The United Republic of Tanzania

Ministry of Water

JOINT TOWN-LEVEL MASTER PLANNING GUIDE

FOR IMPROVING

WATER SUPPLY AND SANITATION SERVICES

November 2021

JOINT TOWN-LEVEL MASTER PLANNING GUIDE
FOR IMPROVING WATER SUPPLY AND SANITATION SERVICES

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List of Abbreviations

CSO	Civil Society Organisation
DP	Development Partner
DEWATS	Decentralised Wastewater Treatment System
EAWAG	Swiss Federal Institute of Aquatic Science and Technology
EWURA	Energy, Water and Utilities Regulatory Authority
FS	Faecal Sludge
GIZ	Gesellschaft fuer Internationale Zusammenarbeit
HH	Household
ISP	Informal Service Provider
LGA	Local Government Authority
MoW	Ministry of Water
NGO	Non-Governmental Organisation
O&M	Operation and Maintenance
RRF	Resource Recovery Facility
SC	Sanitation Chain
TZS	Tanzanian Shilling
USD	US Dollar
WS&S	Water Supply and Sanitation
WSP	Wastewater Stabilisation Pond
WSSA	Urban Water Supply and Sanitation Authority (Utility)
WWTP	Wastewater Treatment Plant

GLOSSARY

1	Anaerobic digestion	The process in which micro-organisms break down biodegradable material in the absence of an oxidizing agent. It is used for industrial or domestic purposes to manage waste and/or to release energy.
2	Biological Oxygen Demand (BOD)	A measure of the amount of oxygen used in the biochemical oxidation of organic matter, over a given time and temperature; it is determined entirely by the availability of organic matter as biological food and by the amount of oxygen used by the micro-organisms during oxidation.
3	Effluent	General term for a liquid that leaves a sanitation technology, typically after blackwater or sludge have undergone solids separation or some type of (partly) treatment. It manifests itself as liquid waste – treated or untreated – flowing out of a factory, farm, commercial establishment, wastewater treatment facility, or out of household premises, discharging into a water body such as a river, lake, lagoon, sewerage or reservoir.
4	Sanitation	The provision of appropriate facilities and services, for the (safe) collection and disposal of human excreta and wastewaters.
5	Sanitation Works	Sewers, drains, pipes, ducts or channels, whether open or closed, used for the drainage of human excreta or wastewater from buildings, land, or on-site systems for reception and containment of human excreta and wastewater, which do not connect to a sewer.
6	Sewer	Any pipe or conduit other than a drain, used for the conveyance of sewage.
7	Sewage	Water-carried waste, in solution or suspension. This can also be referred to as domestic or municipal wastewater.
8	Sewerage	Infrastructure that conveys sewage and ends at the entry to a sewage treatment plant or at the point of discharge into the environment.
9	Sludge	Semi-solids accumulated in onsite sanitation technologies like pit latrines, septic tanks (faecal sludge), or removed from wastewater stabilisation ponds and other liquid waste treatment systems after these have reached their full capacity (wastewater sludge).
10	Blackwater	Liquid waste containing faecal matter, urine, flush water, anal cleansing water and dry cleansing materials.
11	Greywater	Liquid waste generated from domestic activities, excluding sewage.
12	Toilet	Sanitation user-interface, latrine, shed/cabin.
13	In-situ containment	Interim storage compartment (underground) of blackwater from toilets and greywater for example from bathrooms and kitchen. Examples: single pit, double pit, emptiable pit, septic tank…
14	CAPEX	Capital expenditure
15	OPEX	Operational expenditure

MODULE 1 - INTRODUCTION

1.1 THE JOINT TOWN-LEVEL MASTER PLANNING PROCESS

In order to achieve access to water supply and sanitation services to all, following the principle of “Leave No One Behind”, planning and investment decisions regarding these services must adopt a town-wide master planning approach, carried out jointly by the respective utility and the local government authority to ensure congruent and complementary development of these services. Solid-waste management must be part of this.

This *Joint Town-Level Master Planning Guide* is therefore meant to assist Tanzanian **Water Supply and Sanitation Authorities (WSSAs)** and respective **Local Government Authorities (LGAs)** in carrying out an assessment of the existing type and level of water and sanitation services, and propose long- and short-term service level targets, to be achieved collaboratively by both the WSSA and the LGA. In addition to the long- and short-term intervention proposals, the guide outlines a prioritisation process leading to priority measures that may be implemented using available or acquired resources, to attain the quickest possible improvement in the town’s water and sanitation services.

This *Joint Town-Level Master Planning Guide*, together with other source documents (see references), is not meant to be another design manual; it should rather serve as a guide through the first-stage planning and decision-making processes, helping stakeholders, under the leadership of both the WSSAs and LGAs, make decisions about measures for improving sanitation, water supply and solid-waste service levels in their area of mandate, considering technical, organisational, environmental, socio-economic and financial aspects. Before implementation of agreed priority measures on water supply and sanitation services, the WSSAs will still need to carry out a detailed financial analysis for each selected solution and verify their life-cycle viability. This should be followed by the preparation of detailed designs, cost estimates and procurement documents, for implementation but also for developing the institutional framework for effective operations and maintenance.

An overview of the situation in Tanzania regarding water supply and sanitation services is provided in the next section of this Module 1, to put this planning guide in the right context.

1.2 URBAN WATER SUPPLY AND SANITATION SERVICES: A SHARED RESPONSIBILITY

Water supply services have attracted major investments, and this has led to significant improvements over the past decades. The same cannot be said about provision of appropriate sanitation services, covering all sanitation-chain facilities and services, from the safe containment and collection of human excreta and wastewater, up to its safe treatment and disposal (urban sanitation services). Water-related sanitation services have been, and still are, largely a neglected component in the national development interventions in Tanzania.

The lack of sanitation services is a very critical matter, especially in the rapidly growing urban centres, where poor sanitary conditions, including poorly manged solid-waste, are a main vector in the rapid spreading of water-borne diseases. Recent cholera outbreaks are a reminder of the importance of providing clean and safe water supply and sanitation services, in particular to its population in the urban areas.

Sector focus on sanitation: During the WSDP Joint Supervision Mission of October 2016, an agreed action was adopted regarding urban sanitation: "Introduce to WSSAs the master-planning of town-level sanitation chain services (safe removal, conveyance, disposal of faecal sludge) coupled with water supply planning and produce a number of (pilot) draft plans." This was re-emphasised during the JSM of June-July 2017.

This sentiment was echoed during the Joint Water Sector Review meeting of November 2016 by formulation of an undertaking regarding urban sanitation: "MoW is to complete developing its urban sanitation planning guidelines to provide guidance to the WSSAs and LGAs."

A recent analysis of the existing policies, strategies, legislative and regulative frameworks concerning urban sanitation services in Tanzania[1] has confirmed that the written policies and legal documents provide adequate basis for a well-defined distribution of institutional responsibilities where it concerns sanitation. The study concludes that providing sanitation services is largely a responsibility shared between the WSSA and the LGA, with each having specific duties suiting their institutional mandates and powers, while providing room also for NGOs, CSOs and private sector engagement.

The Water Supply and Sanitation Act of 2009 created the WSSAs, which now exist in all regional centres, in district headquarters and townships, and in eight national projects whose service areas include more than one LGA[2] and cover both urban and rural areas.

According to this Act, a WSSA is required, among other functions, to accomplish the following:

a) Develop and maintain water and sanitation works defined by the law as: sewers, drains, pipes, ducts or channels (whether open or closed), used for the drainage of human excreta or wastewater from buildings or land, and onsite systems for the reception of human excreta and wastewater in zones which do not connect to a sewer … (Act, Section 20, c).

b) Plan and execute new projects for the supply of water and for providing sanitation services (within the utility's service area) (Act, Section 20, f).

c) Liaise with local government authorities on matters relating to water supply and sanitation, and for the preparation and execution of plans relating to the expansion thereof (Act, Section 20, h).

[1] Analysis of Policies, Strategies and Regulatory Frameworks for Urban Sanitation in Tanzania, GIZ 2017.

[2] The Tanzanian local administrative system is made up of district (rural) and urban local government authorities (LGAs). This planning guide focuses on the urban authorities only – those in townships, towns, municipalities and cities. All these are referred to in this document as "towns or LGAs"

Based on the provisions of the Public Health Act and the National Environmental Management Act, WSSAs and LGAs are required to collaborate in planning, developing and managing sanitation works, to ensure the effective functioning of sanitation chains in the entire town, i.e. including capture, containment (interim storage), emptying/collection, transportation, treatment and safe disposal of faecal sludge and wastewater**.**

Figure 1: Illustration of a Typical Sanitation Chain (red = plot-level facilities; blue = town-level services)

Currently, only 11 out of the 25 regional centres operate sewer[3] systems (collection, transport), connected to central wastewater treatment facilities (treatment, disposal) mostly in form of Wastewater Stabilisation Ponds (WSPs).

In towns without sewerage, water supply receives primary attention, while sanitation remains unregulated and crude dumping of liquid waste takes place. Only few towns have dedicated Faecal Sludge (FS) disposal sites, let alone a proper wastewater treatment facility. Far too often the FS ends being discharged on solid-waste dumpsites, or worse, directly into the environment. The sanitation chain services are rarely formalised, often not regulated and not supervised, while sludge disposal arrangements are mostly unplanned and unsafe. It is thus anticipated that, with the Town-Level Master Planning Guide, improvements will be jointly developed and implemented by respective WSSAs at LGAs.

As from 2010, sanitation has been receiving more attention, triggered through global, regional and national policies and programmes, starting with the United Nations declaring universal access to water supply and sanitation as a human right. On 25th September 2015, the UN adopted a set of Sustainable Development Goals (SDGs), of which goals 6.1, 6.2 and 6.3 address targets for achieving universal, equitable and adequate sanitation and safe water supply for all, including those currently living in underserved areas or in otherwise vulnerable situations.

On its part, the African Minister's Council on Water (AMCOW) – the Republic of Tanzania had the AMCOW Presidency for the period 2016-18. – also has made urban sanitation a priority. Nationally, the Tanzania National Five-Year Development Plan, 2016-2021 and the Water Sector Development Programme Phase II, put urban sanitation high in the sector-priorities lists.

The growing attention to urban sanitation notwithstanding, it must be noted that at least in the foreseeable future, the majority of the 15 million urban population in Tanzania (extrapolated from census 2012) cannot be connected to conventional sewer systems for a range of reasons, of which the

[3] Any pipe or conduit other than a drain used for conveyance of sewage. Sewage: Is water-carried waste, in either solution or suspension, Sewerage: Infrastructure that conveys sewage, encompassing receiving drains, manholes, pumping stations, storm overflows, screening chambers, etc. Sewerage ends at the entry into a sewage treatment plant, or at the point of discharge into the environment.

most important are financial and technical limitations, inadequate access to water in households, and low population densities particularly in the outskirt of the towns. The *Joint Town-Level Master Planning Guide* draws attention to the need for a new line of thinking that also considers solutions that can be used as an alternative to construction or expansion of relatively expensive piped sewer systems. This will speed up the process of enhancing access to safe sanitation services for the entire urban population in Tanzania.

A critical challenge for WSSAs and LGAs is how to jointly approach the assessment of the town's service needs, i.e. forecasting water requirements and estimating the volumes of faecal sludge and wastewater that must be safely handled, in the short- and long-term. Another challenge is how to ensure an inclusive process of planning, how to realistically identify available resources and applicable measures, which should be followed by the prioritisation of projects that will improve the water supply and sanitation conditions in the entire town in the shortest time possible. Dealing with these challenges is the key objective of this Town-Level Master Planning Guide.

