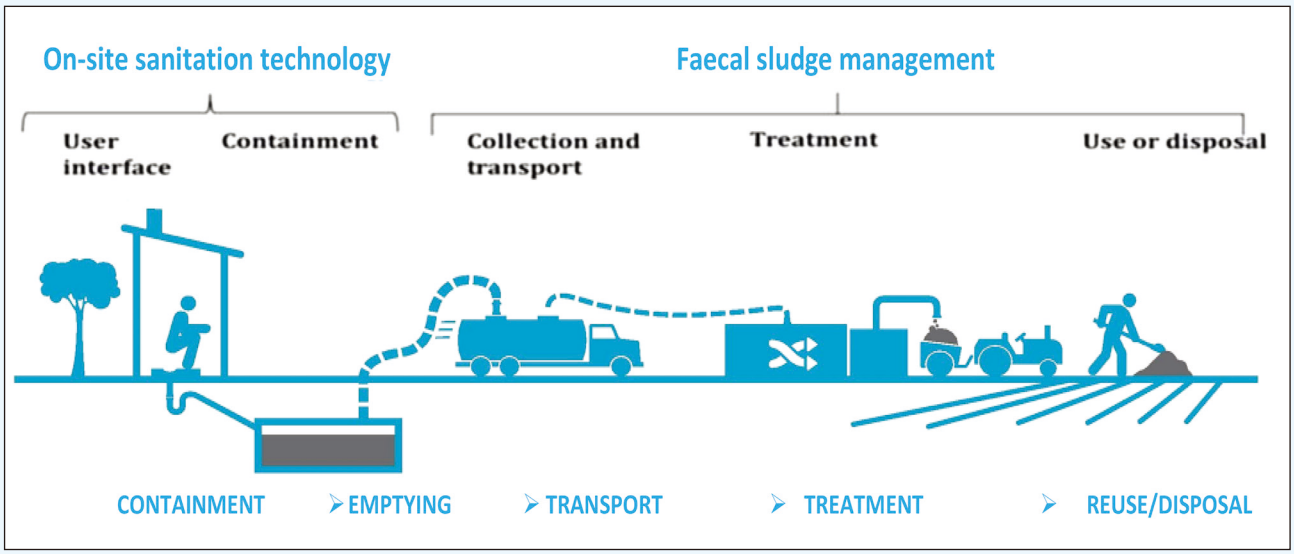


Figure 1- 1 Segments of sanitation Service Chain (Adapted from Design, Construction, Operation, Maintenance Manual, MoW 2020)

1.4 Scope of the Guidelines

These Guidelines give an overview of the policy, legal and regulatory framework related to service provision and regulation of OSS and FSM, they identify key stakeholders and establish the basis, scope, extent, roles and responsibilities of service provision and regulation of OSS and FSM by WSSAs and EWURA respectively. The Guidelines, among other things, contain the following salient features in regulation of OSS and FSM:

a) **Standards Operating Procedures (SOP)** of services along the sanitation service chain. Specifically, the SOP provide the methodologies to be used for desludging, transport, treatment and disposal/reuse of faecal sludge and the standards of service which should be followed/ complied with to ensure effective provision of services to customers and to ensure faecal sludge services are safely managed;

b) **Business Model Options for provision of FSM**. This part provides an outline on (i) business model options for faecal sludge emptying, transport and treatment; (ii) how each business model is structured, financed, and management arrangements made for its delivery within the prevailing regulatory regime; (iii) costs expected to be incurred in each model and respective tariffs; (iv) sources of financing. It also, highlights necessary items to create an enabling environment for provision of OSS-FSM services by the private sector; and

c) **Monitoring, Evaluation and Enforcement of FSM**. This part provides monitoring and evaluation mechanisms of OSS-FSM performance and includes inter-alia key performance indicators for OSS-FSM and enforcement mechanism for non-attainment of FSM targets as stipulated in the WSSAs Business Plans.

2. OVERVIEW OF POLICY AND REGULATORY FRAMEWORK FOR PROVISION OF OSS-FSM SERVICES

2.1 Related Sectoral National Policies

2.1.1 Draft National Water Policy 2020

The draft National Water Policy (NAWAPO) (2020) recognizes that, currently no segment in the sanitation chain is safely managed. The policy recognises further that:

a) the challenges facing non-sewered (OSS and FSM) sanitation include non-emptiable toilets, leaking containments, unsafe emptying and transportation facilities, inadequate faecal sludge treatment facilities, and unsafe disposal practices. Most of the latrines do not comply with non sewered sanitation standards hence posing environmental pollution;
b) there is ineffective institutional and regulatory monitoring and enforcement of minimum quality of service parameters in each segment of the non-sewered sanitation chain; and
c) public private partnership and private sector participation in the provision of sanitation services is inadequate.

The policy objective is, therefore, to have reliable, affordable and sustainable non-sewered sanitation services. In order to achieve this policy objective, the draft NAWAPO (2020), states that the Government will:

i. Ensure availability of capture, containment, emptying, transportation and treatment of faecal sludge services.
ii. Ensure compliance to minimum quality standards for non sewered sanitation.
iii. Promote appropriate technologies for emptying, transportation, further treatment of effluent and sludge for recycling and re-use purposes.
iv. Promote effective sanitation services in education, health and other public institutions.
v. Ensure charges for non-sewered sanitation services are structured in such a way that they recover costs related to service provision.
vi. Promote private sector participation in provision of non sewered sanitation services.
vii. Promote and sensitize communities on sanitation, hygiene education and practice.
viii. Enhance city wide inclusive approach in sanitation planning.

2.1.2 National Health Policy (2017)

The Policy Objective aims to attain sustainable water safety, sanitation, hygiene and food safety. It acknowledges that, there are few improved latrines, which satisfy health requirements, there is inadequate management of waste, capacity and resources to provide and sustain safe water, and food, sanitation and hygiene services at households and public places including menstrual hygiene management services, inadequate enforcement of laws and by-laws.

The Government is therefore committed to enhancing public private partnership on promotion of water safety, food safety, sanitation and hygiene services; strengthening coordination, institutional arrangements and framework for safe water, sanitation and hygiene and food safety services; and

improve systems for sustainable implementation of safe water, sanitation and hygiene.

2.1.3 National Environmental Policy (1997)

The aims of this policy include protecting water sources and preventing environmental pollution. One proposed way to achieve this is to promote technologies for wastewater treatment and recycling and to ensure that, appropriate user-charges that reflect the full value of water resources shall be introduced.

2.2 Related National Legislation

Service provision and regulation of water supply and sanitation services by Water Supply and Sanitation Authorities (WSSAs) emanate from the EWURA Act and Water Supply and Sanitation Act.

Other related national legislation include the Local Government (Urban Authorities) Act, 1982, Public Health Act, 2009, Environmental Management Act, 2004 and Water Resources Management Act, 2009.

2.2.1 Water Supply and Sanitation Act, Cap 272

The Act provides the legal framework for water supply and sanitation. It outlines the responsibilities of government authorities involved in the water sector in both urban and rural areas. It states the obligations of water supply and sanitation authorities to provide water supply and sanitation services, and it indicates their functions, powers and duties. It also assigns responsibility for the provision of adequate and reliable urban water supply and sanitation to Water Supply and Sanitation Authorities (WSSAs) and regulation of the same by EWURA.

2.2.2 Energy and Water Utilities Regulatory Authority Act, Cap 414

The general function of EWURA is to regulate the provision of water supply and sanitation services by a water authority or other persons. This includes, among other things, the establishment of standards related to services and equipment and tariffs chargeable for the provision of water supply and sanitation services.

2.2.3 Environmental Management Act Cap 191

This act defines the main roles of the National Environment Management Council (NEMC). It recognizes all citizens' right to a clean and healthy environment. In this context, safe wastewater management is critical for the benefit of the public at large. The act prohibits all projects with significant negative effects on the environment. The act is enforced by environmental impact assessments.

2.2.4 Public Health Act, 2009

This act emphasizes a number of issues that are of public concern, including sanitation and hygiene. The act prohibits discharge of wastewater without complying to national standards and laws. It emphasizes that all public buildings are to be equipped with sufficient sanitary facilities.

2.2.5 Water Resources Management Act, Cap 331

This act provides the institutional and legal framework for the sustainable management and development of water resources. Specifically, it outlines the principles for water resources management, and prevention and control of water pollution. The act prohibits discharge of waste into any waterbody including ground water without a written permit. In this regard, the legislation provides guidelines and standards for the construction and maintenance of water resource structures, and the issuance and operation of water permits and registration of boreholes.

2.2.6 The Local Government, Cap 288

Under the Local Government (Urban Authorities) Act, 1982 Urban Authorities are mandated, inter alia, to keep and maintain in good order and repair all public latrines, urinals, cesspits, dustbins and other receptacles for the temporary deposition and collection of rubbish, public bathing and washing places, to provide for the removal of all refuse and filth (including human excreta) from any public or private place, provide for the removal of night soil and the disposal of sewage from all premises and houses in its area, so as to prevent injury to health. In this capacity, urban authorities are mandated to make necessary by-laws within their areas of competence. LGA can issue business licence and building permits, and can charge fees on the licence and permits.

2.3 Related National Guidelines

a) National Sanitation Options and Construction Guidelines (2012);
b) Guidelines for Construction of Improved Toilets and Environmental Sanitation (2014);
c) Design Manual for Water Supply and wastewater Disposal (2020)
d) Water and Wastewater Quality Monitoring Guidelines for Water Utilities (2020);
e) Water Resources Monitoring and Pollution Control (WRM&PC) Guidelines (MoW-BWB) (2012);
f) EWURA Performance Benchmarking guideline (2018);
g) EWURA Water and Wastewater Quality Monitoring Guidelines for Water Supply and Sanitation Authorities, 2nd edition (2020); and
h) The Guidelines for the Application of Small-Scale, Decentralized Wastewater Treatment Systems, A Code of Practice for Decision Makers, MOW (2018).

2.4 Related Standards

The existing standards for OSS-FSM is the Tanzania Standard Number TZS860 (*General tolerance limits for municipal and industrial wastewater*) issued by Tanzania Bureau of Standards (TBS). This is mainly for pollution control.

Standards which have been issued by International Organization for Standardization (ISO) standards relevant for sanitation services include:

a) ISO30500 (2018): Non-sewered sanitation systems – Prefabricated integrated treatment units – General safety and performance requirements for design and testing;
b) ISO 24521 (2016): Activities relating to drinking water and wastewater services – Guidelines

for the management of basic on-site domestic wastewater service;

c) ISO 24510 (2007): Activities relating to drinking water and wastewater services – Guidelines for the assessment and for the improvement of the service to users; and

d) ISO 24511 (2007) Activities relating to drinking water and wastewater services – Guidelines for the management of wastewater utilities and for the assessment of wastewater services.

2.5 Permits and Agreements for Regulation of OSS-FSM

Permits regulating OSS-FSM services are issued by Local Government Authorities and Basin Water Boards as follows:

a) The permit for authorising a vessel to carryout faecal sludge emptying and transport services is issued by LGAs pursuant to sections 55(1)(m) and 84 of the Local Government (Urban Authorities) Act, 1982, and regulation 12 of the Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019;

b) A Building Permit authorising the construction of a building is issued by the Local Government Authorities which enforces construction standards; and

c) An effluent discharge permit is issued by Basin Water Boards under sections 63(1) and 64(1) of the Water Resources Management Act, 2009.

Private operators who intend to engage in OSS-FSM services in WSSAs' service areas, are required to enter into Trade Waste Agreements with WSSAs pursuant to regulation 10 of the Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019.

2.6 Licensing Regime for Provision of OSS-FSM Services

a) Private operators intending to provide OSS-FSM services are required to obtain a business licence issued by LGA under the Business Licensing Act, 1972.

b) WSSAs are required to obtain licences for provision of Water Supply and Sanitation services issued by EWURA pursuant to the Water Supply and Sanitation Act 2019 and EWURA Act Cap. 414.

3. INSTITUTIONAL FRAMEWORK FOR PROVISION AND REGULATION OF FSM SERVICES

An appropriate institutional arrangement with clear roles and responsibilities is a prerequisite for effective and sustainable provision of onsite sanitation and fecal sludge management. The institutional framework is defined in OSS and FSM related laws and regulations which determine the relationships between the stakeholders involved in onsite sanitation and FSM.

3.1 Roles and Responsibilities of Key Government Institutions

Key Government Institutions for policy formulation, service provision and regulation of OSS and FSM are: President's Office Regional Administration and Local Government, MoW, MoH, Community Development, Gender, Elderly and Children, LGAs, WSSAs, NEMC, Basin Water Boards and EWURA. The roles and responsibilities of these Key Government Institutions related to OSS and FSM services are defined in policy and legal documents and are summarized in Table 3-1.

Table 3 - 1 Roles and Responsibilities of Key Government Institutions

Institution	Key Roles and responsibilities
Ministries As per *Government Notice, 2016 (GN 144/2016)* on discharge of ministerial functions that was published on 22nd April 2016 it allocates ministerial responsibilities for sanitation as follows:	
President's Office Regional and local government administration (PO-RALG)	Matters on regional and local government administration are vested in the President's Office. Among the functions of the Regional Administration and Local Government is coordination of urban services such as transport, water and sanitation. The administration of LGAs falls under the mandate of the President's Office Regional and local government administration (PO-RALG).
Ministry for Water	Matters on water quality and pollution control, water sources protection, sewage and drainage development are vested in the Ministry for Water
Ministry of Health, Community Development, Gender, Elderly and Children	Matters on preventive and curative services are vested Ministry of Health, Community Development, Gender, Elderly and Children
Vice President's Office – Environment	Matters on environmental protection and enforcement are vested in the Vice President's Office – Environment

Institution	Key Roles and responsibilities
Agencies-Roles and Responsibilities Related to OSS and FSM	
EWURA under the Water Supply and Sanitation Act.	(i) provide water supply and sanitation services for uses as are required by this Act or any other written law dealing with the management of water resources, water quality standards and the environment; (ii) develop and maintain waterworks and sanitation works; (iii) plan and execute new projects for the supply of water and the provision of sanitation; (iv) educate and provide information to persons on public health aspects of water supply, water conservation, sanitation, and similar issues; (v) liaise with relevant government authorities on matters relating to water supply and sanitation and the preparation and execution of plans relating to the expansion thereof; (vi) collect fees and levies including any regulatory levy for water supply and sanitation services supplied to consumers by the water authority; propose water supply and sanitation tariffs; A water authority may, arrange for the exercise and performance of all or any of its powers and functions under the licence by one or more agents, to be known as service providers; and promulgate by-laws for the better performance of functions stipulated under this Act.
LGAs under the Local Government (Urban Authorities) Act,	(i) To coordinate physical planning with the water authorities and community organizations; (ii) To set aside funds from own sources for water supply and sanitation projects; and (iii) Local government authorities may make by- laws in relation to water supply and sanitation to give effect to the efficient and sustainable provision of these services in their areas of jurisdiction by water authorities or community organizations.
NEMC under the Environmental Management Act	(i) carry on environmental audit; (ii) carry out surveys which will assist in the proper management and conservation of the environment; (iii) review and recommend for approval of environment impact statements; (iv) identify projects and programmes or types of projects and programmes, for which environmental audit or environmental monitoring must be conducted under this Act; (v) enforce and ensure compliance of the national environmental quality standards; and (vi) enforce and ensure compliance of the national environmental quality standard.