The current practice of dealing with water supply projects separately from sanitation, cannot be upheld by the fact that the amount of water used by a customer (household, institution or industry) also determines the type of sanitation facilities required by this customer. This has implications for the type of facilities and capacities needed, to ensure the safe collection and disposal of the sludge and wastewater volumes produced at neighbourhood-level, and by all customers together at town-level. In other words, there is a strong relationship between the average water consumption levels in an area, and the appropriate type of sanitation infrastructure that would be required. This means that, before the town-level planning for sanitation can be undertaken, first the town-level planning for water supply must be done.

The guiding principle in developing this *Joint Town-Level Master Planning Guide* is, that the type of sanitation facility used by a certain household or institution depends on, among other things, the level of access to water services and the quantity of water that the customer is willing (or able) to spend on "flushing" excreta in a toilet/latrine. Obviously, a household that must hand-carry buckets of water from miles away, or expensively buys water from vendors, will hardly be prepared to "waste" any of that hard-earned water for flushing a toilet.

Utilities must therefore plan how to provide sanitation support services that have the capacity to safely handle (collect, transport, treat, dispose) the total quantity of wastewater and faecal sludge produced in any zone/Ward[4].This estimated quantity of wastewater needing to be evacuated from a typical zone/Ward stands in more-or-less direct relationship with the quantity of water that average users have available, and/or are willing to spend on flushing their toilets.

[4] A Ward is an administrative area within a local government area. In the urban context, it is a full-fledged institution with both political as well as technical staff, and with clear mandates for development-planning within the Ward area. There are lots of statistical data and information readily available for the Wards (e.g. NBS). It is thus the geographical unit of the LGA that should be the starting point from where water supply or sanitation measures can be planned and implemented. In this guide, the Ward is the lowest planning unit.

The *Joint Town-Level Master Planning Guide* aims at helping utilities and the respective LGAs decide on the sanitation facilities and services required at town-level, that can serve the prevailing user-interface and interim storage technologies used at user-level as dictated by their water supply service situation. This decision-making tool should also guide investment prioritisation within their service area, in which city-wide sanitation services should have a prominent place, alongside the town's water supply services.

The main activity after completing the joint planning exercise will be for the WSSA and LGA to adopt the prioritised projects, facilitate and support all preparatory activities for their implementation, possibly in the next financial year. This requires preparations, including allocating budget for implementation and mobilising the necessary resources in a well-planned and coordinated manner. Business plans and annual budgets are among the tools that should be used. Besides supporting implementation of the town-level projects identified by the WSSA, there will be a need to mobilise the respective Ward Development Committees to support project-related activities in their corresponding areas.

1.3 OVERVIEW OF THE JOINT TOWN-LEVEL MASTER PLANNING PROCESS

The *Joint Town-Level Master Planning Guide* (JPG) describes the planning process in easy-to-follow steps, while some steps are supported by illustrations taken from example maps and tables, produced during different stages in developing this Guide. The initial idea for a joint town-level planning approach was first explored and tested in **Morogoro**, and this was subsequently enhanced in **Kahama.** It was fully applied and finetuned in joint planning sessions in the town of **Korogwe**, which has now a complete Water Supply and Sanitation Plan, the first prepared jointly by WSSA and LGA following the directions provided in this Guide. Korogwe's Plan contains the complete set of Planning **MAP**s and **TAB(**le)s referred to in the Guide.

Nonetheless, some planning steps still take example from the initial maps and tables produced in Morogoro and Kahama, and for ease of reference these are therefore provided in **APPENDIX 1a** (Example Info-Maps), **APPENDIX 1b** (Example Plan-MAPs), and **APPENDIX 2** (Example TABs). **APPENDIX 3** explains the use of the Excel-based calculation tool provided with this Guide. **APPENDIX 4** briefly describes the use of a freeware tool Foxit-Reader for creating maps, illustrating situational assessments and plans (in situations where GIS may not be readily available). It is the Authors' intention, that this Joint Planning Guide and its accompanying tools, will be made available electronically and in digital form.

To facilitate writing the **Joint Plan**, a **Plan Template** made up of 8 Chapters accompanies this Guide as **stand-alone ANNEX** 1. The Guide itself contains 8 Modules, each generating inputs into the corresponding Chapters of the **Plan,** following the structure provided by the template.

The 8 Modules in this Guide are described in brief:

Module 1 - Introduction: This module provides guidance for a brief description of the joint planning process undertaken when developing the Plan, including a reminder of the different mandates in the water supply and sanitation sector in Tanzania, and the key principles that have provided the grounds for developing the Joint Planning Guide.

Module 2 - Preparation: This entails several meetings and working sessions within an estimated period of 1 month. This phase involves decision-making by a respective utility to engage in the process. The utility then mobilises the required resources, including experts, resource persons, and supporting references such as maps, the Design Manual for Water Supply and Wastewater Disposal of the Ministry of Water, working documents[5], data/statistics, photos, software for mapping, data processing/calculation sheets and a prioritisation matrix. Key information to be collected include maps showing Ward and Mtaa boundaries, population data for these administrative areas, and a list of public and private institutions and industries and their location in the town.

Module 3 - Town-Level Assessment: The joint assessment session, including field checks, will take about two days. In this Module, the Joint Planning Team (JPT), made up of experts and resource persons drawn from the WSSA and LGA, is guided in assessing the current water supply and sanitation situation, using the respective town's land-use maps and plans as the base. Instead of conducting detailed field surveys (which are costly and time consuming), the JPT-members use their specific local knowledge of the town, supplemented through consultations with their respective colleagues and field staff (e.g. meter readers and community development officers), and from Ward/Mtaa officers where needed. At this stage of the planning process, the JPT should indicate the Wards that should be labelled as "low income area (LIA)", which are generally marked by a relatively high housing density. In these LIAs, households will have less capacity to afford a house-connection for water supply, and to pay waste management charges. The assessment results are captured in a map (by smallest geographical area, generally Ward or Mtaa), and are then used to quantify the volumes of water consumed, as well as volumes of sludge, wastewater and solid-waste needing to be evacuated from each area for safe treatment and disposal, and from the town as a whole. An Excel-based tool is provided to facilitate these calculations.

Module 4 - Long-Term Planning: The estimated duration for a long-term planning session is one day. Based on the long-term land-use plan for the town, and the results of the assessment of the current situation, the JPT is guided in proposing long-term water supply and sanitation improvements that the WSSA and the LGA wish to introduce in the different Wards and sub-Wards, or in the entire town. In the long-term, most parts of the town should be served through private connections, or through public standpipes. Given the current government push toWards industrialisation, through individual factories or by creation of industrial parks such as Export Promotion Zones (EPZs, which already exist in Dar es Salaam, Morogoro, Mwanza, and in other towns), the WSSAs and the LGAs need to develop strategies on how to serve those areas, without jeopardising continued water supply

[5] Utility Strategic Plan and Business Plan as well as the LGA Strategic Plan and Urban Master Plan.

and sanitation services to the common public. Using the same Excel calculation tool, the JPT estimates the volumes of water that will be required in the long-term, and the volumes of sludge and wastewaters that will then be generated.

Module 5 - Short-Term Water Supply Improvement Projects and Prioritisation: The estimated duration of this short-term planning session is one day. Based on the long-term plan prepared in the previous phase, the WSSA and LGA jointly prepare a town-level short-term water supply and sanitation plan, to be implemented in three years. The Excel tool helps with calculating the estimated volumes of water involved.

Module 6 - Short-Term Sanitation Services Improvement Projects and Prioritisation: The estimated duration of this joint session is 2 days. By comparing the current and the envisaged short-term situation, the JPT identifies projects to be implemented in order to realise the short-term situation. The projects are organised into packages that include Ward-level projects with the required town-level measures. The projects are categorised as institutional, infrastructure investment and support services including support activities by the LGA. Taking into consideration the available options, this planning phase will result in a list of proposed water supply projects that should improve the water supply and sanitation conditions in the town. The Excel tool facilitates estimation of the volumes of sludge and wastewater concerned.

Module 7 - Short-Term Solid-waste Management Services Improvement Projects and Prioritisation: The estimated duration of this joint session is 1 day. By comparing the current and the envisaged short-term situation, the JPT identifies projects to be implemented in order to realise the short-term situation. The projects are organised into packages that include Ward-level projects with the required town-level measures. The Excel tool helps with calculating the estimated volumes of solid-waste involved.

Module 8 - Mainstreaming of Priority Projects into WSSA and LGA Budgets for Implementation: The estimated duration of this session is 2 weeks. Preparations towards resource mobilisation for implementation involves multiple meetings and working sessions, including consultations with stakeholders. The priority-ranking of projects done by the JPT, must be endorsed by the decision-making bodies of both the Council and Utility management. The necessary resource allocations for implementation of the final short-lists of water supply, sanitation and water safety projects must be incorporated in the planning and budgeting cycles of both institutions, preferably for the next financial year, considering that annual planning and budgeting cycles generally start around October each year. Priority projects for improving solid-waste services are mainly implemented by the LGA.

1.4 NEXT PROCESS STEPS

Project implementation, once it has successfully taken off the ground, is to be monitored closely by the JPT; an annual review of the progress made in each project will provide important inputs for the planning and budgeting cycles, in both institutions, for the following financial year. The short-term plans are updated, and new short-term projects are identified, prioritised and included in next year's planning budget. Unless the long-term planning outlook has significantly changed, next year's joint planning process of the JPT may start directly with the short-term planning Modules 5 and 6 of the Joint Planning Guide.

Process Flow Chart

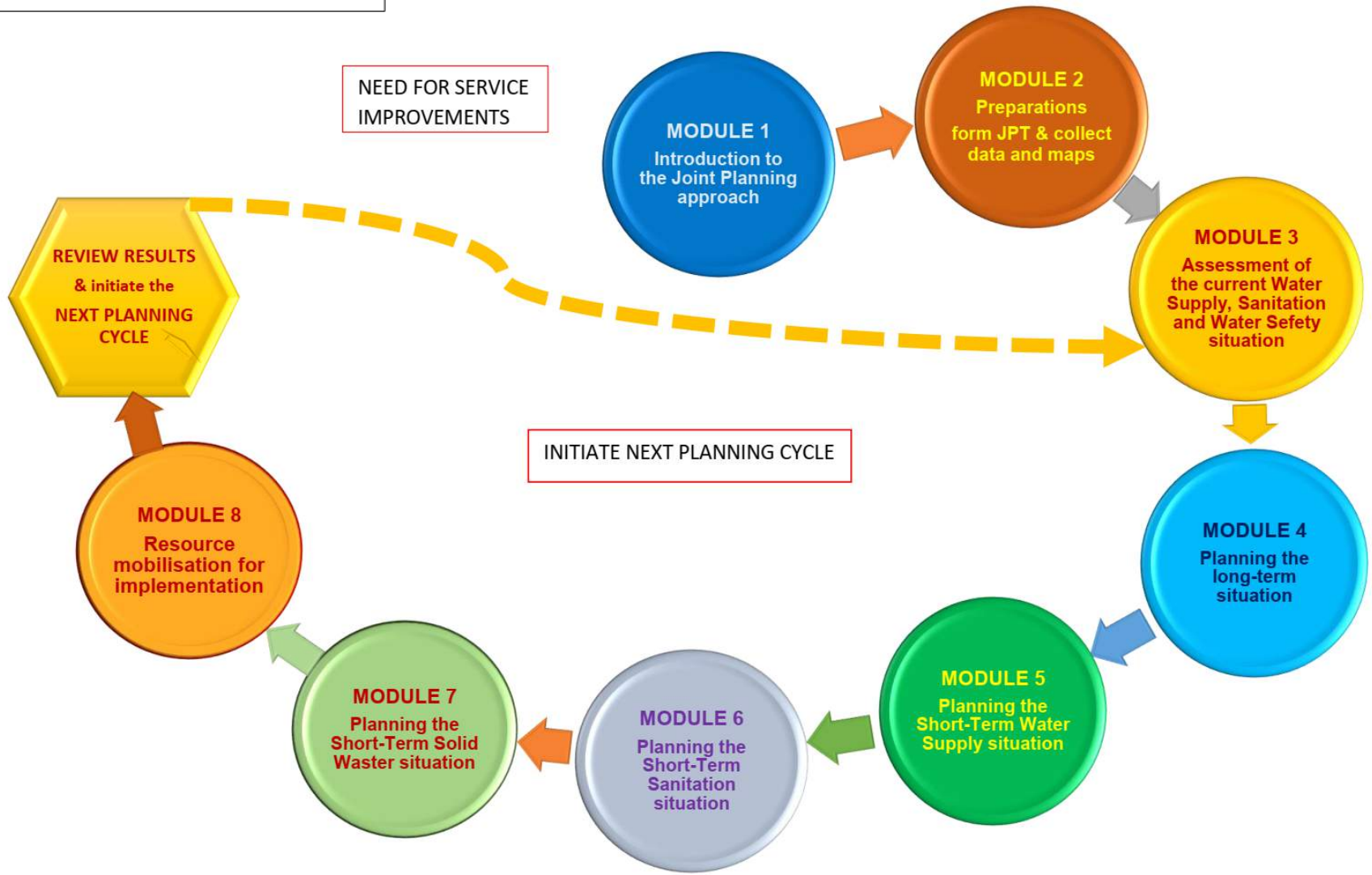


Figure 2: Joint Planning Process Flow Chart

MODULE 2 - PREPARATION

2.1 INTRODUCTION

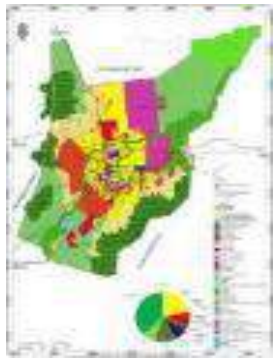
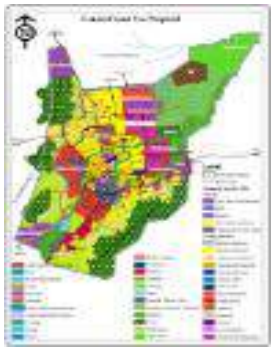
The preparatory phase is critical to the success of the overall application of the JPG. It is therefore important that the activities outlined in **the eight steps** that constitute Module 2 are clearly understood and effectively implemented.

The main activity in this module is that the utility management mobilises ownership, commitment, and financial resources to support the process and the expertise required in accomplishing the modules making up the JPG. The last section of this module outlines some of the key principles that should be followed in order to succeed. Example-maps (**Info-Maps** and **Plan-MAPs**) covering an entire town and related tables (**TABs**) are provided in the **APPENDICES 1a, 1b** and **2** to this Guide.

2.2 PREPARATION PROCESS MATRIX

MAIN ACTIVITIES	EXPECTED OUTPUTS	DESCRIPTION OF ACTIONS	
Module 2 STEP 1 **WSSA initiates planning process and appoints planning team**	Utility Planning Team established	Utility management (most likely Managing Director, MD) decides and allocates resources including number of staff and a budget; initiates and coordinates the planning process, by organising a management meeting to agree on the process; and appoints the planning team and its Team Leader (preferably Technical Manager, TM, or Commercial Manager CM). The Team Leader may delegate some activities at a later stage. The planning team should include at least one staff with mapping skills.	
Module 2 STEP 2 **MD briefs the Board and obtains its support**	Planning and its results supported by Board	The MD informs the utility board members preferably in a Board Meeting about the intended planning exercise and obtains the Board's backing. The meeting may also emphasise which service-level targets should be considered in the short- and long-term planning periods.	

Module 2 STEP 3 **MD and Planning Team Leader brief the LGA Director**	LGA Director briefed by MD and Planning Team, for support	The MD and the Planning Team Leader (see step 1) meet the LGA Director, brief her/him about the upcoming planning exercise and request for LGA's support and participation. It is expected that the LGA Director will honour the request, endorse and support the planning exercise, and appoint team members to join the utility team and thus create a joint planning team (JPT). Preferred members from LGA: Water Engineer, Public Health Officer, Town Planner and an LGA staff conversant with mapping. At this point in the process Terms of Reference should be prepared and signed by the MD (copied to the LGA Director) to clarify responsibilities of the JPT members.	
Module 2 STEP 4 **Joint team meets to draw up an action plan**	JPT Action plan drawn	JPT calls for a team meeting and draws up an action plan and allocates individuals tasks and defines inputs and results. This agreed action plan with task allocations and milestones, is shared with the WSSA MD and the LGA Director for their approval and for securing continuous support and follow-up. After the meeting, the JPT should mobilise the required resources, in particular printed maps (of same scale), MAP-sized transparent tracing paper, marker pens, masking tape, and most importantly a computer with Excel spreadsheet.	 

Module 2 STEP 5 **Acquire reference material, working documents, relevant data and base maps covering the utility/LGA service area**	Set of town MAPs and TABs showing data/statistics as inputs to the planning process acquired	The JPT acquires relevant documents, data and base maps covering the entire town area, in consultation with the Town Planning Department of the LGA. Most essential documents are (see examples in Appendices 1a and 2): 1) Map with Ward/Mtaa boundaries (Info-Map I) to be used in the assessment 2) Current broad land-use for the entire town (Info-Map II) 3) Proposed future land-use plan (Info-Map III) 4) Map of water distribution and sanitation service network (Info-Map IV) 5) Population data for Wards/Mtaas to be entered into the data table (**TAB 1**) 6) Collection of water distribution and sanitation/sewerage data, to be entered in data tables (**TAB 2** & **TAB 3**) Other important reference documents are: 7) The up to date Strategic Plan of the LGA 8) The Town Master Plan Document 9) The up to date Strategic and Business Plan of the WSSA 10) Discharge permit reports for key water sources in the town. If possible, the LGA administrative Ward/Mtaa areas should be harmonised with the utility operational zones. Note that the Ward/Mtaa-data table (TAB 1) will provide the basic information for the subsequent calculations of water supply and faecal-sludge and wastewater volumes, for the assessment and the long- and short-term plans. Note: in smaller town (like Korogwe) it makes sense to use the Mtaas as the smallest assessment/planning unit, while in larger municipalities/cities (like Shinyanga) the Wards will usually be the smallest practicable unit for assessment and planning. Especially in some CBDs, the area of Mtaas become so unpractically small, that it becomes hard to visualise these on a town map, while maintaining the Mtaas level here, would not significantly improve the overall accuracy of the assessment and planning at town-level.	   *Examples of Master Plan Maps (Morogoro)*

Module 2 STEP 6 **Create a Ward-based table with populations and surface areas (kms) for each Ward**	Ward-based data TAB developed	In this step, the JPT develops a Ward/Mtaa data base, using **TAB 1 of** the Excel calculation tables, of which the functioning is described in **APPENDIX 3**. These series of Excel tables are e-tools, specifically developed for the joint planning process, subject to this Guide. The pre-programmed sheets are to facilitate the multiple calculations of the planning process, and to generate the tables supporting the PLAN document. **TAB 1** shall be filled with respective Ward/Mtaa names, household size and current population figures (automatically extrapolated from the NBS reference year data using the annual growth rate) and surface area in km2. If the team obtains other reference information that it considers relevant for the planning exercise, such information should be kept in a separate table. Accuracy of the data is important, as this Ward/Mtaa-based data table **TAB 1** will serve as baseline reference in all subsequent projections, forecasts, planning and later in monitoring changes during implementation. Note: Each Ward/Mtaa in the respective town shall receive an identification number. This number should not change during the entire planning exercise, because it facilitates comparison between basic and calculated data for the respective Ward/Mtaa throughout the process. Note that the basic Ward/Mtaa information and data only need to be entered once into TAB1, as thee will be automatically copied into the subsequent Excel tables for water supply and sanitation calculations.	 *Example of a Ward/Mtaa based statistics table*
Module 2 STEP 7 **Prepare tables for utility water supply and for sanitation service records, in the town**	Data per Ward or zone obtained	The JPT provides a series of records on water supply and wastewater collection volumes, preferably per operational Zone, and enters these values into the Ward-based TABs 2 and 3, which follow Step 6 above. **Water supply data** is obtained from the utility billing records, (see example in **TAB 2**) to start building a database that will be used in the subsequent assessment and planning stages. In most cases, billing records are the easiest source of this information. To level-out possible data fluctuations, it is recommended that records should be obtained for a well-representing period, providing realistic average consumption figures for the respective zones. Note that the town's total average monthly water volumes, as billed by the utility, should later be compared to the volumes calculated during the assessment of current water supply situation, in order to adjust the calculation parameters (e.g. water	 *Example of water supply data*

		consumption per user of a typical facility) and bring the actually recorded and the values calculated from the assessment, closer together.. **Data on sanitation services**, such as wastewater and faecal sludge volumes currently to be processed in the town, are not often readily available. It is advisable, to immediately make provisions to start collecting such information, and for instance instruct service providers (e.g. operators of emptying trucks) to record and report numbers and locations of trips, and the volumes of faecal sludge being collected and disposed.	
Module 2 STEP 8 **Prepare a base-map incorporating existing land-use, Ward/Mtaa boundaries, water distribution and sewerage network (if available) and critical areas**	Base MAP showing Wards, current land-use, water supply and sewerage network prepared	To facilitate the interactive process of assessing the current water supply and sanitation situation in the town, the JPT prepares and prints a '**working base-map'** on A1 or A0 size paper. (Alternatively, a digital map may be displayed using a projector). The map showing the assessed water supply situation, is prepared by combining information from **TABs 1, 2** and **4** (see **APPENDIX 2**). It should cover the entire area of the town and show the boundaries of all Wards/Mtaas, the current broad land-uses (residential, Industrial, commercial especially the central business district, institutional areas such as universities, schools, offices etc.). Identified conservation areas and water sensitive areas should also be indicated into the map. Preferably, also the utility's operational zones and the town's main infrastructures should be shown in the map, to facilitate geographical orientation during the assessment. In case the Ward/Mtaa boundaries are not incorporated into the land-use maps, these boundaries shall be drawn to the same scale on a sheet of transparent paper, which is then superimposed over the land-use map (see example Info-Map 2), to facilitate tracing. Ideally, also the existing water distribution network, and sewer system if existing, should be mapped-out. This will provide input to the assessment exercises described in the next Module. If needed, additional staff from the Council's Town Planning Department should participate and contribute with their specific local knowledge to this mapping exercise. The main output at this step is a Base Map depicting all Wards/Mtaas and showing these alongside the existing broad land-uses for the entire town, and which is to be used for the assessment of the current water supply (MAP 1) and sanitation situation (MAP-2).	  *Example of an infrastructure info map*

Module 2 STEP 9 Identify the most pronounces LIAs and mark these on the Ward boundaries Map.	Base map showing Wards, and low-income-areas drawn	The main characteristics of low-income-areas in urban Tanzania are summarised in Figure 2 below: *Main Characteristics of Low-Income-Areas in Urban Tanzania*. The JPT can refer to these characteristics to identify specific areas in Wards and Mtaas accordingly, and mark these as LIAs in the Ward Boundaries map (Base-map to **MAP 1 to 6**). The same LIA markings should then be copied into the column with heading "economic status" in **TAB 4** (current predominant water supply situation) for those Wards and sub-Wards where low-income population groups feature predominantly. The identification of LIAs is an initial step toWards the actual water supply and sanitation situation assessment phase.	