Institution	Key Roles and responsibilities
EWURA under the EWURA Act and the Water Supply and Sanitation Act 2019)	(i) exercise licensing and regulatory functions in respect of water supply and sanitation services; (ii) establish standards relating to equipment attached to the water and sanitation system; (iii) establish guidelines on tariffs chargeable for the provisions of water supply and sanitation services; (iv) approve tariffs chargeable for the provision of water supply and sanitation services; (v) collect and compile data on licensees as it considers necessary for the performance of its functions under this Act; (vi) establish or approve standards and codes of conduct in respect of-i) licensees;(ii) consumers; and iii) public safety; and (vii) promote the development of water supply and sanitation services in accordance with recognized international standard practices and public demand.
Basin Water Boards under the Water Resources Management Act	(i) approve, issue and revoke water use and discharge permits; and (ii) monitor and enforce water use and discharge permits and pollution prevention measures.

3.2 Responsibilities of WSSAs and EWURA in the Sanitation Service Chain

Roles and responsibilities of WSSAs and EWURA in the sanitation service chain have been derived from the analysis of the policy and regulatory framework of OSS and FSM presented in Section 2 and Table 3.2.

WSSAs shall prepare and implement strategies for the roles and responsibilities identified in Table 3-2. The strategies identified shall form part of the WSSAs Business Plans. EWURA shall review the strategies and monitor their implementation.

Table 3 - 2 Roles and Responsibilities of WSSAs and EWURA along the Sanitation Service Chain

WSSAs	EWURA	Regulatory Instruments
1) Roles and Responsibilities which Cut Across Segments of Sanitation Service Chain		
(i) Provision of onsite sanitation and faecal sludge management services in accordance with WSS Act 2019 and its Regulations.	Regulation of onsite sanitation and faecal sludge management services in accordance with WSS Act 2019 and its Regulations and EWURA Act Cap. 414.	❍ National Water Policy, 2020. ❍ Water Supply and Sanitation Act, 2019. ❍ Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019. ❍ EWURA Act Cap.414.
(ii) Initiate and collaborate with the LGA to prepare a City-Wide Inclusive Sanitation Plan (CWISP) and Joint Town Plans for the area of operation. (iii) Incorporate outputs of CWISP in the WSSAs Business Plans.	Ensure WSSAs interventions which are included in the Business Plans are based on CWISP.	❍ MoW Joint Town- level Master Planning Guide for Improving Water Supply and Sanitation Services (July 2019). ❍ EWURA Guidelines for Preparing a Business Plan for Regulated Water Utilities (RWUs), 2016.
(iv) Prepare and seek approval of SOPs for FSM. (v) Collaborate with LGAs to collect baseline data including sanitation mapping, Shit Flow Diagram (to be reviewed regularly) and information relevant for preparation of city-wide inclusive sanitation plans, Joint Town Plans and computation of performance indicators indicated in Table 81. Prepare and submit performance reports on OSS-FSM as directed by EWURA including the implementation of Standard Operating Procedures (SOP).	❍ Review of WSSAs' SOPs ❍ Review performance reports on OSS-FSM. ❍ Monitoring the performance of WSSAs on OSS-FSM including implementation of SOP.	❍ EWURA Performance Benchmarking Guidelines for Water Utilities, 2018. ❍ EWURA OSS-FSM Guidelines 2020. ❍ Water Supply and Sanitation Rule Services, 2011.
(vi) Initiate transfer of OSS-FSM assets from LGA.		Water Supply and Sanitation Act, 2019.

WSSAs	EWURA	Regulatory Instruments
(vii) Initiate and signing of MoU with LGA. The MoU.		❍ National Water Policy, 2020. ❍ Water Supply and Sanitation Act, 2019. ❍ Local Government (Urban Authorities) Act, 1982.
(viii) WSSAs to collaborate with LGA in developing appropriate IEC materials and undertake IEC campaigns on implementation of OSS-FSM.	Monitoring the implementation of IEC.	❍ EWURA OSS-FSM Guidelines, 2020.
(ix) Collaborate with research institution and higher learning institutions in research, skills and appropriate technology transfer on OSS and FSM applicable to local conditions.	Collaborate with research institution and higher learning institutions with experts in research, skills and appropriate technology transfer on OSS and FSM applicable to local conditions.	❍ Water Supply and Sanitation Act (2019). ❍ EWURA Act. Cap.414.
(x) Compliance with sanitation strategies presented in the business plans.	Ensure WSSAs implement strategies presented in the business plans.	❍ Water Supply and Sanitation (Licensing and Quality Service) Rules, 2020.
2) Specific Roles and Responsibilities in the Sanitation Service Chain		
(a) **Containment**		
(i) Collaborate with Local Government to collect data and information on OSS. (ii) Monitor the development of emptiable sanitation capture and containment facilities. (iii) Promote (awareness creation) on the construction of emptiable improved toilets. (iv) In collaborate with LGAs, monitor the development of sanitation capture facilities from pit latrines to emptiable facilities.	❍ Liaise with MoH, Community Development, Gender, Elderly and Children to link with National Sanitation Management Information System (NSMIS). ❍ Liaise with Ministry of Ministry of Health, Community Development, Gender, Elderly and Children to include designs of emptiable toilets in the National Sanitation Options and Construction Guidelines, 2012	❍ National Sanitation Options and Construction Guidelines (2012). ❍ Guidelines for Construction of Improved Toilets and Environmental Sanitation, 2014. ❍ MoW Design Construction, Operation and Maintenance manual (DCOMM), 2020.

WSSAs	EWURA	Regulatory Instruments
(b) **Emptying and Transport**		
(v) Where necessary, purchase emptying and transport facilities mainly to be used by WSSAs for operations and maintenance of the sewerage system or for lease to private sector.	❍ Issue license to WSSAs for faecal sludge emptying services.	❍ Water Supply and Sanitation Act, 2019. ❍ Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019. ❍ EWURA Act. Cap.414.
(vi) Enter into a Trade Waste Agreement (TWA) with private operators for emptying and transportation of faecal sludge services to treatment plants/ disposal sites subject to private operator obtaining a permit from the Local Government (refer Section 11 and 12 of Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019).	❍ Review the trade waste agreement prior to coming into effect.	❍ Water Supply and Sanitation Act, 2019. ❍ Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019. ❍ EWURAs OSS-FSM Guidelines, 2020.
(vii) Ensure that faecal sludge emptying, and transport services provided by the private sector are in accordance with the WSSAs Standard Operating Procedures (SOPs) provided in section 4 of these Guidelines.	❍ Monitor compliance of WSSA with SOPs.	❍ EWURA OSS-FSM Guidelines (2020). ❍ Water and Wastewater Quality Monitoring Guidelines for Water Utilities, 2nd edition, 2020.

WSSAs	EWURA	Regulatory Instruments
(viii) In consultation with private operators, file a tariff application for emptying and transport services to EWURA Water Tariff in accordance with EWURA (Water Tariff Application and Rate Setting Rules, 2020 and these Guidelines. (ix) Monitor the compliance with the approved tariff and charges by private operators.	❍ Approval of tariff and charges ❍ Monitor the compliance with the approved tariff and charges by WSSAs and Private operators.	❍ EWURA (Water Tariff Application and Rate Setting) Rules, 2020. ❍ EWURA OSS-FSM Guidelines (2020). ❍ EWURA Act. Cap.414. ❍ WSS Act, 2019.
(x) Maintain and update a register of qualified operators for emptying (including manual emptiers) and primary transport for the public to negotiate and choose from.	❍ Monitoring the updating of the register of private operators.	❍ WSS Act, 2019.
(c) **Faecal Sludge Treatment**		
(i) Acquire land for construction of faecal sludge treatment and disposal facilities which complies to NEMC regulations (EIA).	❍ Monitoring of the process.	❍ Water Supply and Sanitation Act, 2019. ❍ Environmental Management Regulations, 2005.
(ii) Construct and operate or contract the construction and operation of faecal sludge treatment facility to the Private Operator subject to approval of construction and commissioning of faecal sludge treatment facility by NEMC. Delegation will be through an agreement with the private operator. (iii) Monitor compliance with signed agreements.	❍ Review the agreement between WSSAs and the private sector. ❍ Monitoring the implementation of agreement.	❍ The Guidelines for the Application of Small-Scale, Decentralized Wastewater Treatment Systems, a Code of Practice for Decision Makers, MoW, 2018. ❍ Ministry of Water Design Construction, Operation and Maintenance manual (DCOMM), 2020. ❍ EWURAs OSS and FSM Guidelines (2020). ❍ Water Supply and Sanitation Act (2019). ❍ Environmental Management Regulations 2005.

WSSAs	EWURA	Regulatory Instruments
(iv) Operate and maintain of faecal sludge treatment facility.	❍ Monitor compliance with SOPs.	❍ SOPs. ❍ Water and Wastewater Quality Monitoring Guidelines for Water Utilities, 2nd edition, 2020.
(v) File a tariff application for faecal sludge treatment by WSSA. (vi) In case of operation by private sector/ CBO: In consultation with Private operators, WSSA to file a tariff application for faecal sludge treatment to EWURA in accordance with EWURA (Water Tariff Application and Rate Setting) Rules 2020.	❍ Approval of Tariffs. ❍ Monitor the compliance of the approved tariff and charges.	❍ Energy and Water Utilities Regulatory Authority (Water Tariff Application and Rate Setting) Rules, 2020. ❍ EWURA OSS-FSM Guidelines 2020. ❍ EWURA Act. Cap.414. ❍ WSS Act, 2019.
(d) **Disposal and/ reuse**		
(i) Dispose treated faecal sludge and effluent complying with disposal standards. (ii) Acquire effluent discharge permits from Basin Water Boards. (iii) Provide treated effluent and sludge for use by different stakeholders. The role of WSSAs is to produce (treat) final faecal sludge and effluent which will comply with the required standards for re-use. This is also an incentive to WSSAs whereby they will create income from sale of treated effluent and faecal sludge.	❍ Monitor compliance of WSSA with SOPs. ❍ Monitor compliance with effluent discharge standards. ❍ Monitor compliance with effluent and sludge re –use standards.	❍ The Tanzania Standard Number TZS 860 (General tolerance limits for municipal and industrial wastewater) issued by Tanzania Bureau of Standards (TBS). This is mainly for pollution control. ❍ In the absence of TBS re-use standard, relevant WHO Guideline will be applicable. ❍ EWURAs OSS-FSM Guidelines 2020.

4. STANDARD OPERATING PROCEDURES (SOP)29 FOR FAECAL SLUDGE MANAGEMENT SERVICES

Standard Operation Procedures (SOP) is a code of best practices for faecal sludge management services which minimizes the risks related to OSS-FSM operations to both operators and the public.

The SOP aims at improving faecal sludge management services through (i) reducing health risk to operators and the surrounding community through safe management of faecal sludge, and (ii) improving the experience of customers and building trust via reliable and professional customer service.

This SOP is comprised of the following procedures: Overall Operations, Emptying; Transport; Treatment; Disposal; Information, Education and Communication (IEC); Occupational Safety and Health for Faecal Sludge Management; Record Keeping and Customer Service; and Training of Service Providers and Personnel all of which are detailed in sections 4.1 to 4.11. Each WSSA shall customize these SOPs to suit its existing conditions.

4.1 Overall Operations

Overall operations are minimum requirements for overall OSS-FSM operations which include: Licensing; Employee Health and Safety; Personnel Protective Equipment (PPE) and Emptying as detailed below:

4.1.1 Licensing

The operator who wants to engage in OSS-FSM business shall obtain a Business Licence issued by the respective LGA. In addition, for those who want to set up FS treatment/processing facility such as DEWATS or for disposal and reuse processing they shall obtain NEMC Environmental Clearance Certificate and shall comply with all legal requirements. FSM operators should be registered by WSSA upon meeting the minimum condition of trade waste agreements for emptying and transport business or contract for FS treatment and disposal services.

4.1.2 Employee Health and Safety

SOP shall include the minimum requirement for employee health and safety which may include vaccinations for (i) Hepatitis B, (ii) Cholera and (ii) Typhoid. All employees must also have a valid health insurance. The employer is liable to provide the vaccines to all employees working in emptying a pit latrine or a septic tank, and FS transportation, treatment and disposal. SOP shall demand that employees meet these requirements.

To ensure employees' safety, the SOP shall also include a requirement by Occupational Health and Safety Act 2003 with regard to employees having access to full PPE. Also, operator's site supervisors must ensure that all team members wear PPE for the duration of the work. PPE for each individual working in emptying a pit latrine or septic tank shall include at least:

29 Modified from Standard Operating Procedures for Improved Faecal Sludge Management in Kisumu County and Municipalities in Gujarat

(i) 1 x thick neoprene gloves
(ii) 1 x think latex gloves (to be worn under thick gloves)
(iii) 1 x impermeable overalls offering full coverage of clothing
(iv) 1 x gumboots (free from holes)
(v) 1 x socks
(vi) 1 x dust mask (minimum standard) or gas mask (optimum)
(vii) 1 x helmet
(viii) 1x goggles

Masks and a helmet are only required for an operator directly emptying a pit and are not a compulsory item for haulers. In general, PPE must be in a good state of repair and clean for each pit latrine emptying job.

In addition to the PPEs, employees should be provided with First Aid Kits while at work. It shall be the responsibility of the employer of each category to provide PPEs to their employees (service providers of emptying services, transportation, and treatment and disposal service operators). When procuring PPEs, the Employer shall observe quality of the required PPEs. As a guide, ***Annex 1*** provides the minimum quality of PPEs.

4.1.3 Emptying Equipment

The SOP shall ensure that the equipment comply with technical, safety and hygiene requirements. The following equipment are among those available for pit or septic tank emptying.

(1) Manual Emptying

There are four (4) common types of mechanical pumping equipment that have been developed and tried; namely, the Sludge Gulper, the diaphragm pump, the Nibbler, and the Manual Pit Emptying Technology (MAPET)[30].

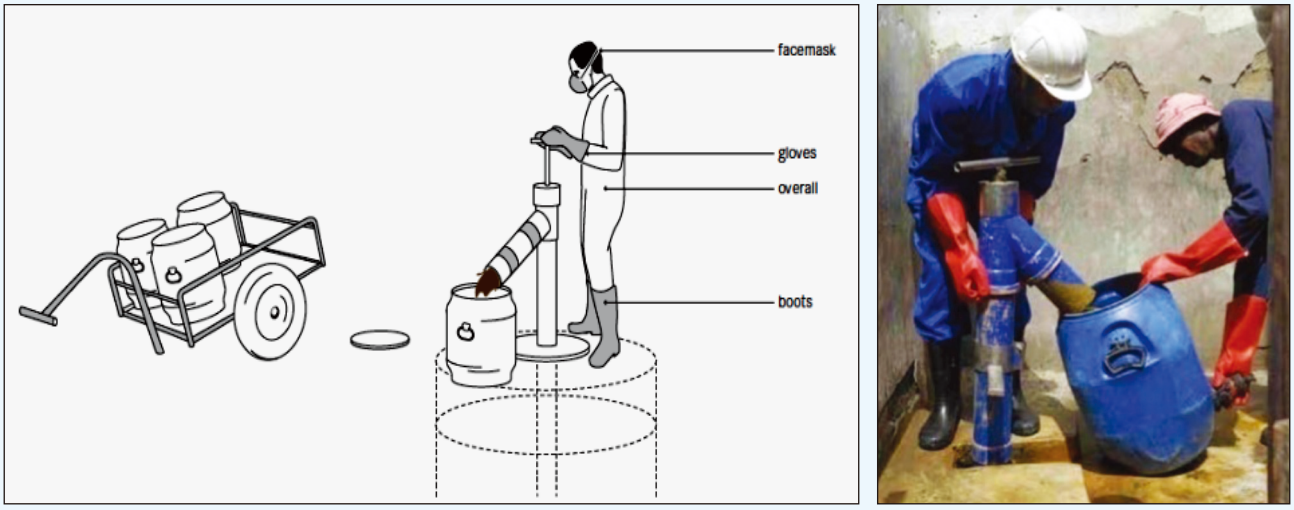


Figure 4- 1 Gulper Technology (Left); Emptying using the Gulper (right) (Adapted FSM Guide for Dar es Salaam, BORDA 2019).

30 DCOMM (MoW) 2020

i) Gulper

A Gulper is a simple hand pump used to empty wet pit latrines and drain interceptor tanks. The gulper technology can only empty a fraction of the pit content and is not employed for septic tanks. Gulper technology is able to remove FS up to a depth of 2.4 meters.

ii) Mapet

In 1992, Dar es Salaam Sewerage and Sanitation Department (DSSD) with WASTE Consultants, developed and tried a human-powered vacuum system for the collection and short-distance transport of sludge called the Manual Pit Emptying Technology (MAPET)[31] in Tanzania. MAPET has two separate components, a pump and a 200 litre vacuum tank, each mounted on a dedicated pushcart. From a technical point of view, trials proved that the MAPET works well and is able to pump sludge from a depth of 3 meters at a rate of 10 to 40 L/min depending on the depth and viscosity of the sludge.

iii) Nibbler

This is a pit emptying device which is meant to remove thicker sludge which cannot be removed by the Gulper[32]. It uses the same principle as the rope pumps. It has a motor bike chain instead of a rope and also has circular discs attached to the chain for picking sludge. A continuous, rotary action, displacement sludge pump called the Nibbler was developed by the LSHTM at around the same time as the Gulper. It is capable of collecting medium viscosity sludge using a continuous roller chain loop enclosed in a PVC pipe.

31 Strande et al, IWA 2014 (Faecal Sludge Management. Systems Approach for Implementation and Operation)
32 Report on the Gulper, Rammer and Nibbler Development, The Kampala Sanihub Project March 2014

The pipe can be inserted into the access hole of a containment structure or a pit latrine without the need to break any part of the structure, Figure 4-2. The chain is driven by manually rotating a double crank and sprocket located at the top of the pipe. Semi-circular metal discs loosely and horizontally attached to the chain at regular intervals scoop out the waste from the bottom of the pit and displace it to the top. Once at the top of the pipe, sludge is scrapped off the discs and into a Y-shaped connector, which guides the sludge into the container being used for onward transport. A vertical plate spanning the length of the pipe divides the downward and upward travel directions of the chain and discs.

Figure 4- 2 Nibbler Testing (Adapted from , The Kampala Sanihub Project March 2014)

iv) Manually Operated Diaphragm Pumps

Manually operated diaphragm pumps, as illustrated in Figure 4-3, are simple low-cost pumps capable of extracting low viscosity FS that contains little non-biodegradable materials[33]. They typically consist of a rigid, disc shaped body clamped to a flexible rubber membrane called a diaphragm. An airtight seal between the diaphragm and the disc forms a cavity. To operate the pump, the diaphragm is alternately pushed and pulled causing it to deform into concave and convex shapes in the same way a rubber plunger is used to unblock a toilet. A strainer and non-returning foot valve fitted to the end of the inlet pipe prevents non-biodegradable material from entering the pump and respectively stops backflow of sludge during operation.

Figure 4- 3 Diaphragme FS Pump (Source Strande et al (ed), 2014 p. 76)

33 Linda Strande et al, IWA 2014 (Faecal Sludge Management. Systems Approach for Implementation and Operation)

(2) Mechanical Emptying

i) Use of Vacuum Trucks:

This is the conventional method for pit and septic tank emptying. This is a truck-mounted tank with the capacity ranging from 0.2 to 16m^3 with a vacuum pump connected to the tank to suck out the sludge (Figure 4-4). The technology can be used to empty pit latrines and septic tanks only in accessible areas.

Figure 4-4: Typical Vacuum Tankers (Left); Typical Portable Vacuum tank (Right)

Pit emptying services in informal and marginalized (densely populated) areas is mostly done using portable vacuum tankers. They are, specifically designed for use in areas that are difficult to reach with a conventional vacuum tanker.

ii) Use of Vacutug

Vacutug (figure 4-5) has a trailer-mounted 500 or 1,000 litres tank used in conjunction with a vacuum pump. The technology can be used to empty pits in marginalized and unplanned settlements where there are narrow paths which are not accessible by large vacuum tanks. The Vacutug removes waste safely for both workers and public health. One of the disadvantages of the technology is its commercial viability. The excreta to be removed may be too solid for the pump to lift, so water may need to be added and the contents mixed to liquefy them first. Any stones, sticks, plastic bags and other solid items thrown into the pit will block the suction hose.

Figure 4- 5 A 500 litres Vacutug

4.2 Emptying Process

This section defines emptying process for pit latrines, septic tanks and portable latrines used in large gatherings. However, the manual and mechanical emptying equipment mentioned in this section are only examples and are not exhaustive.

The emptying process is split into six sections which are: site evaluation; Worksite Operations; Manual Sludge Removal; Emptying Using Vacuum Trucks; Site Departure; and Emptying of Portable Toilets as detailed below:

a) Site Evaluation

Site evaluation must be undertaken by an operator to evaluate the specific work needed at that site and to ensure that the pit/tank for emptying can be safely emptied via the processes/technology available. It is recommended to use a standard pit evaluation card or checklist to ensure safety of operators is guaranteed e.g. pit is in good structural condition, access to site is possible, sludge is of a consistency that can be emptied using available equipment etc. Sample checklist is provided in ***Annex 2.*** The checklist should be filled by the Operator's supervisor.

b) Worksite Operations

Procedures needed to keep the working place safe are:

(i) Preparation of workspace

Workspace should be cleared of all household items before start of operations so as to decrease the risk of contamination of goods that will remain onsite post emptying. Typical items to remove include

washing buckets and clothes. Plastic sheeting must be placed on the ground in the workspace in key areas at risk of exposure to sludge.

(ii) Prevent access to unauthorized personnel in workspace

The workspace must be enclosed with a barrier tape blocking pedestrian access and safety signs (Figure 4-6) should be displayed. No unauthorized personnel may come within 5 meters of the emptying operations. Children will be curious, and it is the operator's site supervisor's responsibility to ensure no one can approach the emptying site, emptying team or any faecal sludge contaminated objects.

Figure 4- 6: Sample hazardous workspace signage (Left), Barrier tape erected around workspace (right).

(iii) Preventing Contamination

All items contaminated with faecal sludge must be kept within the designated worksite unless being transported to a vehicle.

(iv) Use of PPE

Operator's site supervisor is responsible to ensure that all operator wear full PPE and are easily identifiable to the public.

(v) Restriction to use of phones during work

Use of phones shall be restricted and hands must be washed before operator touches phones or other personal items.

(vi) Restriction of smoking, alcohol or drug use

Under no circumstances should intoxicated operator be tolerated. Intoxicated operator must be immediately removed from site and reprimanded as they pose a hazard to themselves and to the public. No smoking is to be tolerated on site.

(vii) Restriction on eating at worksite

Should a snack/lunch be required, operator must leave the work site, wash their hands thoroughly with soap, and eat away from workplace.

(viii) Securing uncovered pits or septic tanks

Under no circumstances should an open pit be left unattended by operator. This is an extreme hazard for curious persons especially children. Barriers must be erected, and preferably the open area should be securely covered if the operator needs to vacate the site.

c) Manual Sludge Emptying

(i) Control of entry to the pit/tank

Under no circumstances are staff of the operator permitted to enter the pit or tank being emptied.

(ii) Tools to be used at all times

Improved pit latrine emptying tools must be used. Operators are responsible for ensuring minimum exposure to faecal sludge for their employees.

(iii) Control of Sludge Spillages

All sludge spillages that do not occur on plastic sheeting must be cleared immediately.

(iv) Storage of Waste

Waste must be transferred to sealed barrels, free from leaks. Lids should be put on barrels immediately after filling. The external surface of the barrel should be wiped should it be contaminated by sludge spillage.

d) Emptying using vacuum trucks:

(i) The service providers shall ensure safe operation of the truck and equipment at all times.
(ii) Service providers shall inspect all trucks prior to transport on public roads to ensure that faecal sludge will not leak, spill, or run out of the tank; in the event of accidental spillage of faecal sludge, the operator has to immediately take action to contain the faecal sludge, minimize the environmental impact, and begin clean-up procedures. After the desludging operation, the operator should clean and disinfect any spills with a bleach solution or by spreading lime on the spillage. It is the collection operator's responsibility to verify that sufficient disinfectant (bleach or lime) is on the truck before going to a collection site. Applicable Environmental Pollution Penalties may be imposed on operators who do not comply with the applicable Environmental regulations. Spillage control handling procedures are provided in ***Annex 3.***
(iii) All trucks used to transport faecal sludge have to be equipped, at all times, with spill control or absorbent materials and disinfectant materials, such as lime or chlorine bleach.

(iv) Workers must wear appropriate personal protective equipment (PPE), including rubber gloves, rubber boots, a face mask and eye protection, they must wash their hands with soap and bathe properly. WSSAs to implement mechanisms for monitoring the use of PPE and discharge of sludge in approved locations; all clothing (both PPE and under layers) should be clean.

e) Site Departure

(i) Site to be left in safe condition

It is the responsibility of the operator's site supervisor to ensure that the latrine is repaired if the repair has been agreed with the customer. If a customer has chosen to repair their own latrine, the pit must be sealed off or covered prior to the teams' departure to decrease the risk of children becoming injured.

(ii) Site to be cleaned prior to departure

All surfaces must be clean and free from faecal sludge prior to team departure. Chlorine solution or other disinfectant must be used to disinfect the area contaminated during the emptying. All equipment (and solid waste) is to be removed from site. All water used for cleaning is to be brought to the disposal point for disposal.

f) Emptying of Portable Toilets

i) Equipment for Emptying Portable Toilets

Emptying shall be done on site using a vacuum tanker with sufficient storing tanks. A large hose is connected into the output holes of the toilet. The hose sucks out the waste using vacuum technology and empty the remains into the truck's large tanks. In practice there are tankers that can hold from 2000 liters to 18,000 liters.

Figure 4- 7 Portable Toilets

Maintenance schedule will depend on how often the toilets are being used. Toilets that see a high amount of use may require more than one service a week. Generally, portable toilets should be serviced at least once a week.

ii) Portable Toilets Cleaning Equipment

During cleaning of portable toilets, one will require at the minimum the following equipment and materials:

- Waste suction or vacuum machine
- Anti-Bacterial spray
- High pressure hot wash
- Toilet chemicals
- Toilet consumables (e.g. Toilet paper, hand sanitizer)
- PPE Equipment

iii) Portable Toilet Cleaning Process:

1) Pumping out of waste

The waste inside the tank of a portable toilet is removed by using a vacuum. To prevent any debris from being sucked up, the operator shall make sure he inserts the sucking hose all the way to the bottom and slightly to one side. Once the waste is at a low-level, he has to check if there is any debris to be removed from inside the tank. The waste shall then be transported to an authorized faecal sludge dumping or treatment facility.

2) Cleaning

Most of portable toilets are made of HDPE (High Density Polyethylene) to make them easy to clean. Cleaning the inside of the portable toilet is very important and needs to be done in order to prevent mold from accumulating and stop the development of bacteria or other germs. This requires a disinfectant and a high-pressure washer. Spray the inside of the toilet with disinfectant and rinse thoroughly.

During this part it will be worth looking for any broken parts that need replacement. Common areas to check are door handles or hand sanitizers.

3) Deodorizing the toilet

Once the toilet is clean the next step is to ensure any smell is well taken care of. The deodorizing and odour removing spray are recommended.

After cleaning, the holding tank shall be refilled with water mixed with fresh chemical deodorizer products. Once done clean the toilet once again with the odour removing spray.

4) Restocking of consumables

The Operator shall make sure all the essential supply consumables are well stocked and ready to use: toilet paper, paper towels, hand sanitizer or soap if included, or even air freshener.