RECAP

At this phase in the planning process, the following outputs are realised:

1) The Joint Planning Team (JPT) is in place and operational.
2) Ward information (**TAB 1**) is available, showing Ward identification number, Ward name, population, area, predominant land-use, estimated water consumption volumes based on actually billed volumes per utility billing zone **(TAB 2), and estimated sanitaion records (TAB 3).**
3) The Ward data and subsequent quantification for water supply and sanition volumes, will be facilitated by the Excel-based calculation tables **(from TAB 4 onwards)**, which have been programmed into cell-protected and auto-calculating spread sheets. To make full use of these TABs, the JPT should appoint preferably two members who are most coversant with data processing and MS Excel, to lead this task.
4) The base-map for all assessment and planning **MAPs** 1 through 6 is available, showing the entire town area, Ward/Mtaa boundaries, broad land-uses, critical areas, and water supply and sewer network to provide guidance during the joint assessment process.
5) Some of the JPT members should acquaint themselve with the 'mapping' skills, so that this team can carry out the mapping or the reults generated by the JPT. During the interactive process, this may be done simply by using paper-based maps, but eventually these maps need to be digitised with a map-drawing software, or by using for example"Foxit Reader" PDF software, as has been used in this Guide. **APPENDIX 2** povides a simlified collection of tips on how to use the free-ware Foxit-Reader to creat maps. If the necessary hardware and specialist staff can contineously be avaiilable during the entire assesmenta and planning process stages, one may of course consider using a more sophisticated GIS application.
6) It is important that the WSSA management, LGA and the JPT take the following items into consideration :
   a) The JPT should be composed in such a way that the members have the required knowledge and ability to assess the situation of both water supply and sanitation service levels in the different Wards/Mtaas in the entire town.
   b) It will be advantageous to use the Wards/Mtaas as the basic planning unit, as this links the process to real time statistical data and related information and will facilitate involvement of the Ward/Mtaa administration during planning, as well as during the subsequent implementation of planning decisions taken and their enforcement.
      c) Data and other information required must be obtained from official sources (NBS approved) and should be prepared and readily available, before the actual start of the joint planning process.

How to Identify Low-Income-Areas

Low-income-areas (LIAs) in urban Tanzania share the following key characteristics:

A. ***Poor housing quality and poor access to basic services****, such as reliable water supply, safe sanitation, solid-waste removal, storm-water drainage, electricity and street lights, community facilities (schools, dispensaries), hardened roads and pathways.*
B. ***High housing densities, high population density, and limited living space****.*
C. ***Low and unreliable incomes*** *(often earned day-by-day through informal activities).*

Other conditions that often accompany the key-characteristics described above, or that are a consequence of these circumstances:

a) *LIAs lack adequate and affordable water supply and lack even the most basic sanitation facilities;*
b) *If households in LIAs have latrines/toilets, these are normally on-site facilities and not serviced by the authorities;*
c) *Residents rely on unreliable water sources (wells, rivers, ponds) or on distant public or private outlets of utility water;*
d) *Most residents depend on purchasing water from third-party sources (unregulated), from landlords, neighbours, community or privately-run outlets, and informal vendors;*
e) *LIAs can be planned or un-planned, which affects the land security of infrastructure interventions;*
f) *Unplanned areas generally have a hazardous layout, and difficult geographical and environmental conditions;*
g) *Low-income groups are often confined to restricted land spaces, forming small-size slums blended between higher-income housing areas;*
h) *Residents lack access to general information, and are mostly unaware of their civil and human rights;*
i) *LIAs are generally heterogeneous with a high level of socio-economic differentiation;*
j) *LIAs lack social cohesion, attributed to high mobility levels of its residents;*
k) *Health conditions in most LIAs are deplorable.*

Figure 3: Key Characteristics of Low-Income-Areas

MODULE 3 - TOWN-LEVEL JOINT ASSESSMENT OF CURRENT SITUATION

3.1 INTRODUCTION

At this stage, the Joint Planning Team (JPT) carries out an assessment of the **water supply, sanitation and solid-waste service situation** for the whole town area. This shall form the basis for the JPT to propose long-term and short-term plans of improvement. The base-map produced during the preparation stage, is used as the base-layer for mapping-out the current situation of water supply **(MAP 1)** and sanitation services **(MAP 2)** in each Ward/Mtaa, while the existing solid-waste facilities are indicated in the **Water Safety Risk Map (MAP 1A).** The members of the JPT, each with their specific professional capacities and areas of expertise, use their local knowledge to draw-up a jointly accepted situational map portraying the **current predominant water supply, sanitation, and solid-waste conditions** in each Ward, sub-Ward or Mtaa. In general, it will be advisable to schedule joint field visits to typical neighbourhoods, to confirm the team's common understanding of the situations sketched-out in the maps. Paper-based charts can provide a useful first platform for an interactive assessment process, but once agreement is reached, the **recorded water supply, sanitation and solid-waste situations** in the different sections of town, should be transferred into digital maps, and the assessment information entered into the corresponding data tables (**TAB 4** and **TAB 5**).

The main thrust in this assessment stage is to make a joint analysis of the current water supply situation in the town-areas, assess where people have access to the services of the utility and where not, as well as capture the typical faecal sludge and wastewater containment and disposal arrangements practiced in the different sections of town.

Interactive assessment sessions supported by joint field visits, in Morogoro and in the town of Kahama, providing inputs to digital maps and tables

3.1.1 Assessing the present Water Supply Situation

Five main categories (A, Bi, B, C and Ci) are used for mapping the **predominant current water supply systems**. For practical reasons, the number of categories is limited to these five, and the situation captured by each is described here below:

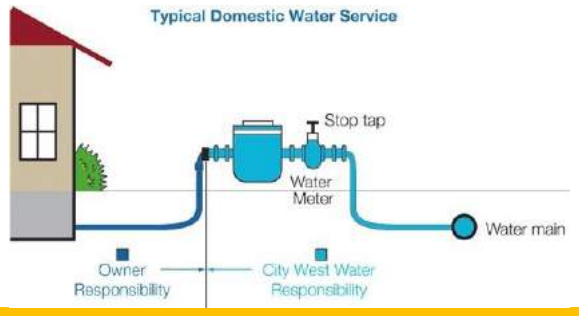
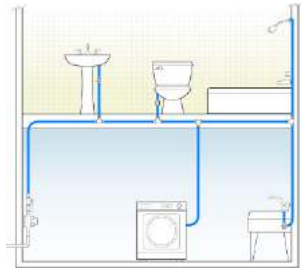
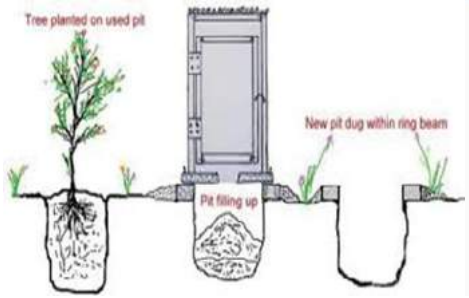
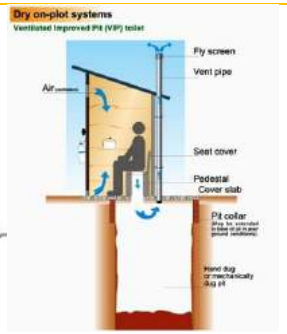
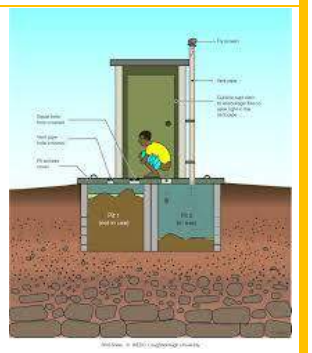
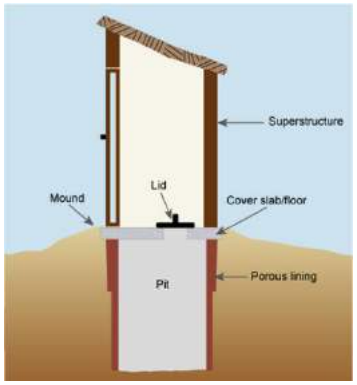
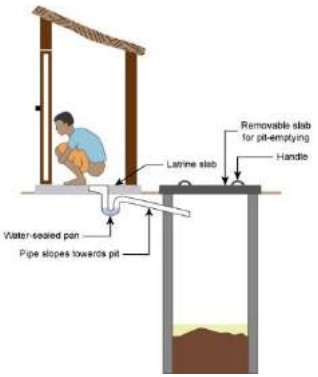
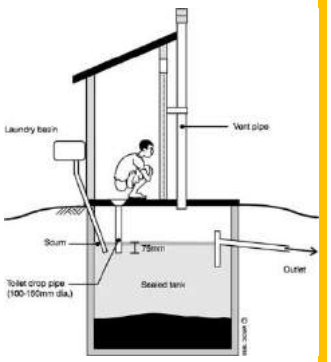
A	In these areas, households are predominantly neither served by COWSO nor by the WSSA, and instead they are left to draw water, of unknown quality, from streams, ponds and unprotected wells (**WEL**) or buy water from unregulated small-scale vendors (**IWV**) and water bowsers (**IWB**). The prefix **"I"** or **"R"** indicates whether a service is "**I**nformal" or "**R**egulated" by the utility.	 
Bi	Here, households are predominantly served through not provided by the WSSA, but rather form COWSO operated water systems. COWSOs usually operate their own standpipes **(CSP)** that receive water from their own sources.	 
B	In these areas, customers predominantly served through Utility operated standpipes **(USP**) supplied from the WSSA network or through regulated bowsers.	
C	Customers in these areas are predominantly served with WSSA water supply through household connections (**HHC**). There will also be cases of neighbor-sales (**NS**), unregulated by WSSAs	 
Ci	Areas where the WSSA predominantly serves (or at least regulates) water supply to large customers like institutions, industries, commercial centers **(ICC**). In industrial zones (EPZ) there are usually no households	

Figure 4: Overview of water supply situation categories A, B, Bi, C, Ci

3.1.2 Assessing the present Sanitation Services Situation

The following sanitation (containment and disposal) systems are considered during the assessment:

OPN	People not using latrines in a neighborhood must be practicing it. Such a situation poses a **serious health risk** (like cholera, at right), not only to the person practicing it, but to the entire community even beyond the neighborhood. This practice **cannot be tolerated.**	 
PIT	In areas with water supply situation “A”, households will not spend water on toilet flushing. **Unlined pits** of traditional latrines (left**)**, or under ventilated improved pit latrines (**VIP,** center**),** are usually abandoned when full, and a new pit is dug next to it; as long there is space left on the plot. More advanced latrines use **lined twin-pits** (right), where the dry and hygienised sludge, is removed from the unused pit, and often used as soil improver. These “**dry-on-plot**” systems **do not require utility-managed emptying and disposal services**.	  
EPT	Latrine/toilets with **emptiable pits** (left) are found in households using some water for flushing, for instance in **pour-flush latrines** (center, right). In dense housing areas where digging a new pit is not an option for lack of space, and public health reasons, the semi-liquid sludge must be emptied once the pit is full, either manually (gulper) or by vacuum truck. This service must be **regulated by the Utility,** along the entire sanitation chain, meaning **from pit emptying to sludge treatment/disposal.**	  