4.3 Transport of Faecal Sludge

a) Transport of FS from Manual Emptying

Faecal sludge from manual emptying is commonly transported in barrels using pickup trucks, three-wheeler motorbikes and pushcarts to the treatment site or transfer stations. Overloading and contamination of a transport facility should be avoided during transportation of faecal sludge. Furthermore, sealed barrels should be used for this purpose.

b) Transport of FS by Vacuum Tankers

The vacuum tankers as a minimum shall comply with the following requirements:

(i) Display the company name, company logo, contact number and business registration number on both sides of the truck used to transport faecal sludge. The information should be marked using permanent and readable lettering at least 6 inches high and made of a reflective material;

(ii) Clear and visible signage on the vehicle stating that waste is being transported;

(iii) Display the service area (municipalities or suburbs covered by their permits);

(iv) Have a leak-proof body (tank) and a strong locking mechanism that can withstand collision with another truck or any permanent structure;

(v) All trucks used to transport FS to be equipped, at all times, with spill control or absorbent materials and disinfectant materials, such as lime or chlorine bleach;

(vi) The collection truck should be in good running condition in accordance with the Tanzania Traffic Police safety standards on roadworthiness. The truck owner shall ensure the truck is inspected once a year (during road safety week) and shall affix a valid sticker after the inspection;

(vii) The driver and support operator (operator) should attend training sessions on safe emptying and transportation to be organized by the WSSA;

(viii) The vacuum tanker should not spill any FS when transporting to the destination site; and

(ix) Compliance with Occupational health and Safety requirement in line with OHS Act (2003) and its regulations. As a minimum, all workers should be provided with regular health checks, receive medical advice and treatment (e.g. deworming), and be adequately vaccinated against potentially relevant infections (such as Typhoid fever and Hepatitis B, depending on the epidemiological context).

4.4 Faecal Sludge Treatment

The faecal sludge treatment processes before reuse are grouped according to the treatment objectives which are dewatering, stabilization, nutrient management and pathogens reduction.

Treatment of sludge can be done by use of three types of technologies which are: (a) Co-Treatment of FS at a Wastewater Treatment Plant (WWTP) or Oxidation ponds; (b)the treatment of FS in a dedicated FS treatment plant, FS stabilization pond or DEWATS; and (c)direct land application.

To allow sustainable operations, FS treatment methods should be of low O&M costs, low energy consumption and, if possible, able to support operational cost recovery. Adopted systems should be compatible with the expertise, climatic and local contexts of the particular area and with the institutional/entrepreneurial set-up responsible for scheme implementation and servicing[34]. Details are as follows:

a) Treatment of Faecal Sludge at a WWTP -Co-treatment (e.g. Ponds in Iringa)
Advantage: Facilities can constitute a low-cost and environmentally sound option for FS treatment.

Disadvantage: if WWTPs are not designed to handle additional FS loads, the overload of biodegradable matter and nutrients can cause negative effects on facility performance and, ultimately, on effluent quality and operational cost. Before deciding to co-treat, one shall consider the facility performance limits, which depends on the manner and the part of the process in which FS is introduced.

Key points for regulation of co-treatment of FS at WWTPs:

(i) If a person is engaged in FS collection, that person shall dispose the FS at an approved receiving facility;
(ii) WSSA will charge a fee for receiving FS;
(iii) WSSA may issue an order prohibiting disposal of faecal sludge to a particular facility if the receiving facility is overloaded or does not comply with technical, environmental or public health concerns. In such event WSSA shall provide alternative for FS disposal; and
(iv) A person shall not dispose FS at a WWTP or facility if the operation of the WWTP is prohibited by a public order.

b) Use of Faecal Sludge Treatment Plants (FSTP), Waste Stabilization Ponds (WSP) and DEWATS.

For situations where WWTPs are not available or WWTPs are too far or have insufficient capacity, decentralized Faecal Sludge Treatment Plants (example of Geita-FSTP), DEWATS (Example Tuangoma in DSM) are recommended. FS volume, quality, land availability, discharge/reuse options, possible odor as well as cultural aspects will determine which type of technology is best suited for a particular case. For detailed technology options, it is advised to refer to the Design, Construction, Operation and Maintenance Manual for Sanitation Facilities, 2020 issued by MoW.

Advantage: There is potential nutrient and organic matter recovery from FS, while mixed systems with sewage sludge have a much higher contamination risk, e.g., from heavy metals.

34 F aecal Sludge Management (FSM)Eawag/SANDEC, 1998

Disadvantage: It will need initial capital for investment to set up a separate plant and skilled operator.

c. Land Application

If within the service area there are no FS treatment facilities, FS shall be handled as per section 7.3.3 of the National Sanitation Options and Construction Guidelines (2012) (using onsite treatment systems).

Advantages: It is cheap.

Disadvantages: Possibility of polluting ground water.

4.5 Faecal Sludge Disposal

Solid waste must be separated from the sludge at the entry point to the treatment facility. Screens must be raked, and solids transferred to a drying area and thereafter shall be put in burning chamber (incinerator) with approval from NEMC. Figure 4-8 below shows a typical bar screen and burning chamber (incinerator).

Figure 4- 8 : Solid waste collected at bar screen (left) and a typical incinerator (burning chamber) (right)-Kahama

Treated FS shall be disposed in accordance with the requirement of NEMC.

4.6 Faecal Sludge Reuse (Resource Recovery)

Generally, there are three resources that can be recovered from FS:

(a) Reclaimed water: deep-row entrenchment of untreated FS; or effluent from FS treatment facilities used for irrigation or in aquaculture.
(b) Energy (e.g. Biogas): biogas from the anaerobic digestion of faecal, and carbonization of FS.
(c) Nutrients and Soil conditioners: dewatered or dried sludge produced from unplanted drying beds for land application; co-composting of faecal sludge and organic solid waste; larvae from the treatment with black soldier fly; and food for living organisms e.g. fish and chicken.

4.7 Customer Service

Provision of pit latrine or septic tank emptying service requires service provision in terms of both equipment and customer service. Customer service includes among others, marketing and attending to customer complaints.

a) Marketing

WSSAs marketing staff must be trained to provide an accurate representation of OSS and FSM services. Staff should be trained on marketing of OSS and FSM and tap experience from LGAs and other key stakeholders on marketing of public and social services like solid waste collection.

b) Attending to Customer Complaints

WSSA shall establish a system of getting feedback from customers on provision of OSS-FSM services. WSSA will be required to use this system to extract information to be used to improve the services. This system shall be complemented with suggestion boxes and Toll-free number to be publicized widely. WSSA shall open a register for customer complaints indicating at least the following: date, time, name of customer, nature of complaint, action taken, when complaints were sorted out and whether the customer was given feedback. Generally, the complaints handling procedures shall comply with the EWURA (Licensing and Quality of Service) Rules, 2020.

4.8 Record Keeping

WSSAs shall keep a record of customer information including household areas and location, type, age, capacity, status and date of desludging of septic tank and latrines, quantity of desludged faecal sludge, user charges collected, accidents and spillages.

Records will be used for monitoring progress in the development of OSS and FSM facilities, for information sharing with other stakeholders including environmental agency (e.g. NEMC), investors and private operators. Records will also assist WSSAs in business planning, designing future projects, revenue collection and environmental pollution monitoring.

For proper record keeping the operators of emptying and transportation, and treatment of faecal sludge shall maintain a detailed record of their operations. In addition to GPS tracking (for trucks), daily follow up shall be done to help achieve a more realistic record of operations. Sample data recording sheet (Manifest form) (***Annex 4***) and accidental spillage notification form (***Annex 5).***

4.9 Information, Education and Communication (IEC)

It is required for WSSAs to collaborate with LGAs in developing appropriate IEC materials and undertake IEC campaigns through print and electronic medium, outdoor medium and consultations and workshops. IEC shall target residents to promote adoption of proper latrine designs and construction methods; proper and periodic desludging; proper disposal of solid waste (trash into dust bins and not in latrines); safe sanitation practices; and use of professional sanitation services as stipulated in this SOP. Apart from the public the following stakeholders should also be targeted:

a) The builders, masons and suppliers of septic tanks and pits shall be exposed to better designs and better methods of construction.

b) The operators of collection and transportation shall be provided information on standard operating procedures.

c) Non-Government Organizations (NGOs), Community Based Organizations (CBOs), women's groups and school children shall be extensively involved in undertaking and receiving IEC campaigns.

d) Operators and other involved parties shall also develop IE material and educate communities on safe management of faecal sludge.

Considering diversity in OSS and FSM services, WSSAs shall collaborate with LGAs to support capacity building of various stakeholders including its own staff through appropriate institutions such as higher learning institutions, vocational training institutions and NGOs to undertake training needs assessment, design training modules and jointly deliver the training programs including dissemination of occupational health and safety awareness.

4.10 Occupational Safety and Health for Faecal Sludge Management

In compliance with occupational health and safety requirement in line with OHS Act, 2003 and its regulations, WSSAs shall undertake the following measures:

a) Organize training sessions on safe emptying and transportation.

b) Promote use of PPEs to emptiers.

c) Develop mechanisms for establishing service recipients' responsibility for OHS to emptiers. (WSSA may mention this condition related to service recipient's responsibility for OHS in a letter/form in response to requests for emptying).

d) Sensitize operators engaged in emptying and transportation on personal safety and health issues. Workers should be encouraged to undertake regular health checks and to always use PPE. Workers should be aware of the health impacts of alcohol consumption, and especially the role of alcohol and drugs in workplace accidents. Sludge discharge into the local environment should be prohibited and workers made aware of its environmental and health impacts. This requirement shall be included in operators' contracts.

WSSAs shall work in partnership with sanitation and health NGOs on the initiative to modernize FSM, so that NGOs/CBOs can play complementary role. NGOs/CBOs may identify sustainability options, including OHS options, and consultation with community and local government bodies.

4.11 Training of Service Providers and Personnel

Faecal sludge is a biologically active material that must be handled with care. Operators must always employ good hygienic and work practices when handling or working with faecal sludge. The operator is not only responsible for their own personal safety, but also for safety on the road during transport.

All service providers and personnel directly involved in the operations are required to undergo training on health, safety, and hygiene from OSHA, VETA, and other recognized academic institutions, research or professional organizations. Further information on safety issues is provided in ***Annex 6***.

5. PLANNING AND DESIGN OF SANITATION OPTIONS

Sanitation options comprise options for capture, containment, emptying and transport, treatment and disposal/reuse facilities and are illustrated in Figure 5-1. The figure provides sanitation options, showing ways in which choices between various wet and dry toilet systems and on-site and off-site disposal options affect the type of treatment required.

In particular, the matters removed from the pit may have the characteristics of either septage or FS, depending on the amount of water retained in the pit. The diagram is an aid for initial assessment of sanitation systems and treatment needs, which should be followed by more detailed investigation of the situation in the field.

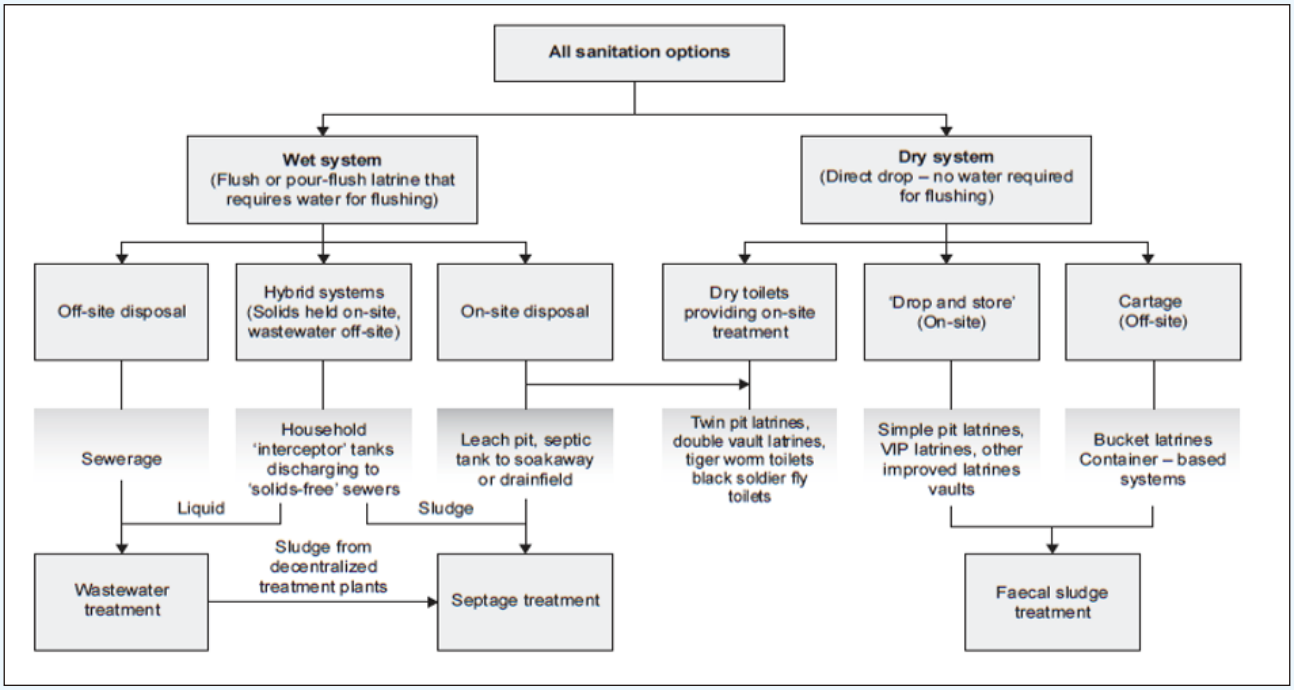


Figure 5- 1 Sanitation Options (Adapted from MoW Design Construction Operation and Maintenance Manual for Design of Sanitation Projects MoW 2020)

5.1 City-Wide Inclusive Sanitation planning

5.1.1 Stages in Citywide Inclusive Sanitation Planning

Citywide inclusive sanitation[35] means that: everybody benefits from adequate sanitation service delivery outcomes; human waste is safely managed along the whole sanitation service chain; effective resource recovery and re-use are considered; a diversity of technical solutions is embraced for adaptive, mixed and incremental approaches; and onsite and sewerage solutions are combined, in either centralized or decentralized systems, to better respond to the realities found in the area.

35 Citywide sanitation, A Call for Action available at:http://pubdocs.worldbank.org/en/589771503512867370/City-wide-Inclusive-Sanitation.pdf

Citywide sanitation planning is implemented in five stages. This section provides guidance on the implementation of citywide sanitation in relation to the activities and outputs and is summarized below in Table 5-1 . The implementation stages may be undertaken in sequence but in many instances the activities are likely to be iterative and therefore one activity does not necessarily need to be fully completed before the next one is initiated. The steps outlined below are therefore meant to provide guidance on the overall process rather than to be a blueprint.

The process for citywide sanitation planning is expected to be initiated by the Local Government Authority in accordance with section 8(1) of the Water Supply and Sanitation Act. However, WSSAs may also initiate the process subject to section 20 (h) of the WSSA Act (2019).

Table 5-1 Stages for Implementation of Citywide Inclusive Sanitation Planning[36] (with Consideration of Joint Town Planning)

Implementation Stage and Activities	Outcome
Stage 1: Build institutional commitment and partnership for planning (i) Establish planning process leader of the sanitation task force. (ii) Consultation and facilitation of the process. (iii) Assess key priorities and incentives. (iv) Define collective vision and priorities for sanitation improvement. (v) Agree upon the planning process.	Formation of a Task Force with representation from the relevant stakeholders and agreement between members about their common vision for sanitation improvement and principles that are to govern the way that services are to be delivered. This should help to mitigate future disagreements about overall policy towards sanitation services in the city and demonstrates their commitment towards improving sanitation services on the ground. As a minimum, the Task Force shall include representatives from WSSAs; and LGA departments responsible with environment, public health, land use planning and community development, and water supply. The Task Force shall also include representatives from training and research institutions with great focus and mandate on water and sanitation; and private sector with practical experience on sanitation works especially FSM businesses. The formation of Task Force shall also observe gender inclusivity.
Stage 2: Understand the existing context and define priorities (i) Collect and review information about existing sanitation facilities, how well the sanitation is integrated into the city/town/municipal land use plan and how adaptive it is. (ii) Assess whether or not Joint Town Plans and Water Safety Plans exist. Where they exist, review them to identify issues and priority interventions. (iii) Identify constraints to service provision (iv) Undertake a sanitation market assessment. (v) Identify priority areas for improvement,	A clear understanding of problems to be addressed, priority areas for improvement and locations which require service expansion and those that require upgrading. It should also include details of short, medium- and long-term priorities. Deepen the understanding on how well the sanitation is integrated into the city/town/municipal land use plan, looking at the fact that urbanization is a common phenomenon and affects hugely on effectiveness of sanitation systems and options provided.
Stage 3: Develop systems for sanitation improvement (i) Delineate zones for system development. (ii) Consider appropriate toilet technologies. (iii) Develop a strategy for treatment, disposal or reuse. (iv) Collection and transportation of wastewater and faecal sludge. (v) Consider operational and maintenance requirements. (vi) Assess costs of proposed improvement options.	A clear understanding on what types of system are appropriate to serve different parts of the city with a well-developed plan for collecting, treating and reusing the residual waste streams. The cost implications and arrangements for operation and maintenance should also be defined.

36 IWA, GIZ, Eawag (September 2014), Sanitation 21, A Planning Framework for Improving, City-wide Sanitation Services, Section IV

Implementation Stage and Activities	Outcome
Stage 4: Develop inclusive for service delivery (i) Develop appropriate management arrangements. (ii) Derive cost-recovery mechanisms. (iii) Strengthen financing mechanisms. (iv) Develop arrangements for monitoring and regulation.	A number of defined service delivery models that can be adopted by the city to upgrade sanitation services throughout the city. These service delivery models should utilize the agreed technologies for upgrade defined in Stage 3 providing the necessary details to describe the arrangements for management, financing and cost recovery. The service delivery models should be linked to the institutional arrangements for monitoring and regulation to ensure that service providers meet the agreed service level improvements.
Stage 5: Prepare for implementation (i) Ensure proposals meet expectations for improvement. (ii) Sanitation promotion, advocacy and awareness-raising. (iii) Capacity building.	The final plan itself and an agreed strategy for financing and implementation of the priority components. This should also include specific target/action to promote sanitation through advocacy and awareness raising combined with a well-developed capacity building strategy to support the implementation of specific components of the plan.

5.2 Design of Onsite Sanitation Systems (OSS)

The design of onsite sanitation facilities is well captured in the Guidelines which were prepared by the Ministry of Health, Community Development, Gender, Elderly namely: National Sanitation Options and Construction Guideline (NSOCG) of 2012; and "*Mwongozo wa Ujenzi wa Vyoo Bora na Usafi wa Mazingira*" (Guidelines for Construction of Toilets and Sanitation). However, the Guidelines do not provide specific emptiable toilets (with inbuilt access hole for emptying) as shown on the drawing on Figure 5.2.

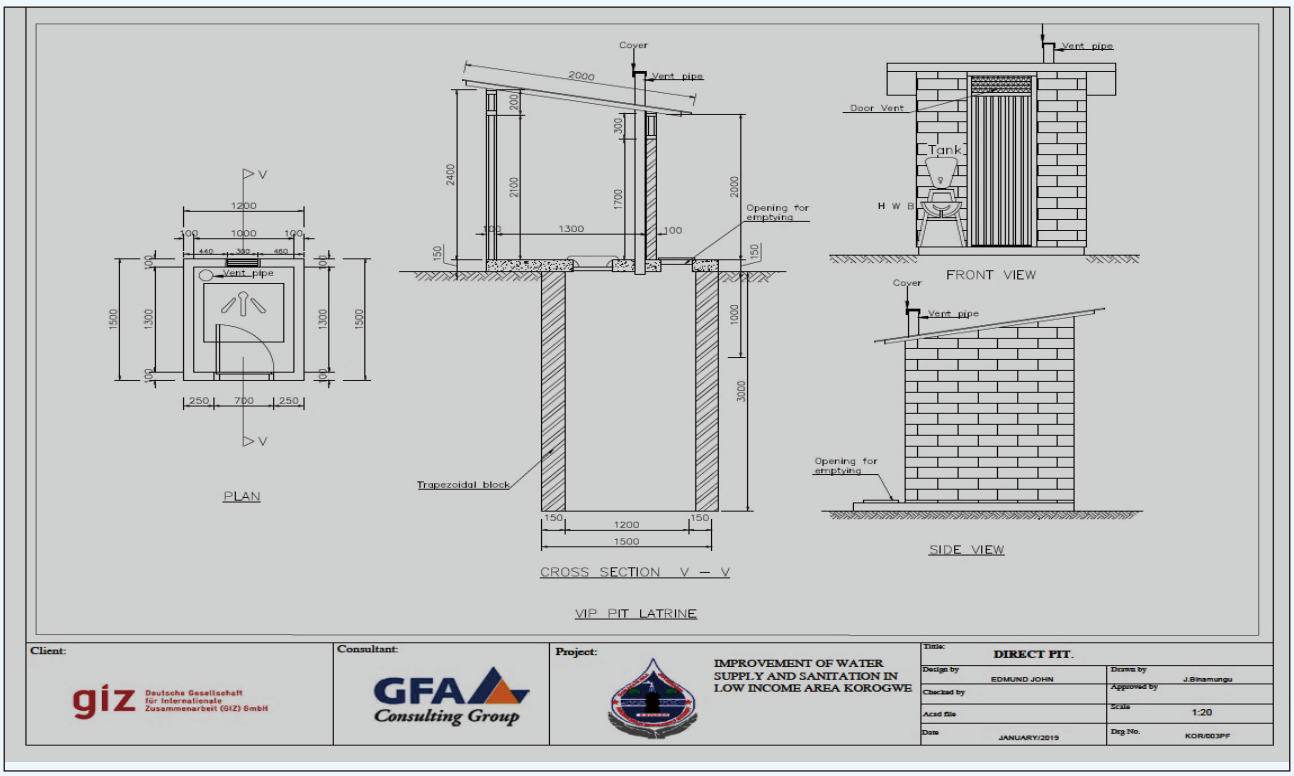


Figure 5- 2 Improved Latrine with side manhole for emptying services.

WSSAs shall be aware of emptiable toilet designs and advise LGAs, households who seek a toilet, and craftsmen accordingly.

5.3 Design of Treatment Facilities

When designing treatment technologies, the final end use or disposal option of sludge and liquid streams should first be determined, so that obtaining the appropriate level of treatment for the desired endues can be incorporated into the design. Once the final end use or disposal options have been selected, it becomes possible to work backwards starting from the final treatment requirements to design a system that achieves the treatment objectives. For example, pathogen reduction and level of sludge water content requirements will be very different if the intended end product is compost for use on food crops or if it is fuel for use as combustion in industrial processes. These decisions are context specific and need to be made based on local regulations and the market demand for end products.

WSSAs should make reference to the design manual prepared by the Ministry of Water (DCOMM, MoW 2020) which can be supplemented by other relevant reference materials such as:

a) Guidelines for the Application of Small-Scale, Decentralized Wastewater Treatment Systems, A Code of Practice for Decision Makers, MoW 2018;
b) Faecal Sludge Management, Systems Approach for Implementation and Operation, Strande *et al*, 2014; and
c) Guidelines on Sanitation and Health WHO, 2018.

5.4 Preparation of Sanitation Safety Plans

The underlying purpose of sanitation interventions is to protect public health and the environment. Management and investments in improvements on sanitation systems should be made based on adequate understanding of the actual health risks posed by the systems and how these risks might best be controlled. Sanitation Safety Planning (SSP) is a risk-based management tool for sanitation systems. The SSP manual provides practical step-by-step guidance to assist in the implementation of the safely managed sanitation. However, the approach and tools in the manual can be applied to all sanitary systems to ensure the system is managed to meet health objectives.

WSSAs must factor in the requirement of Sanitation Safety Plans (SSP) in the Wastewater Quality Monitoring Programme. The guideline for preparation of SSP is included in the EWURA Water and Wastewater Quality Monitoring Guidelines for Water Supply and Sanitation Authorities, Second Edition, March 2020.

6. BUSINESS MODEL OPTIONS FOR PROVISION OF FSM

This section provides guidance to Business Models to be considered by WSSAs to operate and maintain the FSM system. The proposed FSM Business Models are necessary for establishing and operationalizing the overall system.

Three main types of Business Models for developing a sustainable FSM system are highlighted, namely:

a) Emptying and Transport Business Models comprised of: On-Demand based Emptying and Transport Model and Scheduled Emptying and Transport Model;
b) Faecal Sludge Treatment Business Model; and
c) Reuse Business models.

6.1 Emptying and Transport Business Models

6.1.1 On-Demand based Emptying and Transport Business Model

The common practice for desludging of septic tanks is "demand-based desludging" rather than scheduled desludging. FS emptying at households, institutions and public toilets are carried out as per demand and service fees which are paid per volume of FS emptied and collected. The fees collected are meant to cover operational costs of emptying, transport and disposal including profit.
Disadvantages:

a) Service providers have to wait to be called to provide service and do not know when and where the next demand is and can therefore not plan.
b) On-demand based emptying and transport practices have adverse social and environmental impacts and are hard to regulate. Desludging is only called in when there is an overflow of FS from toilets or septic tanks. This also creates an opportunity for service providers to charge high user fees which may lead to households to resort to open defecation to avoid filling the toilets/septic tanks. In addition, desludging charges may be higher in townships due to low volume of business, private operators are mostly based in cities/municipalities and when they are called in, they charge additional transport costs and living costs during desludging.

6.1.1.1 Promoting Competition for Motorized Emptying

With the demand-based model, EWURA may promote competition among service providers by setting the cost recovery tariff as a cap tariff and customers may be given an opportunity to bargain the charge downwards without compromising the quality of service. The cap tariff shall be set in accordance with section 6.1.4. In addition to setting a cap tariff, WSSAs may promote competition through implementation of the following strategies[37]:

a) maintain, update and publicize a register of service providers for sludge emptying, transport and discharge for the public to negotiate and choose from;
b) assign a toll-free help line for sanitation customers to assist them during negotiation or choosing of service providers when requested; and

37 ESAWAS Regulators Association, Guidelines for Sanitation Services Tariff Setting and Inputs for Tariff Modelspg 40

c) establishment or upgrading existing call center to include GPS tracking of the trucks.

6.1.1.2 Promoting Competition for Manual/Mechanical Emptying Services

WSSAs will propose to EWURA a tariff for charging manual or mechanical emptying services. In order to promote competition, the strategies will include the following[38]:

(a) create service area zones, prepare performance contracts and assign service providers through a competitive process;
(b) maintain, update and publicize a register of qualified operators for emptying and primary transport for the public to negotiate and choose from;
(c) prepare and publish technical options for emptying and primary transport technologies for use by service providers and for awareness creation to customers;
(d) facilitate emptying, both primary and secondary area wise so as to promote economies of scale; and
(e) assign a toll-free help line for sanitation customers so as to assist customers during negotiation or choosing of operators when requested.

6.1.2 Scheduled Emptying and Transport Business Models

Scheduled desludging is a planned intervention for regular desludging. Every household is desludged at planned intervals depending on the size of the facility to be desludged (septic tank or latrine) and the number of users of the facility.

Financing of scheduled desludging shall be from sanitation levy and households shall not have to pay an additional amount for the desludging services unless they require an unscheduled service. Scheduled desludging may be outsourced to private operators and their payment should be based on the quantity of sludge delivered to the treatment plant (preventing illegal dumping); and the number of households that used the desludging service. However, a penalty should be introduced which will include compensation to a customer, who has paid for desludging services, but the services were not provided by the service provider as planned. If it is mandatory desludging, this will be an all-inclusive desludging service including household (low income and high income) and institutional latrines and septic tanks. Mandatory desludging will require all households with OSS facilities to pay sanitation levy. Enforcement of payment for households without a water connection shall be through the LGAs bylaws, in a similar way as they enforce solid waste collection.

Here below are variants of business models for scheduled desludging derived from experiences in Asia which may be applicable[39]. Consideration of relevant experience from other countries is also encouraged.

6.1.3 Scheduled Desludging - PPP Annuity Model

Private service provider brings trucks and operates through a performance-based contract to carry out scheduled desludging on a predetermined schedule set by WSSAs. Fees as per the bid are paid to private operators for each septic tank emptied. The utility collects a sanitation levy on water to cover the payment of fees.