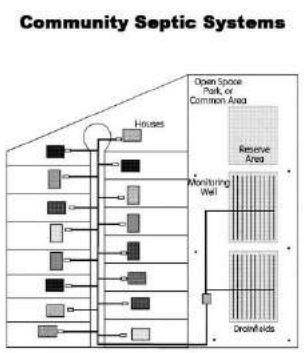
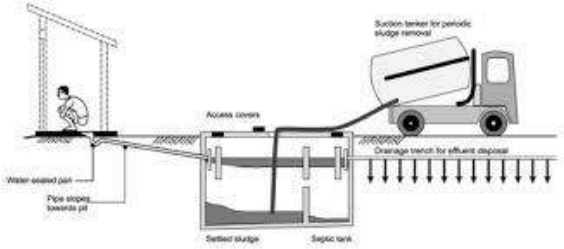
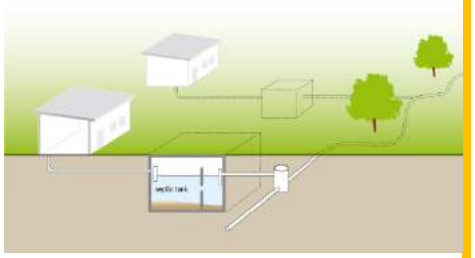
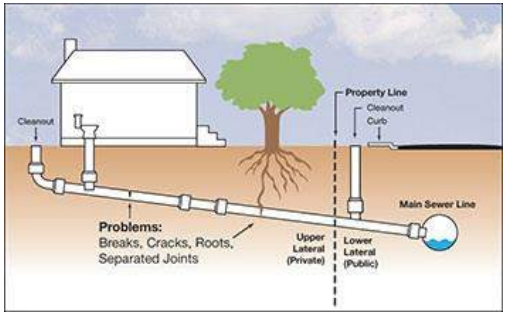
CSF	A c**ommunal sanitation facility** is a good solution in areas with water supply situation “B” and “C”, These set-ups require less land-area and reduce construction and emptying service costs by sharing among users. Households may be connected, for instance through “**simplified sewers**”, to **collective cesspits** (containment only) **or septic tanks** (part-treatment and effluent infiltration) which are located where access for emptying services is easiest. **DEWATs** are communal systems that incorporate partial treatment and resource recovery processes.	  *Example of communal sanitation facility in Kahama*
SEP	Septic tanks are generally used in areas with water supply situation “B” and “C” (including bowser supply). Household using **relatively much water** (often enjoying **in-house plumbing**), sludge and wastewater from cistern-flushed toilets, bathrooms, kitchens, and laundry basins are contained in a **septic tank** (left) or similar facility. Partly treated **effluent** water is left to soak into the ground or is led further away through a **solid-free sewer** (right)**.**	 
SEW	Sewerage is only suitable for areas with water supply situation “C”, as piped sewer networks require minimum average water consumption rates by connected households (100 ltr/c/d), to limit the risk of blockage within the sewer pipes. A mixture of sludge and wastewater will discharge from cistern-flushed toilets, supplemented by grey-water from kitchens, bathrooms and laundry. The sanitary **sewer** drainage is usually **separated** from the **stormwater** drainage system.	 

Figure 5: Overview of the different sanitation containment systems

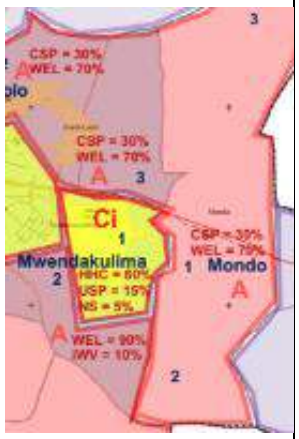
3.1.3 Assessing the present Solid-waste Management Situation

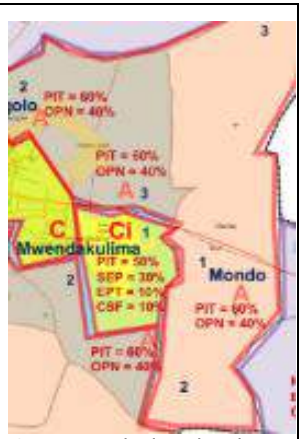
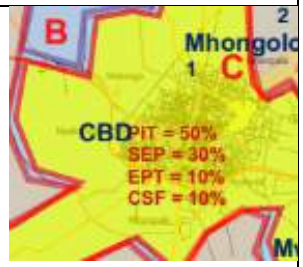
The following Categories for the existing Solid-waste Management (collection, and disposal) service levels are proposed for the assessment: Each Category indicates the current solid-waste management system that is perceived as predominant in a particular area.

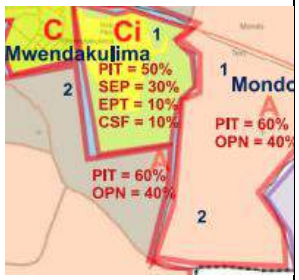
DH	Solid-waste is Dumped Haphazardly (DH), due to inadequate collection mechanisms, insufficient disposal sites as well as weak local enforcements of key laws governing solid-waste management	
BG	Solid-waste is Buried in the Ground (BG) especially in peri-urban areas as another method of managing waste at household level	
OAB	Open-Air Burning (OAB) is used as one of the methods of managing waste in the wards	
TSF	There are solid-waste Transfer Station Facilities (TSF) provided / constructed in the town	
CDL	There are adequate mechanisms in place for solid-waste Collection, Disposal and Law-enforcement (CDL) – including designated solid-waste landfill sites	 

Figure 5: Overview of urban solid-waste situations categories DH, BG, OAB, TSF, CDL

3.2 ASSESSMENT PROCESS MATRIX

CURRENT WATER SUPPLY SITUATION	OUTPUT	DESCRIPTION OF ACTIONS	
Module 3 STEP 1 **Map-out the current predominant water supply situation (A, B, C) as jointly assessed for each Ward/Mtaa, and identify the water safety risk areas**	Current water supply system and service levels mapped	The JPT uses the base-map prepared during the preparation stage, to jointly draw-up the planning **MAP 1**, and the team discusses and agrees on the current predominant water supply service levels, (A, BI, B, C and CI described in the introduction) in each Ward/Mtaa and shows this as exemplified in **APPENDIX 1b** as MAP 1 covering the entire town. In case the JPT is unable to use a GIS-based mapping system, the freeware Foxit Reader may be used as a simple tool to create and modify maps, as described in **APPENDIX 4.** Note: It is possible that during the assessment, one Ward may be found to have two or more characteristics that are served by different water supply delivery systems, which should be indicated on planning **MAP 1** showing the current water supply situation. Ideally, the Wards are in that case split into Mtaas, for which statistics are available. For instance, in Kahama town, Mwandekulima Ward was allocated to three categories. However, because boundaries for Mtaas were not available at the time of the joint planning in Kahama, "sub-Wards" were created instead of division in Mtaas. Best is to stick to Mtaas if possible. • *Mwendakulima Sub-Ward 1: Predominantly CI, where water is supplied to the Mining Company which is a large customer (ICC) contributing about 25% of the utility revenue from water bills. Few households residing there are served with 3 delivery systems: HHC 80%, USP 15% and NS 5%.* • *Mwendakulima Sub-Ward 2: A with two delivery systems: WEL 70%, CSP 30%* • *Mwendakulima Sub-Ward 3: A with two delivery systems: WEL 90%, and IWV 10%* On the other hand, Mondo Ward has been assessed as only one zone and the delivery system are: WEL 70% and CSP 30% which is similar to Mwendakulima Sub-Ward 2. A **Water Safety Risk MAP 1A** should be annexed to the Plan document (or inserted in the text), which shows the location of vulnerable water source areas, alongside the location of wastewater (transfer, treatment and disposal) facilities and solid-waste (transfer, disposal/landfill) sites. The map may also indicate areas with steep slopes, hilly terrain, swamps, forests, nature reserves etc. (as was found in the Morogoro situation} which may be of influence on potential source contaminations.	 *Example assesment MAP for Kahama*  *Current assessed water supply situation mapped-out around Mondo and Mendakulima Wards in Kahama*

		This **MAP 1A** is mainly to draw attention to the LGA and the WSSA on the importance of protecting and conserving areas which may have implications on the existing water sources. At this stage of the assessment the following issues can be raised: • Should the utility and LGA discourage or regulate the informal service providers who are filling the regulated service gap? • Is the utility able to extend the water supply network to those Wards, and to start the construction of USPs? • What is needed to extend the water supply network to these areas? • Should the utility and council consider registering and formalising the current informally operating service providers, and integrate them into their system? • If informal service providers will be regulated (and subsequently be formalised), can the quality of the water supply be ensured, and how can this be done? Answers to these questions are inputs to the next stage that looks into the long-term water supply situations expected in the entire town. In the next steps the JPT carries similar assessment to establish the current sanitation situation.	 *Current sanitation situation mapped-out for the same section in Kahama*
Module 3 STEP 2 **Quantify the current water supply volumes**	Volume of water currently consumed quantified	This step in the process is meant to guide the JPT in translating the mapped information on the situation into volumes of water consumed currently. The estimated information is entered into **TAB 4** of the Excel calculation sheets (provided with this Planning Guide), with other background information, such as broad land-use, current population, and predominant water supply classification. Using the **TAB 4,** the JPT is able to show the volume of water consumed in each Ward/Mtaa in relation to the predominant land-use, total population in the Ward, water supply type, and the share of water supplied through the utility.	
Module 3 STEP 3 **Map-out the of current sanitation systems as jointly assessed for each Ward/Mtaa**	Current sanitation systems assessed	The process carried out during Step 1 above is repeated in assessing and mapping the current situation of sanitation services. Through discussions and fieldwork, the JPT maps out the different sanitation (containment and disposal) systems practiced in each Ward, using the six, typical sanitation (containment) systems (e.g. OPN, PIT, EPT, SEP, CSF and SEW) and the disposal mechanisms used in these; for example, EPTs require gulpers or exhauster trucks to empty them and transport sludge to the disposal site.	

		Inputs from the Public Health Officer and the Community Development Officer from the LGA are essential in obtaining the required information for the mapping exercise. Results from the exercise will be show on sanitation assessment **MAP 2**. Taking the example of Mondo Ward in Kahama, where there are no water supply services from the WSSA, the sanitation containment systems found in the Ward are predominantly dry pit latrines (PIT) 60%, and open defecation (OPN) 40% (see example). The system is similar to the one used in Mwendakulima Sub-Ward 2 and 3, whereas in sub-Ward one containment is in terms of SEP 30%, CSF 40% PIT 20% and EPT 105 (see example), better than in Mondo, largely due to a comparatively better water supply situation. The different types of waste (dry/hygienised FS for example from twin-pits, wet FS, from emptiable pits and septic tanks, and sewage/wastewater evacuated by sewers) require different means of removal, transportation, treatment and safe disposal or re-use. Such distinction is important for determining possible project measures for improving the current sanitation situation.	*Example of sanitation situation in the CBD of Kahama*  *Example of sanitation situation in Modo and M of Kahama*
Module 3 STEP 4 **Quantify the current faecal sludge and wastewater volumes**	Table showing current volumes of sludge and waste water generated within the town	As was the case in Step 2 above, the JPT interprets sanitation assessment **MAP 2** showing the current situation of sanitation and based on this, estimates the current volumes of faecal sludge and wastewater generated in each Ward or Mtaa, and in the town. These rather tedious calculations have been automated in **TAB 5** of the Excel sheet of. Background information, such as broad land-use, current population, and predominant water supply classification, are pre-filled in **TAB 5,** auto-copied from **TAB 4**. The different sanitation containment systems in use, determine the sanitation chain facilities that would be needed in each Ward/Mtaa. Where information is available it should be possible to assess the performance of the existing sanitation chain services in terms of the share of the volume of sludge and wastewater that is safely collected and disposed.	 *Data entry, from the mapped current sanitation situation, into the calculation table*

RECAP:

At this stage in the planning process, the JPT should have produced two current situational maps and corresponding data tables:

- **MAP 1** and **TAB 4**, which together indicate the existing water supply situation in the town. In particular, the assessment MAP 1 will show where the utility's served, underserved and unserved customers are located, while the calculations in TAB 4 will give an indication of the corresponding water consumption volumes in each area.
- **MAP 2** and **TAB 5**, which together indicate the distribution of predominant sanitation containment systems being used in the different sections of the town. while the calculations in TAB 5 will give an indication of the corresponding Faecal Sludge and wastewater volumes generated in each area.