38 ESAWAS Regulators Association, Guidelines for Sanitation Services Tariff Setting and Inputs for Tariff Modelspg 40
39 Mehta Meera, Citywide Inclusive Sanitation through Scheduled Desludging Service: Emerging Experience from India, November 2019, pg8

Advantages: Reduces the capex burden for local governments; results in higher service levels; guaranteed fees result in competitive bid prices.

6.1.4 Scheduled Desludging — Private Sector Partnership (PSP) Annuity Model

In a PSP annuity model the private service provider leases or operates LGA or WSSA trucks and carries out desludging operations on a performance-based contract. Fees are determined in the bid.
Advantage: LGA/ WSSAs capex may incentivize more and smaller private service providers to participate.

6.1.5 Scheduled Desludging on Requisition

Regular desludging services are provided to only those households that request regular desludging on the household register. The private operator then informs the households about their regular desludging period and provides the service.
Advantage: Can be explored as a potential model for transition from on-demand to scheduled desludging.

6.1.6 Integrated Model with Treatment and Scheduled Desludging

In this model, a private service provider operates both desludging and treatment services in the town. The treatment facility may fully or partially be funded by the Government or by the private sector. The trucks are funded by the private sector. Recovery could be from the Government (PPP contract) or from desludging charges. Desludging charges from households are the source of OPEX funding for collection, transport and treatment. Charges are collected directly by the operator (user charges), or through WSSA (Sanitation levy) which then pays the operator.
Advantages: Integrated models offer efficiency, convenience and easier contracting with the same private provider.

6.1.7 PPP/PSP-based Clustered Integrated Model with Treatment and Scheduled Desludging

In this model, a private service provider operates both desludging and treatment services in a cluster of towns.
Advantages: Cluster approach and co-treatment can provide efficiencies in treatment facilities.

6.1.8 Management of Emptying and Transport Business Models

6.1.8.1 Trade Waste Agreement (TWA)

Emptying and Transportation of FS is the role of a WSSA which can be contracted to the private service provider as indicated in Table 3.2.

In accordance with regulation 10 (1) and (2) of the Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019, WSSAs have a duty to enter into Trade Waste Agreements with private operators for implementing emptying and transport whereby the terms and conditions shall include:

a) provisions on the rate of discharge of FS;
b) taking of samples and checking the compliance of FS before discharge to FS disposal works;
c) prescription on the nature of FS;
d) provision on the details of FS disposal works;
e) prescription of the fees, tariff, and charges and the source of each;
f) provision of technical support to the private operator where necessary; and
g) maintenance of equipment's to the standards required by the local government.

6.1.8.2 Minimum Operational Conditions of Trade Waste Agreement (TWA)

In addition to the terms and conditions stipulated in the Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019, the TWA shall also include the following minimum operational conditions:

a) pay statutory payments including, business license fees, TRA income tax payment, LATRA and NEMC fees;
b) provide necessary staff, material and equipment for effective service delivery;
c) comply with the tariff as approved by EWURA;
d) comply with the service quality standards as issued by the EWURA from time to time;
e) operate in accordance with existing, standards, laws, Standard Operating Procedures (SOP) and regulations related to the services to be provided;
f) subject to regulation 24 (1) of the of the Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019, the Operator shall not discharge gaseous, liquid and solid waste which contains any fat, grease, oil, petroleum spirits, abattoir waste, hospital waste, sand, detritus, chemicals from mining or similar matter into the treatment plant;
g) keep a record of its services in a form specified by a WSSA and submit the report to the WSSA at intervals as specified by the WSSA; and
h) pay dumping fees.

6.1.8.3 Conditions for the Vessels

Furthermore, and in accordance with regulation 12 of the Water Supply and Sanitation (Provision and Management of Sewage and Wastewater Services) Regulations, 2019, prior to entering into a trade waste agreement for carrying out emptying and transport services, the Private Operator shall have a permit from the LGA after ensuring that the vessel meets the following conditions:

a) has a containment mechanism to conceal the contents except during loading and unloading;
b) is water and air tight manufactured to prevent leakage through cleaning;
c) has self-sucking and offloading mechanisms; and
d) has been visibly marked as strictly carrying and transporting wastewater and sewage only.

6.1.8.4 WSSAs obligations[40]*:*

A WSSA shall:

a) ensure that, all operators of FS exhausting trucks operating in areas not covered by the sewer network are registered with a WSSA;
b) ensure that the designated points of disposal of the wastewater and sludge are known to the exhauster operators and meet the standards for such facilities and is maintained to protect the environment and safe disposal of waste;
c) maintain a daily register of all disposals in terms of volume disposed at the discharge point and shall as per sampling schedule in the Water Quality and Effluent Monitoring Guideline test sludge samples;
d) ensure the operator complies to the tariff as approved by EWURA;
e) ensure that the service provider complies with Standard Operating Procedures (SOP) for FS emptying and transport; and
f) ensure that the service provider meets the service provision standards on safety and environmental protection.

6.1.9 Costs and Tariff for Emptying and Transport Services

WSSAs shall ensure emptying and transport tariffs and charges are in compliance with the EWURA (Water Tariff Application and Rate Setting) Rules, 2020. Costs which constitute Revenue Requirement for Emptying and Transport Services Models[41] may take into consideration items shown in Table 6-1. The revenue requirement is determined for each size of the motorized emptying and transport equipment (e.g. 3, 8, 10 m^3).

Table 6 -1 Costs for Emptying and Transport Services

Cost Category	Costs
O&M COSTS - Operational Costs	**Volume Related Costs** (i) Operations of transfer stations (ii) Fuel and lubricants (iii) FS discharge fees (iv) Cost of exhauster pipes and fittings (v) Safety protective gears
	Customer Related Costs (i) Labour (ii) Subcontracting (iii) Monitoring operations of emptying and transport of FS
	Fixed Costs (i) Cost for operator/driver, (ii) Administration costs (iii) Financial Charges (iv) Municipal license fees and service levy (v) Environmental, regulatory and fees (vi) Taxes i.e. Corporate tax & VAT (vii) LATRA fees (viii) Fire Fees (ix) OSHA fees (x) Office rental fees

40 ESAWAS Regulators Association, Guidelines for Inclusive Urban Sanitation Service Provision (Incorporating Non-Sewered Sanitation Services), March 2020, pg. 57

41 (i) Additional information to Parts IV and V of the Energy and Water Utilities Regulatory Authority (Water Tariff Application and Rate Setting) Rules, 2020

Cost Category	Costs
O&M Costs - Maintenance and Repair Costs	**Volume Related Costs** (i) Repair and maintenance of manual and mechanical emptying equipment (ii) Repair and maintenance of transfer stations (iii) Spare parts (iv) Repair and maintenance of exhauster trucks
Depreciation Costs	**Volume Related Costs** (i) Cost of exhauster trucks (ii) Cost of transfer stations (iii) Cost of manual and mechanical emptying equipment
Return on Investments *The Regulatory Asset Base (RAB) which may be included in calculating ROI shall be derived from the following assets*	**Volume Related Costs** (i) Cost of exhauster trucks (ii) Cost of manual and mechanical emptying equipment (iii) Cost of transfer stations

6.2 Faecal Sludge Treatment Business Models

Business models for FS treatment can be implemented in accordance with the Public-Private Partnership (PPP) Operational Guidelines for the Water Supply and Sanitation Sector (May 2017). There are three variants for the FS treatment Business Model:

a) where the WSSAs responsible for designing, constructing and managing the FS treatment facility. The PPP Guidelines provide that the type of PPP which can be applicable is the "Public Sector Service Provision";

b) where the private operator is responsible for designing, constructing, owning and managing the treatment facilities. The PPP Guidelines provide that the type of PPP which can be applicable is the "Design, Build, Finance, Maintain and Operate (DBFMO) contract."; and

c) where treatment services are contracted to the private operator, with WSSA designing, constructing, and owning the treatment facilities, and leasing operation out to a private operator. The PPP Guidelines provide that the type of PPP which can be applicable is the "Management Contract".

In case of b) and c) the treatment operator shall be paid on an output basis (e.g. Tanzania Shillings (TZS) per m^3 of biosolids), which gives the operator a strong incentive to increase volumes treated. This will require careful monitoring and enforcement by WSSA.

6.2.1 Management of FS Treatment Model

As indicated in Table 3.2 FS treatment is the role of a WSSA which may be contracted to the private operator. Therefore, if a WSSA contracts faecal sludge treatment services, it has a duty to enter into a contract with a Private operator implementing the service.

The services to be offered by the private operator may either be; (A) to construct, own and operate the FS treatment facility or; (B) to operate and maintain the faecal sludge treatment facility which is owned by the utility.

a) Minimum Conditions for Outsourcing FS Treatment Services

Before outsourcing FS treatment services, a contract should be entered between a WSSA and a private operator whereby a WSSA has to ensure that the following prior conditions are complied with[42]:

(i) the operator has a business permit issued by the LGA;
(ii) the approved design of the FS Treatment Facility;
(iii) construction permit of the treatment facility;
(iv) approval by NEMC;
(v) business plan for conducting the business;
(vi) financial status of the operator;
(vii) technical description and flow chart of the system operation;
(viii) training manual for system operators; and
(ix) health and safety policy.

b) Minimum Conditions for FS Treatment Operation Contract

In addition to the requirements of a Trade Waste Agreement, below are the additional operational conditions that shall be incorporated in the FS treatment agreement:

(i) the operator should pay statutory payments including, Business license fees, TRA income tax payment and NEMC fees;
(ii) provide necessary staff, material and equipment for effective service delivery;
(iii) comply with the tariff as approved by EWURA;
(iv) comply with the service quality standards as issued by the EWURA from time to time;
(v) operate in accordance with existing, standards, laws, Standard Operating Procedures (SOP) and regulations related to the services to be provided;
(vi) comply with general directives issued by WSSAs; and
(vii) keep a record of its services in a form specified by a WSSA and submit the report to WSSA every year from the commencement of the year in which the contract has been signed.

6.2.2 Costs and Tariff for Faecal Sludge Treatment

WSSAs shall determine FS treatment tariff and charges in compliance with the EWURA (Water Tariff Application and Rate Setting) Rules, 2020. Costs which constitute Revenue Requirement for FS treatment Services may take into consideration items shown in Table 6-2.

42 ESAWAS Regulators Association, Guidelines for Inclusive Urban Sanitation Service Provision(Incorporating Non-Sewered Sanitation Services), March 2020, pg. 58

Table 6-2 Costs for FS Treatment

Cost Category	Costs
O&M COSTS - Operational Costs	**Volume Related Costs**: (i) Electricity costs for use within the treatment plant (ii) Operation of plant equipment (iii) Chemical costs for advanced waste treatment technologies (iv) Wastewater laboratory costs (v) Waste/sludge disposal fees (vi) Fuel and lubricants
	Fixed Costs (i) Personnel Costs for Operations (ii) Safety protective gear (iii) Truck used for operations (iv) General administration costs (v) Financial Charges (vi) Board expenses (vii) License, environmental permits, regulatory fees, Land fee and property tax.
O&M Costs -Maintenance and Repair Costs	**Volume Related Costs** (i) Maintenance and repair of ponds (ii) Maintenance and repair of treatment plant equipment
	Fixed Costs (i) Cost of truck use for maintenance (ii) Civil works within the plant, (iii) Maintenance of the management information system (for billing, finance etc.) (iv) Access roads to the treatment plant.
Depreciation Costs	**Volume Related Costs** Major Repairs for the Treatment Plant
	Fixed Costs (i) Land (ii) Treatment plant and equipment (iii) Civil works within the plant (iv) Trucks used for treatment services
Return on Investments The Regulatory Asset Base (RAB) which may be included in calculating ROI shall be derived from the following assets:	**Volume Related Costs** Major Repairs for the Treatment Plant **Fixed Costs** (i) Land (ii) Treatment plant and equipment (iii) Civil works within the plant (iv) Trucks used for treatment services

6.3 Re-Use Business Models[43]

WSSAs may consider reuse of FS taking into consideration that it contains resources such as nutrients, energy and water; all of which have intrinsic value that can offer monetary gain. Recovered nutrients or energy may be used internally for cost savings or sold to generate revenue.

a) Nutrient recovery from FS

FS contains organic matter which, if applied to poor soils, can improve its biophysical characteristics such as water-retention capacity. The macro - and micro-nutrients contained in FS are required to aid plant growth.

c) Energy recovery from FS

FS contains organic carbon that can be used to generate energy in the form of heat or electricity. The recovery of energy from FS can be done through various biological, mechanical and thermal processes. Examples include anaerobic digestion to produce biogas, gasification to produce syngas and pyrolysis to yield bio char.

Business models for reuse focus on resource recovery solutions i.e. energy and nutrient recovery from FS and related mechanisms for cost recovery to ensure sustainable service delivery. Benefits accrued via Resource Recovery and Reuse (RRR) can support upstream sanitation services.

The currently applicable reuse business models are:

a) models for toilet access and in-situ energy recovery;
b) models emphasising reuse at the end of the service chain; and
c) models covering the entire sanitation service chain from toilet access to reuse.

6.3.1 Models for toilet access and in-situ energy recovery

This business model focuses on the direct link of the two ends of the sanitation service chain – access to toilets and resource recovery and does not engage in the emptying and transportation component of the service chain, as waste generation, treatment and reuse take place in close proximity. The model is mostly applicable to public toilets.

Besides providing environmentally friendly renewable energy and low-cost liquid fertilizer, the model offers an improved sanitation service to residents of the community on a fee-for-usage basis. Biogas is generated by treating human excreta from the public toilets. The biogas generated can be used internally for lighting or for the provision of hot water for bathing, resulting in energy savings. Alternatively, biogas can be sold to neighbouring businesses (e.g., street vendor) or households. The bio-slurry from the bio- digester is rich in nutrients and can be sold as liquid fertilizer to farmers or used for landscaping around the toilet complex; the liquid fertilizer needs, however, to be sanitized further. The business earns revenue mostly from the fee charged for the provision of toilet services,

43 Krishna Rao et l, Business Models for Sludge Management (2016) and Resource Recovery and Reuse as an Incentive for a More Viable Sanitation Service Chain

followed by sale or savings incurred from the biogas produced. This business model can be initiated by Private operator or CBO and requires partnership with the municipality to provide land for the public toilet.

6.3.2 Business model of reuse at the end of the service chain

The business model of reuse at the end of the service chain focuses on the value proposition pertaining to the reuse product, and depends on the type of resource recovered (nutrients/organic matter/energy) from the FS and target customer segment. This business model involves collection of toilet and organic waste, which is then used to produce organic compost, through co-compositing and generating renewable energy.

Co-composting refers to the simultaneous composting of at least two organic sources: Nitrogen-rich FS from on-site sanitation with the carbon-rich organic portion of Municipal Solid Waste (MSW), sawdust or agro-waste to create the right carbon to nitrogen ratio for optimal composting, i.e., heat development and pathogen destruction. The co-composting business thus requires linkages between those in charge of household waste (MSW) collection and those serving OSSs. The waste from toilets may be collected on demand or scheduled basis from household and public toilets and organic waste may be collected from local food markets or households by segregating organic waste with other waste.

The objective of the model is to produce a safe and valuable product for agricultural production. Furthermore, composting reduces the volume of waste by about 50%, which helps waste management to save on transport and disposal costs.

The resulting sanitized product (co-compost) is sold to farmers, landscapers, nurseries, tree plantations, flower producers, etc., always targeting multiple market segments with demand throughout the year. The revenue of the treatment plant is usually a mix of two possible income streams: (i) from households or the municipality for the absorbed waste volume (FS and MSW); and (ii) from farmers and landscapers for the sold co-compost.

6.3.3 Business model covering the entire sanitation service chain

The business model engages in every component of the sanitation service chain – from provision of toilet to households, collection and transportation of sludge to treatment for disposal or reuse.

This model is best suited for the container-based sanitation (CBS) system whereby human waste is captured in sealable containers, and then transported to treatment facilities. CBS is a sanitation option in urban areas where permanent on-site sanitation and sewerage systems are infeasible such as hilly and remote areas, slums, emergency camps and floods. Typically, on a scheduled basis (weekly or twice every week), the containers are collected and transported to a central processing facility where the waste is processed. Additionally, CBS providers may produce compost, which reduces the waste volume, allows to sanitize also the most recent (fresh) faecal matter and to produce a soil ameliorant for farming. An alternative is energy generation, which could take place at a centralized processing facility for the faecal matter. The key revenue for the business is from the rental of toilets (and emptying service), complemented by the sale of reuse products.

6.4 Financing of Business Models

The operation of Business Models (service and infrastructure) may be financed from the following sources:

(a) Tariff and Charges

Tariff and Charges are collected from customers in return for the service provided. Payments shall be based on volume of FS emptied or treated.

(b) Disposal Fees

Fees charged by treatment plants to private emptying enterprises for disposal of sludge which is equivalent to tariff for FS treatment.

(c) Sanitation Levy

It is a fee paid by users of on-site sanitation services to the WSSA for emptying, transporting or treatment of FS. The levy is to be collected through a surcharge on a water bill. This levy is recommended to be introduced in case of scheduled desludging (refer section 6.1.2). It should have a separate account to create discipline in its use.

(d) Taxes

Taxes, which are raised by the government through the tax system e.g. adding fees on property tax which is applicable for all households (sanitation tax)[44].

(e) Transfers

Funds made available through international donors and a range of other charitable entities through grants, low-interest loans and underwriting projects through guarantees.

(f) Trade

Represents revenues that can be made by selling resources recovered through the service provided.

(g) Funds from Financing institutions

Another source of financing the sanitation business is the use of financial arrangements from other financing institutions such as banks, micro-financing institutions that have shown interest in financing urban sanitation works for both faecal and solid waste management.

44 Sanitation Through Services India Meera Mehta*, Dinesh Mehta and Upasana Yadav

6.5 Enabling Environment for Engaging a Private Sector

a) Why involve a private sector?

(i) Market knowledge and technical expertise: The private sector is already involved in the delivery of onsite sanitation and FSM services.

(ii) Operational efficiency: Because the private sector operates in order to generate profits, delegating the management of public assets to a private operator could create operational efficiencies.

(iii) Increases operational effectiveness through:
- Shortening the turnaround time on provision of services to the needy households.
- Expanding access to pit emptying services.

(iv) Commercial orientation: private operators are likely to adopt a demand-responsive approach and seek to increase their customer base.

(v) Capital Investments: the private sector has a critical role to play in helping to bridge the sanitation service gap by bringing capital, offering efficiency, innovation and flexibility to address complex issues.

b) Enabling environment

WSSAs shall provide conducive enabling environment for engaging private sector in the provision of FSM services which may include:

i) leverage existing structures and businesses, to support existing businesses in expanding into FSM, as opposed to setting up a new business focused exclusively on this service (e.g. TOA NGOMA DEWATS operator who used to be a solid waste collector));

ii) show, don't just tell. This can be by reference to an existing project or business. The demonstration of effective service delivery models is a powerful driver of change (e.g. DEWATS operation in Kigamboni);

iii) support the formation of associations of cesspit emptiers and transporter to enable them access technology, financing, training, OSHA services and have a common voice in airing their concerns to improve their business environment;

iv) provide information and data on the prospects of private sector in the respective area, for example to provide data on the current and future volume of FS in a water authority area which may be established through Town Level Sanitation Planning. These quantities can assist the private sector to estimate the volume of business and the respective returns;

v) incentives like construction of additional FS treatment facilities or transfer stations in all corners of the city or town outskirts and improving access roads to the treatment facilities or transfer stations to reduce transport cost, wear and tear;

vi) increase the dialogue between public and private stakeholders in order to improve collaboration and regulation of FSM services;

vii) building private sector capacity to help it grow, including through trainings, technology transfer (i.e. DEWATS technology), make available to operators detailed operational manuals i.e. Manual for emptiers to supplement the SOPs business development support and facilitate access to credit;

viii) put in place effective regulation and enforcement. In most locations, a new entrant to the FSM sector can expect to find themselves competing with multiple informal operators, who are positioned to charge lower prices through unsafe practices (for example, illegally dumping sludge in a local watercourse or open green fields);

ix) support infrastructure planning based on realistic estimates of investment. The provision of decentralized transfer stations, for example, can significantly enhance the capacity of FSM businesses to serve low-income areas. Where they are developed, sanitation master plans must provide for this infrastructure (e.g. Joint Town Level Planning (JTP) in KOROGWE and TUNDUMA);

x) assess sources of long-term sector financing; FSM will need some form of public investment or subsidy to survive as a viable market. There is no one-size-fits-all solution: opportunities are likely to exist to create the financing model for a given service, and flexibility is required to respond effectively; and

xi) support the introduction of PPP for provision of FSM services in accordance with the applicable Public-Private Partnership framework.

7. MONITORING, EVALUATION AND ENFORCEMENT

Monitoring of OSS and FSM shall aim to measure and ensure that inputs and activities lead to their intended results and outcomes; to adjust course where necessary; and to establish whether progress is being made towards provision of safely managed sanitation services.

In order to effectively monitor the attainment of safely managed sanitation through improvement of OSS and FSM, strategies and performance targets for OSS and FSM interventions should be included in WSSAs' Business Plans. Section 7.1 provides details of key performance indicators for monitoring achievement of OSS and FSM targets.

7.1 Key performance indicators for OSS and FSM

Key performance indicators to be included in the monitoring framework of OSS- FSM by WSSAs and EWURA are indicated in Table 7.1.

Table 7-1 Key Performance Indicators for Monitoring OSS and FSM

No	Key Performance Indicators	Description	Data to be collected	Source of Primary Data
1.	Onsite Sanitation			
2.	Emptiable latrines (%).	Percentage of Emptiable latrines in the Service Area.	i. Total number of latrines in a service area. ii. Total number of emptiable latrines in a service area.	Data collection by WSSAs in collaboration with LGAs and through NSMIS.
3.	Population using emptiable latrines (%).	Percentage of population using emptiable toilets in WSSA service area.	i. Population in a service area. ii. Number of emptiable latrines. iii. Average households' size.	Data collection by WSSAs in collaboration with LGAs and through NSMIS.
4.	Population using septic tanks (%.)	Percentage of population using septic tanks which connect to public sewer in WSSA service area.	i. Population in a service area. ii. Number of septic tanks. iii. Average households' size.	Data collection by WSSAs in collaboration with LGAs and through NSMIS.
5.	Faecal sludge collection indicators			
6.	Collection efficiency of FS-septic tanks (%).	Percentage of FS which is collected from septic tanks to the total expected FS to be collected during the assessment period.	i. Total volume of FS expected from septic tanks ii. Total volume of faecal sludge collected from septic tanks.	Data on collected FS to be collected at the treatment facility from FS dumping records. Expected FS to be calculated.

No	Key Performance Indicators	Description	Data to be collected	Source of Primary Data
7.	Collection efficiency of FS-latrines. (%)	Percentage of FS which is collected from toilets to the total expected faecal sludge to be collected during the assessment period.	i. Total volume of faecal sludge expected from latrines. ii. Total volume of FS collected from latrines.	Data on collected faecal sludge to be collected at the treatment facility from faecal sludge dumping records. Expected faecal sludge to be calculated.
8.	Manual desludging. (%)	Percentage of manually desludged to the total desludged FS.	i. Total volume of FS desludged manually ii. Total volume of FS desludged.	Data on manually collected and total FS to be collected at the treatment facility from FS dumping records.
9.	Desludged latrines (%).	Percentage of latrines that have been desludged.	i. Total number of latrines ii. Total number of latrines to be desludged.	Total number of toilets to be obtained from NSMIS. The number of desludged toilets to be obtained from pit emptiers.
10.	Desludged septic tanks (%).	Percentage of septic tanks that have been desludged.	i. Total number of septic tanks ii. Total number of septic tanks to be desludged.	Total number of septic tanks to be obtained from NSMIS. The number desludged septic tanks to be obtained from operators of cesspit emptiers.
11.	Faecal sludge Transportation Indicators			
12.	Ratio of cesspit emptiers/1000 septic tanks.	Number of cesspit emptiers/1000 septic tanks (Ratio).	i. Total number of cesspit tanks. ii. Total number of cesspit emptiers.	Number of cesspit emptiers to be obtained from registration records (at WSSAs). The number of septic tanks to be obtained from NSMIS.
13.	Faecal sludge treatment indicators			
14.	Percentage of received FS at the treatment plant.	Percentage of received FS at the treatment plant to total expected FS to be emptied during the assessment period (%).	i. Total volume of FS received at the treatment plant ii. Total volume of FS expected to be emptied.	Data of received FS to be collected at the treatment facility from FS dumping records. Expected FS to be emptied to be calculated.
15.	Capacity of FS treatment facility.	FS treatment capacity as a percentage of current volume of sludge received.	i. Total volume of FS treated ii. Total volume of FS received at the treatment plant.	Treatment capacity to be obtained from design records. Data of received FS and FS to be collected at the treatment facility from FS dumping records.

No	Key Performance Indicators	Description	Data to be collected	Source of Primary Data
16.	Compliance to sludge quality standards.	Percent of treated sludge quality tests which meet the quality standards.	i. Total number of samples of treated sludge that comply with the quality standard. ii. Total number of samples tested.	From external laboratory results – preferably from accredited laboratories.
17.	Compliance to effluent quality standards.	Percent of effluent quality tests which meet the effluent quality standards.	i. Total number of samples of effluent that comply with the quality standard. ii. Total number of samples tested.	From external laboratory results – preferably from accredited laboratories.
18.	Re-Use of Treated Effluent/Sludge			
19.	Re-use of treated effluent/ sludge.	Percentage of reuse and recycling of treated effluent/ sludge to total treated effluent/ sludge.	i. Total volume treated effluent/sludge reused. ii. Total volume of effluent/ sludge treated.	Quantities of re-used treated effluent/sludge and total treated effluent/sludge to be obtained from records at the treatment plant.

7.2 Preliminary Data and Information

WSSAs are currently reporting on the development of OSS and FSM in their area of operations using preliminary data and information shown on Table 7-2. In addition to the performance indicators in Table 7-1, WSSAs shall continue reporting on preliminary data and information in order to continue tracking the development of OSS and FSM in WSSAs until the full monitoring indicator system is in place, including incorporation into MaJIs.

Table 7-2: Preliminary Data and Information

SN	PRELIMINARY DATA AND INFORMATION	UNIT
1	Total number of households in the service area	No.
2	Number of Cesspit emptiers trucks owned by a Utility	No.
3	Total volume of Cesspit emptiers trucks owned by a Utility	m^3
4	Number of Cesspit emptiers trucks owned by LGA(s)	No.
5	Total volume of Cesspit emptiers trucks owned by an LGA	m^3
6	Number of Private owned Cesspit emptiers registered by a WSSA or an LGA	No.
7	Total volume of Private owned Cesspit emptiers registered by a WSSA or an LGA	m^3
8	Availability of FS treatment facility	YES/ NO
9	Type of FS treatment facility	Mention
10	Total capacity of sludge treatment facility	m^3/year
11	Volume of FS dumped at treatment facility per year	m^3/year
12	Existence of sewer network	YES/ NO
13	Volume of sewage generated per year	m^3/year
14	Number of trips made by cesspit emptier trucks	No/year

SN	PRELIMINARY DATA AND INFORMATION	UNIT
	CONTAINMENT TECHNOLOGY	**Households**
15	Households without Latrines (Open Defecation)	No.
16	Traditional pit latrine	No.
17	Improved ventilated pit latrine (VIP Latrine)	No.
18	Septic tank	No.
19	Connected to Sewer	No.

7.3 Enforcement

Failure by WSSA to attain performance targets for FSM indicators (Table 7.1) contained in WSSAs Business plans may lead to regulatory sanctions as stipulated in the Water Supply and Sanitation Act and its Regulations and Rules. Enforcement of onsite sanitation services shall be implemented by LGAs in accordance with respective by-laws.

Annex 1: Minimum Specifications of PPEs

PPE provided must be suitable for the risk intended without constituting a risk itself. Thus, it must be adjusted to the circumstances of the workplace. PPE must not only be effective but also provide comfort to the user. The following are sample of PPE :

1. Face masks

Protective face mask or splash-proof face shield: to protect nose and mouth from splashes of human waste or sewage.

In the context of FSM, this refers to the Respiratory Protective Equipment (RPE). This is a particular type of PPE, used to protect the individual wearer against inhalation of hazardous substances in the workplace air. There are two general types of respiratory protective equipment (RPE), based on the principle by which protection is provided to the user as follows.

1. Respirators (filtering equipment) i.e.: filter, gas filter, combined filter, filtering half-mask. 2. Breathing apparatus (isolating equipment) i.e.: self-contained breathing apparatus (open-circuit and closed circuit), compressed line breathing apparatus.