- Now that both the current water supply and sanitation situations has been visually displayed, it is recommended at this stage also to identify the source of the water supplies for the town, and thus to define which source areas need protection. Preventing source pollution or damage is at all times far less costly than purifying water once it is contaminated or having to construct a new, replacement water sources. A Water Risk Map may be incorporated into **MAP 1** of the current water supply assessment, or may be presented as a figure in the text of the PLAN document.

3.3 ASSESSMENT PROCESS MATRIX – SOLID-WASTE

CURRENT SOLID-WASTE MANAGEMENT SITUATION	OUTPUT	DESCRIPTION OF ACTIONS	
Module 3 STEP 5 Quantify the weight of Solid-waste generation for current situation and future estimates	On the Water Safety Map 1A location of solid-waste transfer stations and dumping sites are indicated, and current and future quantities are estimated in Table 11	As in STEP 2 and 4 above, the JPT interprets solid-waste generation assessment **MAP 1A** showing the current situation based on estimates of amount produce (Tons/day) and then changed into the equivalent of kg/cap/day in the town. These calculations have been automated in **TAB 11** of the excel sheet based on population in each mtaa/ward . Background information, such as broad land use, current and projected population calculations are prefilled in **TAB 11** and auto-copied from TAB 4. The different solid-waste management systems in use, determine the solid management chain facilities that would be needed in each Mtaa/Ward. For wards/mitaa where soiid waste data is available, it is should be easier to assess the performance of the existing solid-waste chain services in terms of the share of the solid-waste that is collected and disposed .	

TABLE 11 - DOMESTIC SOLID WASTE — MBEYA CITY — SOLID WASTE GENERATED

0.50	[kg/cap/day] Solid Waste	(for forecast)	Current	Short-term	Long-term	Current	Short-term	Long-term
Ward Nr	Ward Name	land use predomina	Pop.Year 2020	Pop.Year 2023	Pop.Year 2037	[kg/day] 2020	[kg/day] 2023	[kg/day] 2037
1	Sisimba	CBD	5,553	6,189	11,034	2,777	3,095	5,517
2	Ghana	resid	6,542	7,291	13,000	3,271	3,646	6,500
3	Nonde	resid	3,306	3,685	6,570	1,653	1,842	3,285
4	Maendeleo	CBD	3,742	4,170	7,435	1,871	2,085	3,718
5	Majengo	resid	4,385	4,887	8,712	2,192	2,443	4,356
6	Itiji	resid	5,510	6,140	10,948	2,755	3,070	5,474
7	Mbalizi Road	CBD	7,927	8,835	15,752	3,964	4,418	7,876

RECAP:

- **MAP 1A** and **TAB 11** both indicates the distribution of solid-waste systems being used in different parts of the town. While calculations in TAB11 will give the corresponding solid-waste generated in each area.
- The current water supply and solid-waste situations are now being visually displayed. At this stage, it is therefore recommended to identify the sources of water supplies for the town, and define which source areas need protection. By preventing water sources pollution or damage is at all times far less costly than purifying water once it is contaminated or constructing a new one or replacing it. A water risk MAP 1A should be presented in Appendices 1.

MODULE 4 - LONG-TERM PLANNING

4.1 INTRODUCTION

At this stage in the joint planning process, the Guide supports the JPT in looking into the future. The main task of the JPT at this stage is to recommend water supply systems that will significantly improve the service situation and achieve the set targets within the planning period. The planning horizon should be decided jointly by the LGA and WSSA, taking into account their normal long-term planning periods. In most cases, the town land-use planning period will range between 10 and 20 years. The basis fo the long-term water and sanitation planning is therefore the available, approved and up-to date land-use master plan for the entire town.

The key inputs at this stage include the proposed land-use master plan showing also Ward/Mtaa boundaries. These info-maps should be suitable as a basis for the long-term proposals for upgrading the water supply and sanitation services levels in the entire town. The proposals are derived through relating the results of the assessments carried out in Module 3 and are then presented as long-term situation maps in planning **MAP 3** and **MAP 4.** The relevant sector policies, standards, guidelines and global, national as well as local town-level targets are depicted in the reference documents collected during Module 2.

The approach that the JPT may use in looking into the future is the service ladder concept. Through planning and implementation, the households in the town are supported and encouraged to ‘climb’ the ladder and reach the top level in terms of service quality.

4.1.1 Water Supply service ladder

In this Guide, the service ladder for water supply services is defined as having four steps to climb. The top of the ladder represents services from private connections at individual households, which should therefore be the long-term vision for the plan.

Service levels	Main characteristics associated with the step in the ladder	Long-term assumptions in climbing ladder
Lowest: People obtain water from unprotected water supplies	Health risks from consuming water of unknown quality Access-related risks from unreliable source No public institution is responsible in this type of service	In the long-term, such sources will have to be assessed and regulated or closed down so as to reduce health risks associated with continued use of open water sources and shallow wells. It is also expected that all water sources should be managed and monitored by the utility.
Somewhat improved: People are served by regulated water supply providers	The source is managed by the utility and quality is monitored at least at the source. However, there are reliability and cost issues associated with the access system which is based on informal and unregulated service providers.	In the long-term, service providers will have to be formalised and regulated. The utility and the LGA should prohibit the distribution and sale of water from unsafe sources, through by-laws enacted and enforced by the LGA.
Improved: People are served by utility-controlled public standpipes	Water supply through utility standpipes is among the fastest ways of supporting households make a significant climb of the service ladder. The standpipe system has potentials for serving the customers with water of monitored quality. Availability and access in terms of costs are assured. The key limitation remains to be the distance from a standpipe to the household.	In the long-term, all standpipes in the town should be served with an efficient water supply distribution network designed with capacity to serve public standpipes as well as private connections.
Top: People and other customers (institutions and industries) are served by domestic/private water connections	This is the ultimate target where households receive water within the premises or inside the house for 24 hours.	The long-term assumption is that, in order to reach this top-level step on the ladder, the utility and the LGA must have investment strategies that ensures that: • the water supply network covers the entire town; • water sources are capable of meeting the water demand on a sustainable basis; • utility water production, treatment and distribution capacities are adequate and sustainable; • the utility has the capacity to connect all new customers as they apply for services; and • different types of customers are motivated and supported to apply for private connections and pay their bills timely.

Figure 6: Overview of Water Supply Service Levels and related Measures

4.1.2 Sanitation services ladder

The service ladder for urban sanitation is made-up of six steps. Step one is not an actual step in the ladder although it exists in many parts of towns in Tanzania. Given the water supply situation in many towns and the socio-economic context of many households it is likely that Steps 4[h] and 5 will be the most optimal targets that a town can realistically achieve in the short-term.

Service levels	Main characteristics associated with the step in the sanitation ladder	Long-term assumptions to support climbing the sanitation services ladder
Non-step: People practice open defecation	This practice carries social, health and environmental risks. In addition to public health risks, the practice has a potential for increasing water risks in the town in terms of source pollution directly or indirectly when it rains.	Given the health and environmental risks associated with continued practice of open defecation the assumption is that in the long-term this practice should be abolished in the towns. Households should be required through effective by-laws to construct and use at least the cheapest latrines/containment facilities.
Lowest step up: People at this step, use traditional latrines with unlined pits for in-situ containment	This could be an improvement compared to open defecation since it includes some form of containment facility although with risk related to collapsing when heavy rains occur. Since emptying is rather difficult there are also risks of environmental pollution. In case a twin-pit system is used, the toilet is simply switched back to the alternating pit, after the hygienised sludge has been emptied from it.	The assumption is that since this containment facility offers in-situ containment of faecal sludge, it is an improvement over the practice of open defecation. However, it is important that in the long-term it should be replaced with improved traditional pit latrines that are emptiable and thus making this a real step on the sanitation ladder. Even in areas not serviced by the utility (in water supply and sanitation emptying services), the town authorities should encourage at least the construction of low-cost emptiable pit latrines at homes, and public toilets at markets and shopping centres, taking into account site-specific conditions such as level of water table, housing density, predominant land-use etc.
Slightly higher step up – EPT: People use latrines with emptiable line pits for in-situ containment	This is a step on the ladder since it has reduced public health risks and is part of the sanitation chain facilities.	Two assumptions are made: • There is effective disposal system including utility-regulated emptying and transport services to designated locations.

		• There are efforts to increase the capacities in town for faecal sludge emptying, transportation, treatment and disposal services.
Medium level step up – SEP: People use flushed toilets connected to individual septic tanks for in-situ containment (and partial treatment)	This rather significant step in the ladder occurs once the water supply situation improves with access to water that is available in the house or within the premises; and that the price is reasonable, and that significant volume of water can be used for sanitation purposes.	The assumption is that with adequate water supply services, households will upgrade from PITs or EPTs to septic tanks (SEP) The facility requires adequate capacity of emptying, transportation, treatment and disposal services in the town.
Medium-high step up – CSF: People use flushed toilets connected to communal sanitation facilities	This step on the ladder could be seen as an innovation especially for areas with high building density where land to construct individual septic tanks may not been adequate. Another justification for this facility is to pool not only land but financial resources for several households to be served by the facility.	Introduce communal septic tanks in selected areas served by regulated emptying services.
Top level step – SEW: People use flushed toilets connected to a piped sewerage system	This is the highest step on the ladder in situations with adequate water supply where households also consume adequate volumes of water that is required to run the system.	Key assumptions • Utility provides adequate water supply services • Average households consume reasonably large volumes of water (about 100 l/c/d) • Promote piped sewerage networks in suitable areas (e.g. in CBD) and increase the treatment capacity • Enforce mandatory connections to a sewerage network where it exists.

Figure 7: Overview of Sanitation Service Levels and associated Measures

4.1.3 Solid-waste services ladder

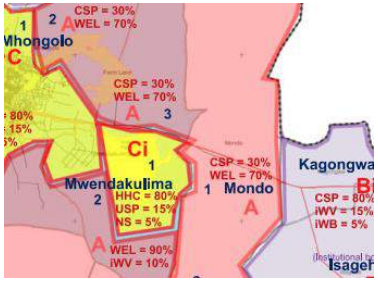
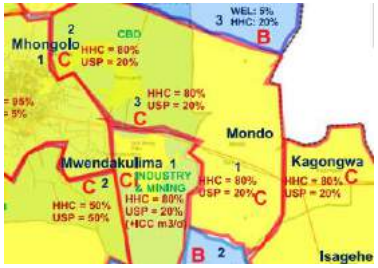
Service Levels	Main characteristics associated with improved step in the solid-waste management	Long term assumptions in improved solid-waste management
Non-Step: Solid-waste is dumped haphazardly on the ground	Health risks of polluting/ contamination of water sources (surface and underground)	In a long-term this habit should be abolished in towns. Households should be required through effective by-laws to use household bins; streets should have solid-waste collectors to empty their bins or empty at transfer stations
Lowest step up: Households bury their solid-waste, or burn it in open air	This is a step forward from haphazard dumping of solid-waste. This more practical in peri-urban areas where there no congestion of houses and people. The risks are air pollution and possibility of underground water contamination	These are in-situ solid-waste management practices. The long-term solution this will be replaced by improved solid-waste management systems e.g. use of household bins, transfer stations and landfill sites
Medium Level step up: Households use bins, transfer stations and collection is done and transport is provided to dumping site	There is a significant step in solid-waste collection and disposal. The significant number of households are abiding to the law and solid-waste collections services are being provided. The risk of water sources contamination is very minimum.	Introduce properly constructed landfill site and regularly monitor leachates from observation boreholes drilled close to the landfill.
Top level step: Solid-waste Systems are working per required standards	There are adequate solid-waste collection mechanisms, sorting for recycling, reuse or safe disposal sites and law enforcement in place. – including solid-waste land-fills which are properly managed.	All solid-waste management systems are a working, i.e. the whole solid-waste chain is complete and law enforcement is in place.