Recommended Respirators for FS operations are the Filtering face pieces: They either entirely or substantially consist of filter material. They should conform to the EN 149:2001 standard. There are two types of these respirators i.e. intended to be used for a maximum of a single shift (marked with the letters NR – not reusable) and intended to be used for more than a single shift (marked with the letter R – reusable). An example of the filtering face piece is shown in the picture.

Figure 1. Filtering face piece. (Source: Dräger Safety Poland)

2. Safety Glasses (Googles) for Eye and Face Protection

Preferred PPE for eye protection are safety glasses. Good safety glasses shall be in tempered glass or synthetic material. The frame is nonflammable and may be equipped with side shields. Safety glasses provide protection against flying particulates or chemical splashes. Safety glasses shall be used correctly. Never rest your glasses on the lenses, and those who already wear glasses should use goggles or safety glasses with corrective lenses. Clean the glasses under running water and rub dry with a soft cloth. Put on safety glasses when work is involving risk of eye injury and when transferring and FS. In the event of damage (e.g. scratches) and wear and tear, replace them.

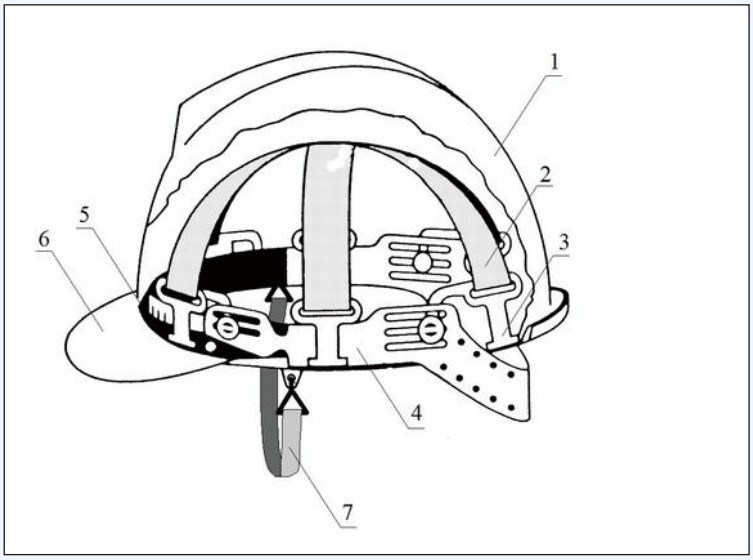
3. Safety helmet for head protection

Safety helmet are meant to protect the head. Effective protective headgear shall have the following minimum quality:

- Hard and not penetrable

- Absorb the shock that comes in the aftermath of a blow
- Be slow to catch on fire
- Also be water-resistant
- Include instructions that can help the workers adjust it properly for maximum protection

To provide the users head with a suitable level of protection against physical factors, the helmet must be properly selected, fitted and used. According to the most common and basic form of PPE aimed at protecting an employee's head is an industrial safety helmet which shall have the following components: shell, harness and headband manufactured in compliance with international standard, EN 397:1995 [3]and EN 14052:2005,.



1 – shell,
2 – harness,
3 – harness fixing,
4 – headband,
5 – sweatband,
6 – peak,
7 – chinstrap

Figure 2: Construction of an industrial safety helmet.

A faulty safety helmet shall be avoided as it offers little or no protection. Check frequently whether the suspension is still adjusted to the head. Replace your safety helmet in case of damage or when it has suffered a heavy impact. Safety helmet should not be decorated with stickers or paint so as not to affect the integrity of its safety and hide possible cracks.

4. Gloves

Proper gloves are the synthetic, heavy duty gloves, long with rough skin outside to enhance grip and breathable from the inside preferably with a cotton cloth to prevent sweat which can cause fungus. Gloves shall be able to protect against hazardous liquids/ chemicals types. Gloves should be used in the correct manner to avoid chemicals from running into sleeve. Replace worn gloves that have come into contact with toxic substances.

5. Footwear for Foot Protection

Footwear for foot protection should be made of synthetic materials, rubber or leather and should be available in different leg heights. Proper footwear should be fitted with a hard tip to protect the toes, and a nonslip sole to keep the wearer from slipping. Safety shoes shall at all times be in good conditions and maintained properly. Worn shoes and shoes that have been in contact with toxic substances shall be replaced.

6. Overalls for Body Protection

Good overalls are those which can provide protection against risks such as FS contamination and general dirt. Overall should be fitted with reflective tapes for visibility of the user. Avoid overalls with wide sleeves or loose flaps that can get caught between the moving or rotating parts of a machine. Dirty overalls must be cleaned or replaced immediately. Ensure damaged overalls are repaired immediately or replaced when repair is not possible.

Figure 3 Overall with reflective tapes

7. First Aid Kit

The First Aid Kit shall contain a minimum of the following equipment:

i) scissors, tweezers, needle, suture thread, sterile disposable gloves, surgical mask and emergency eye wash kit.
ii) bandages and cloths, adhesive bandages of various sizes and shapes, surgical gauze, surgical tape, skin tape/butterfly, closure strips, eye pads, cotton pads and cotton balls, large cloth bandages and ace bandages.

Annex 2 – Site Inspection Checklist

Inspector Name: ……..

Date: …….

Activity to be inspected *(emptying, transportation, disposal and treatment)***: …….**

Site Location: ……..

Section 1: Relevant Permits/licenses (Yes/No)

1. Business licence: ……..

2. Permit to transport waste: …….

3. Signed Trade Waste Agreement: …….

Section 2: Emptying (Yes/No)

1. Barriers have been erected to close off working area: …..
2. A sign is on display prohibiting access for unauthorised personnel: …..
3. Plastic sheeting is covering the ground of the operating workspace:…..
4. The workspace is free from personal items belonging to the household: …..
5. No unauthorised personnel are in the workspace: …..
6. All contaminated items are contained within the workspace: …..
7. Workers are in full PPE that is in good condition – overalls, gloves and gumboots:…..
8. Those workers directly emptying sludge are wearing masks and helmets:…..
9. No operator is using phones, smoking or have used alcohol or drugs:…..
10. Open pits have not been left unsupervised:…..
11. Upgraded tools are being used to remove sludge:…..
12. Chlorine solution or soap other disinfectant is available for site disinfection:...
13. No sludge spillages are visible in the work site:…..
14. Waste is being moved in stored barrels:……
15. The site is left in a good condition when operator leave to transport waste:….

Section 3: Transportation (Yes/No)

1. Clear and visible signage on the vehicle stating that waste is being transported:….
2. Vehicle used is not for transporting goods for human consumption:…..
3. Trailer has high walls to prevent barrels tipping over:….
4. Vehicle has not been overloaded:….
5. A plastic sheet is being used to cover the floor of the vehicle:…..
6. All barrels being transported are sealed correctly:…..

Section 4: Disposal (Yes/No)

1. Waste is being disposed to designated site:…..
2. Solid waste collected is appropriately disposed:…
3. Equipment used is washed in a safe location where public will not be exposed to sludge:…..
4. Equipment is stored in protected area where public will not be exposed to sludge:…..

Section 5: Treatment (Yes/No)

1. Feacal sludge treatment area well maintained, fence and gate available:……
2. Warning signs at the feacal sludge treatment area available:….
3. Feacal sludge treatment plant working tools and equipment available and applied:……
4. Personal Protective Equipment (PPE) for feacal sludge treatment plant maintenance available and applied:…..

Section 6: Customer Services (Yes/No)

1. Customer confirms they are satisfied with sign-up and quotation process:…..
2. Customer confirms they received a written contract:…..
3. Customer confirms they have received receipt for payment:….
4. Customer received the approved applicable tariff:…..

Improvements Required

Signed: _____ Date: _____

Inspector

Signed: _____ Date: _____

Operator/ Site Supervisor

Annex 3. Faecal sludge (FS) Spillage Handling Procedure

FS spillage should be avoided during emptying, transportation and disposal. Operators should have adequate knowledge to identify spills. Immediate action should be taken to contain the spillage, reduce the possibility of health hazard and minimize the environmental impact. Should spills occur, special care must be taken to clean and disinfect surfaces to avoid health risks and ensure safety. Examples of common disinfecting methods and safety measures include:

i) Bleach solution – Typically one cup of bleach to 2 litres of water is a good solution for disinfecting surfaces.
ii) Lime – only use outside. Sprinkle over spilled area, wait 15 minutes, then wash with water
iii) Safety cones – set up safety cones around spilled areas until properly disinfected

Reporting

In case, the volume of spillage is more than 100 litres, notify the concerned authority (city corporation / municipality) with the necessary information including date, time, location, volume of spillage, actions taken to contain the spillage and to disinfect the areas and required future actions (if necessary).

What needs to be done when there is a FS-spill while removing the tank/pit-lid and collecting sludge from the client's pit / septic tank

1. Remove the sludge with the use of a tool (i.e. shovel). Afterwards, wash the tool and then pour bleaching powder on.
2. If the surface is made of concrete, wash the area with water and then disinfect. If the water stranded or absorbed by the soil, dig earth and cover the wet area to avoid human contact; Warn the households and their children not to walk barefooted at least for few days.
3. Each quantity of FS should be dealt with carefully and should follow the steps of removing, washing, bleaching and covering with earth as appropriate.
4. For larger spills, the first step should be to prevent FS running off into nearby streams or contaminate water supplies. This is done by using the tool (shovel) to dig containment ditches, or pile dirt around the spill to keep it from running off. Then disinfect with the bleaching powder and clean up.

What if there is FS-spill while driving the vacutug on the street or if there is an accident

1. If the quantity of spillage is less than 100 litres, remove the sludge from the street and cover the sludge appropriately according to environmental applicable laws. Pour bleaching powder to disinfect the residue on the street.
2. If the spillage is more than 500 litres, immediately contact the relevant LGAs, NEMC to report. In this case, a massive operation needs to be taken where other vacutugs / water-trucks may join to wash away sludge and then pour bleaching powder on the street.

What about spillage while discharging FS?

Cover the area with earth. Bleaching may not be necessary as these places are generally off limit to people. If spillage takes place on a concrete floor within the discharging area, then washing and bleaching would be necessary.

If there is a spill/spray on human body

1. If there is spill or sudden spray due to malfunction/poor workmanship of emptiers, the person affected should immediate take a proper shower/bath. If it affects an emptier, he should immediately be released from the duty to do the same.
2. Emptiers should always alert households, children and by-standers to stay away and inform them of the adverse effects contracting FS.

Annex 4: Manifest Form

MANIFEST FORM

FAECAL SLUDGE ORIGIN

Name (Household/Unit Owner): _____
Address:_____
Mobile Number:_____

Date of Collection: _____

SOURCE AND VOLUME OF FAECAL SLUDGE

Source	**Check one**	**Volume (cubic meters)**
Residential		
Commercial/Industrial		
Institutional		
Wastewater Treatment Plant		

Check to ensure that FS from the source is free from grease, oil, metals, and chemicals that may contaminate the treatment process.

TRANSPORTER

Operator/Company	
Address	
Plate No.	
Name of Driver	
Driver's Mobile No.	
Driver' s Signature	

Attested by WSSA Authorized Representative: _____
(Name and Signature)

TREATMENT/DISPOSAL *FACILITY*

Name of Treatment/Disposal Facility	
Location of Treatment/Disposal Facility	
Date of FS Disposal	
Name of Disposal Facility Attendant	
Signature of Disposal Facility Attendant	
Driver's Signature	

Annex 5: Sample of Accidental Spillage Notification Form

Accidental Spillage Notification Form

NAME OF CONTACT PERSON	CONTACT ADDRESS	
INCIDENT DATE	INCIDENT TIME	
INCIDENT ADDRESS	VOLUME OF SLUDGE/SEPTAGE SPILLED (cubic metres)	
INCIDENT DESCRIPTION		
IMMEDIATE ACTION TAKEN TO CONTROL THE SPILL, MINIMIZE THE ENVIRONMENTAL IMPACT AND CLEANUP PROCEDURES		
ENVIRONMENTAL CONTAMINATION		
Water	Ground	Others
Spread of Spilled Materials		
Nearby stream	Soil	
Storm drain	Near Shoe/Coast	
Others		
Local Terrain Conditions		
Flat	Concrete/Asphalt	
Grassy	Near River Banks	
Dirt	Other (specify)	

Prepared by

_____

(Name and Signature)

Annex 6: Safety Issues

Basic concepts on Occupational Safety and Health

In the Faecal Sludge Management, health and safety at work improve quality and productivity at work. It guarantees quality and productivity at work which can plays good role in promoting economic growth and employment. This is due to the fact that the lack of effective protection to ensure health and safety at work can result in absenteeism, in the wake of workplace accidents and occupational illnesses, and can lead to permanent occupational disability.

The main focus of occupational health is on three different objectives:

(i) Maintenance and promotion of workers' health and their working capacity;
(ii) Improvement of working environment and work to become conducive to safety and health; and
(iii) Development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

Employer´s obligation

The employer is responsible for;

(i) providing and maintaining PPEs;
(ii) Ensuring that everyone applies the PPE correctly;
(iii) Providing sufficient information and instructions on the use of PPE; and
(iv) Maintenance, cleaning, decontamination, inspection, repair and replacement of PPE.

Employees obligation

Employees are obliged to use the PPE provided by the employer. Employees are under an obligation to use the PPE correctly, check it frequently, take care of it and ensure its safe storage, exactly as prescribed by the employer

Safety Issues

1. Septage is an infectious material. It can cause disease if ingested or when it comes in contact with broken skin. Always wash hands immediately with soap after contacting septage or tools and equipment that may have contacted septage, and always before eating or drinking.
2. Septage workers should be immunized for tetanus, hepatitis A, and hepatitis B.
3. Never smoke while operating septage equipment. Septic tanks may generate methane, an explosive gas. Smoking also promotes the hand to mouth route of infection.
4. Use caution around the septic tank. Never enter a septic tank. Every year people are killed because they enter tanks, which are confined spaces that may contain toxic gas or too little oxygen. Use caution when walking around septic tanks. Septic tanks may cave in or break when excessive weight is place on the lid or manhole cover.
5. Always secure septic tank lids with screws or locks. Keep children safe by securing septic tank lids.
6. Personal protective equipment – All employees are responsible for maintaining their personal protective equipment in good condition. This protective equipment includes among others, Gloves, Boots, Hard hat and face mask