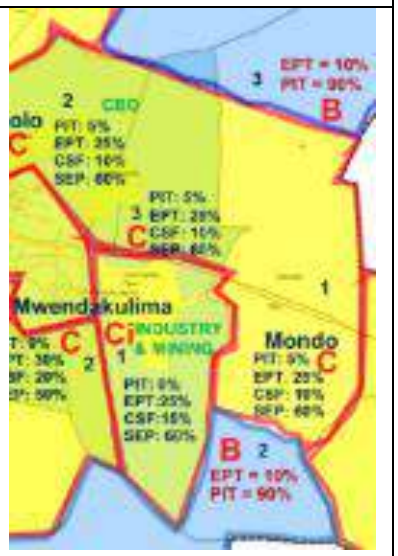
Figure 8: Overview of Solid-waste Management levels and associated measures

4.1.4 Improving water supply, sanitation, and solid-waste services

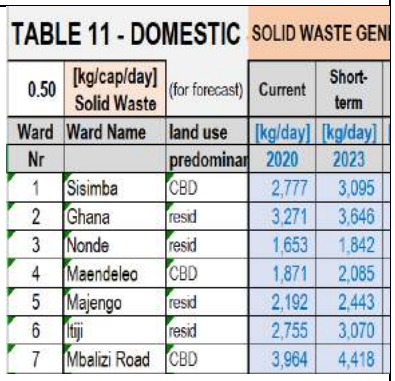
It is expected that the JPT will use the services ladder in proposing future conditions for the town whereby informal and un-regulated water supply services such as **IWVs**, **IWBs** and **NSs** will be significantly reduced in the proposed long-term plan. All the same, **open-defecation** will be eliminated through improved toilet facilities supported by safe emptying and disposal services, and if accompanied by **improved solid-waste services,** it will keep the towns also visually clean. The key outputs of this phase are proposed water supply systems for improving services in the long-term. The long-term planning process is detailed in the following section.

4.2 LONG-TERM PLANNING PROCESS MATRIX

LONG-TERM PLANNING	OUTPUT	ACTION DESCRIPTION	Examples
Module 4 STEP 1 **Map-out the proposed long-term (10 – 20 years) water supply situation for each Ward/Mtaa and for the town**	Long-term water supply plan in place	Main task of the JPT at this stage is to plan upgrades of water supply types that will significantly improve the service situation and achieve set targets within the planning period. Using the same Ward/Mtaa Boundaries of Info-Map I, but now superimposed on the long-term proposed Land-use Plan of Info-Map III, the JPT indicates the preferred/proposed future predominant water supply systems the utility and the LGA would like to achieve in each Ward by the end of the long-term planning period (ten/twenty years). This will be done by referring to relevant utility- and national-level policy statements, standards, guidelines and water sector plans and targets (Refer to Modules 2 and 3 and the water supply service ladder). Since it is anticipated that in the long-term, the WSSA should cover the entire town with water supply services, the type A areas should no longer feature in planning **MAP 3** showing the long-term planned situation for water supply. Only area types B and C should appear. Likewise supply systems through informal service providers (IWVs and IWBs) should by then have been replaced by regulated services (RWVs and RWBs). Taking the example of Mondo Ward in Kahama, the long-term planned water supply situation (as shown on planning **MAP 3**) is to move Mondo from type A to type C in the long-term with DCC 70%, USP 15% and ICC 15% to type C in part of the Ward and the rest be upgraded to category B. The people living in the part that will be upgraded to areas categorised as C will enjoy services from domestic customer connections (DCC) 70%, institutional customer connections (ICC) 15%, and public standpipes (USPs) 15%. The population in the part of the Ward/Mtaa that upgrades from type A to B, will receive services from USPs 75%, DCC 20% and WEL 5%. Studies have shown that USP is the system of supply which is the most effective, most affordable and quickest way of improving the access to utility water supply for a large number of people living in the Wards/Mtaas, and this is an especially effective way of expanding Utility business in low-income areas.	 *Mapped-out current water supply situation, example around Mondo Ward, Kahama*  *Mapped-out long-term water supply situtation, aound Monod Ward, Kahama*

Module 4 STEP 2 **Estimate the long-term expected water consumption volumes for each Ward/Mtaa and for the whole town**	Long-term water requirements (volumes) are established	Using planning **MAP 3** for the long-term planned water supply situation, the JPT estimates values for the anticipated long-term water demand in each Ward/Mtaa, using **TAB 6** of the Excel Calculation Sheets (provided with this Planning Guide), based on future consumption figures for households, institutions, industries (EPZs) and commercial areas. The process is very much the same as done for the current situation, except that this time there are no actual billing records to enter. Results from this step are exemplified in a long-term water consumption calculation sheet of **TAB 6** which shows the expected future water consumption patterns in each Ward/Mtaa and calculates this for the entire town.	 *Data entry into the calculation table, to quantify the long-term water supply situation, example Kahama*
Module 4 STEP 3 **Map-out the proposed long-term predominant sanitation systems for each Ward/Mtaa and for the whole town**	Long-term sanitation plan in place	As in Step 1 above, the JPT should particularly consult the LGA Public Health Officer, Water Engineer, Community Development Officer (if they are not members of the JPT) and other key stakeholders and obtain inputs for a long-term proposal for improving the sanitation services in each Ward. The proposal should take into consideration current national, sector, and utility-level policy statements (e.g. Vision 2025, National Water Sector Development Strategy, and Utility Business Plans), national and global standards, goals and targets. The agreed proposal is then expressed as a percentage of expected predominant sanitation containment systems (assuming these to be supported by appropriate services for emptying, transport, treatment and disposal) per Ward, and displayed on planning **MAP 4** showing the long-term planned sanitation situation. Like with water supply systems, a Ward can display several sanitation solutions envisioned for the future. Using Mondo Ward in Kahama as an example, the long-term proposal has also upgraded the sanitation services from currently PIT 60% and OPD 40% to the following improved levels: • In Mondo 1, where the predominant water supply service is upgraded from A to type C, sanitation is upgraded as follows: SEP 60%, EPT 25%, CSF 10%, and PIT 5%. • In Mondo 2 and 3, where water supply is upgraded from A to type B, sanitation is upgraded as follows: PIT 90%, EPT 10% (and no more OPD).	 *Mapped-out long-term planned sanitation situation around Mondo Ward, Kahama*

		Naturally, sanitation systems depend on water supply as the amount of water available to a household defines the possible sanitation solution. For instance, a household which fetches water from a water kiosk or buys from a vendor is not likely to use even a pour-flushed toilet. Hence, it is important to note that the long-term proposals on sanitation will by and large depend on the following factors: • Ability of the WSSA to improve the water supply situation to the proposed levels • How effective the LGA is, in playing its part in enforcing public health-related laws • The effectiveness of by-laws in place within the LGA • How the LGA uses the building regulations to achieve hygiene standards • Availability of community awareness activities.	
Module 4 STEP 4 **Estimate the long-term volumes of sludge and wastewater produced per Ward/Mtaa and the entire town.**	Long-term sanitation volumes determined	At this stage, the JPT is required to apply the long-term sanitation calculation sheet of **TAB 7**, to project long-term volumes of sludge and wastewater that is expected to be produced in each Ward and for the whole town. The estimation is done through entering the long-term population data, percentage of the proposed system of sanitation, average faecal sludge generation per person per year, and other relevant Ward-level information into the calculation sheet and thus leading to indicative volumes of (dry) in-situ disposed FS, and (wet) FS contained in (emptiable PITs and SEPs) and domestic wastewater that are expected to be produced in each Ward/Mtaa, each requiring different means and arrangements of removal, transportation, treatment and disposal or re-use. (See **TAB 7**). The calculated figures for faecal sludge and domestic wastewater from each Ward will contribute to the cumulative figures for the entire town. Realistic estimate volumes should be added for faecal sludge and wastewater discharged by industries, institutions and commercial entities. These forecast figures are important for providing a long-term outlook regarding the planning of sanitation chain infrastructure, e.g. long-term capacity requirements for wastewater collection by sewer (where sewerage is in place), and faecal sludge removal from onsite containment systems (e.g. PIT, SEP), transportation (including transfer stations), treatment and disposal. This should also give indication of the appropriate dimensions of areas to be reserved for treatment facilities (be it waste stabilisation ponds, digester ponds or faecal sludge drying beds, for instance). This will enable timely and foresighted land-acquisition,	 *Data entry, from the mapped long-term sanitation situation, into the calculation table*

		as well as provide an idea of the required financial, institutional and governance structures and private sector engagement to make the service efficient, affordable and sustainable. **APPENDIX 5** provides basic information on transfer stations **APPENDIX 6** describes typical characteristic of different sewage treatment systems with the corresponding land requirements **APPENDIX 7** refers to site selection for faecal sludge treatment facilities	
Module 4 STEP 5 Estimate the long-term solid-waste production per Ward/Mtaa and the entire town	Long-term solid-waste management system in place	The JPT is required to use the long-term calculation sheet of TAB 11, to project long term solid-waste figures that are expected to be generated in each Ward/ Mtaa for the whole town. The estimation is done by entering the long-term population and average solid-waste generation per capita per day that are expected to be produced in each Ward/Mtaa, each requiring different means and arrangements of household storage, collection, and transportation, sorting for recycling and Disposal or Reuse (see TAB 11). Forecast figures are important for provision of long-term planning of solid-waste management service chain, e.g. long-term capacity requirements for solid-waste storage, collection, transportation (including transfer stations), recycling and disposal or reuse. This will also give indication of appropriate dimensions of areas to be reserved for disposal (dumping sites, landfills, and transfer stations). This will also enable timely and foresighted land acquisition, as well as provide an area of the required financial, institutional and governance structures and private sector engagement to make the service efficient, affordable, and sustainable.	 TABLE 11 - DOMESTIC SOLID WASTE GEN 0.50 [kg/cap/day] Solid Waste (for forecast) Current Short-term Ward Nr / Ward Name / land use predominar / [kg/day] 2020 / [kg/day] 2023 1 Sisimba CBD 2,777 3,095 2 Ghana resid 3,271 3,646 3 Nonde resid 1,653 1,842 4 Maendeleo CBD 1,871 2,085 5 Majengo resid 2,192 2,443 6 Itiji resid 2,755 3,070 7 Mbalizi Road CBD 3,964 4,418

RECAP

At this stage, the JPT should have produced two long-term plans covering water supply and sanitation improvements. The first plan supported by planning **MAP 3** and quantification **TAB 6** show water supply systems to be achieved in different Ward/zones of the town by the long-term planning year.

- It should be the long-term vision of the WSSA and LGA to have a significant part of the town served by customer connections including domestic, industrial and institutional facilities.
- In Wards where the utility has extended the network, but only few customers have actually been connected, the dominant system of service will remain USPs. In Wards where the network has not yet arrived, the utility will establish RWVs and RWBs or regulate already operating IWVs and IWBs and integrate them into their service system. There could also be some Wards/Mtaas served by water drawn from a utility own borehole. It is expected that in the long-term there will be no more Wards/Mtaas served by IWVs, IWBs or NS.

The second output is the long-term plan for envisaged upgraded sanitation systems, supported by planning **MAP 4** and quantification in **TAB 7:**

- The water supply situation does influence the sanitation services. It is therefore assumed that in the Wards served by RWVs or RWBs and USPs, there will be households with little or no water for flushing toilets and these will be shown on the planning MAP 4 as EPT and CSF.
- In most cases EPT, CSF and SEP will be the dominant service system in the town. In addition to the service system, the long-term plan should also indicate the tentative location(s) and size of the treatment facility (or facilities if more than one is needed).
- In discussing the FS and wastewater treatment facility, the team should consider technological suitability, socio-cultural, economic/business, and environmental and governance aspects
- Considering the financial situation of most WSSAs and LGAs, the long-term capacity requirements and the ultimate standards for FSM, but also the gradually growing demand, a staged approach to developing the treatment facility is recommended. **APPENDIX 8** provides some examples of the stepwise development of faecal sludge treatment facilities in stages.

MODULE 5 - SHORT-TERM WATER SUPPLY IMPROVEMENT PLANNING

5.1 INTRODUCTION

At this stage, the JPT must first of all agree on the duration of the 'short-term' or phase one planning period. It should be a period during which service improvement projects can realistically be planned, financed and implemented with the available resources and procedural timelines. This is a strategy to implement the long-term plan step-by-step, in doable phases, of say of 3 to 5 years each. After each phase, a subsequent short-term plan should be developed. The utility Business Plan may provide some guidance or may be adjusted accordingly.

By implementing the priority short-term measures, the target population is expected to climb one or more steps in the ladder and thus access improved services. For instance, Wards/Mtaas whose populations are served by unregulated water supply services should at least get access to regulated utility services as their first step on the ladder. On the other hand, climbing the sanitation services ladder may require a certain level of water supply. This should also be considered when proposing short-term measures for improving water supply services.

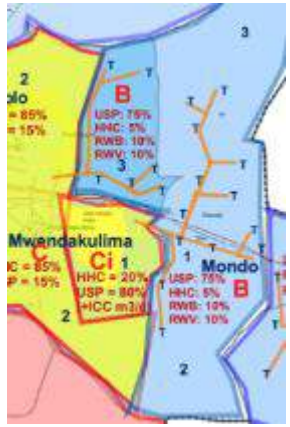
Although the identified improvement measures are to be implemented at Ward/Mtaa level, in most cases there will be additional town-level interventions required to support those Ward-level interventions as outlined. The JPT should therefore assess the proposed Ward/Mtaa-level improvement measures, but also assess what town-level interventions may be needed from respective WSSA or LGA, to ensure the viability of a particular Ward/Mtaa-level measure.

For instance, where additional water volumes are needed for a Ward/Mtaa level intervention to become viable, it will be the responsibility of the utility to implement the required town-level measure at the same time (e.g. extension of the network, increasing water production and distribution capacities into the area).

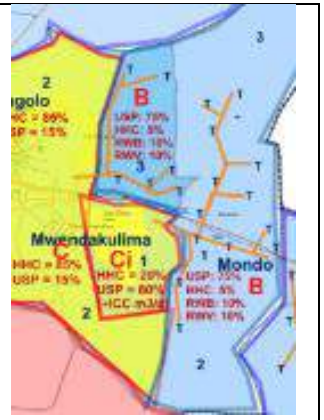
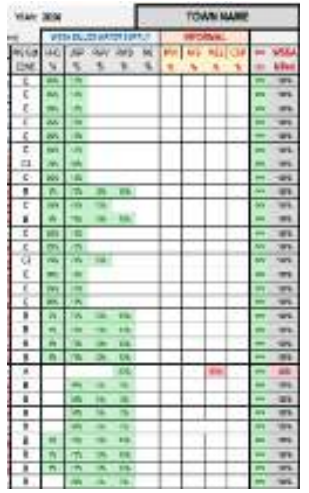
By categorising the town-level measures into those to be managed by the WSSA and LGA, the JPT contributes towards ensuring that key measures are mainstreamed into the planning and budgeting systems of both the WSSA and the LGA. In most cases, the identified measures should be included in the WSSA/LGA annual plans and respective budgets.

In the following sections, the Guide proposes steps that should be followed by the JPT in identifying the short-term measures to improve services in water supply in selected Wards/Mtaa and for the entire town.

5.2 SHORT-TERM PLANNING PROCESS MATRIX – WATER SUPPLY

SHORT-TERM WATER SUPPLY IMPROVEMENT MEASURES	OUTPUT	ACTION DESCRIPTION	
Module 5 STEP 1 **Map-out the proposed short-term improved water supply situation for each Ward/Mtaa**	**MAP 9**: Short-term planned water supply improvement projects in place	The critical task at this stage is for the JPT, in consultation with the utility management, to identify actual water supply improvement projects that should be implemented in the short-term (3 to 5 years' period) as extracted from the long-term plan. In identifying the projects, the JPT should not only consult the LGA, but also refer to the short-term (PHASE ONE) land-use proposals made by the Town Planning Department as part of the town master plan. The key targets of the short-term plan are to: • support step-by-step implementation of the proposal put forward in the long-term plan; • support households, public and private institutions as well as industries climb some steps in the service ladder within the short-term period; • provide immediate access to currently underserved parts of the population; and • reduce the share of IWVs, IWBs and NS in the entire town, aim at reducing type A water supply situations, and shift to as many types B and C zones in the town as possible. Ward/Mtaa-level short-term measures should be guided by the principle of "leave no one behind". In that sense, they should particularly target type A Wards that are currently predominantly served by unprotected and/or non-regulated systems. Results from the activities in this stage should be as exemplified in planning **MAP 5** which will become part of the Joint Plan document. For example, the long-term plan for Kahama proposes that all households living in Mondo Ward will by then be served with type C water supply system. However, given the available resources including implementation capacity, households in Mondo Ward will in the short-term only move from the current type A to type B water supply system. This means shifting from mainly	 *Mapped-out short-term planned water situation, around Mondo Ward, Kahama*

		unprotected well and unregulated services to protected sources and regulated services including 75% USPs, 20% regulated private service providers and only 5% private connections. Similar analysis is carried out for each Ward in the long-term plan where the JPT agrees to those proposals which can be fully or partly be included in the short-term plan. Thus, the main differences between the long-term and short-term plans are as follows: • The long-term is more of a visionary outlook, pointing to the preferred situation in the distant future, whereas the short-term planned situation identifies measures to be implemented in order to realise the long-term vision. • The short-term plan includes measures in a small number of Wards (critical Wards) where improvements must be made, unlike the long-term plan which covers more-or-less all Wards in the town. Using the information above, the JPT prepares the short-term plan for water supply improvements, which is presented in the joint plan as **MAP 5**. The short-term plan measures should therefore carry more details to facilitate prioritisation. Such details include the types of measure in terms of area of investment and a rough budget. • Institutional and organizational development in the WSSA or the LGA systems and procedures. • Physical infrastructure investment. • Studies to collect additional information to support further planning and implementation. The short-term measures and their activities in the three areas, Wards/Mtaas served and the number of people to benefit are described in Chapter 6 of the Plan.	

Module 5 STEP 2 **Check the required water supply volumes and supply capacities for each area, where needed suggest measures to improve capacity**	Quantified short-term water supply improvement measures at town level	Using planning **MAP 5** and the reference data (land use and population) in each Ward/Mtaa, the JPT calculates/estimates the expected new water consumption/demand based on the proposed short-term measures. The starting point is to fill **TAB 8** with data by copying the current and proposed short-term water supply systems as shown in **MAP 5** The calculation sheet will work out the short-term water consumption requirements in volumes for each Ward and for the entire town and present it as the last 5 columns in **TAB 8**. Once the short-term water demand data is available and shown on TAB 8, the JPT should relate that with the volume of water to be realistically available in the short-term based on the capacity of the utility to produce, treat and distribute the same. Following questions may be useful in assessing the WSSA's capacity to meet the demands: • Is the current WSSA capacity in safe and clean water production, treatment, storage and distribution able to cater for the short-term demand? If not, what are the short-term measures that should be taken? • Is the capacity of the water distribution main pipe able to feed the tertiary and therefore the last miles? If not, the JPT should propose realist measures. • Is the current capacity of the source able to meet additional demands? If the JPT is of the opinion that the use of wells, boreholes or streams will continue in some Wards where Utility services do not yet reach, this must be subjected to an assessment of the public health risks. Such assessment may lead to closure or upgrading of certain water points. Through discussing these town level measures, the JPT will get ideas on required town-level water supply improvement measures to be taken into account and on the basis of this adjust the Ward/Mtaa level measures accordingly and revise the plan as shown on planning **MAP 5**. Town-level measures aiming at increasing the available water are presented in Section 10 of Chapter 6 of the plan. The measures may cover the following aspects: • Volume and source capacity to be maintained or increased • Water treatment capacity to be maintained or increased • Distribution capacity to be increased	 *Mapped-out short-term planned water supply situation around Mondo Ward, Kahama*  *Calculation table for short-term water supply volumes*

Module 5 STEP 3 **Detail proposed measures to facilitate prioritisation**	Table with key characteristics of the short-term measures ready	After the revising the plan in **MAP 5** and the list of measures as a result of Step 2 above, the JPT gathers additional information to further describe the measures and facilitate prioritisation. The required additional information is mainly drawn from reference documents most of them already collected as part of the preparations (Module 2), and information generated during the assessment of the current situation (Module 3). The additional information includes: • Geographical coverage of the measure: number and names of Wards/Mtaas or the whole town area • Number of households (people), institutions and industries to benefit from implementation of the measure • Potential for PPP arrangements during implementation • Per capita expenditure and thus value for money. • Contributing to set targets on water supply services. An overview of short-term water supply improvement measures included in the short-term plan should be provided preferably in table form.	
Module 5 STEP 4 **Preliminary rate the individual project packages, and agree on weighting factors for priority listing**	Table showing information on the respective weighted scores for each water supply project package to facilitate ranking by management, is available	In this step the JPT applies the **agreed priority scoring criteria** and respective weighting factors and assigns score for each project package. Examples of important prioritisation criteria are the following: • Environmental and public health benefits especially for sanitation projects • Benefiting low-income underserved areas in line with 'leave no one behind'. People living in low-income areas are at a higher risk of contracting water supply and sanitation-related diseases such cholera. • Governance demands in terms of the magnitude of re-adjustments required to have the project implemented and impacts sustainable. • Technology required • Financing of project packages that can be assisted by the WSSA and the LGA or can be mobilised locally to receive a higher score. Additional prioritisation criteria may be considered but is important to note extra criteria calls for additional data. It is therefore recommended that the criteria should not exceed ten and the data	

		required should be easily available from reliable and official sources and should not be time consuming. Once the list of criteria has been agreed upon, the JPT should thus assign weights for each taking into account relevant policy statements and standards. The information obtained is included into a table with the rating by JPT filled with score number 3 assigned to project packages that can be implemented in the next financial year and score 2 as those which will be implemented after the next financial year. Project packages whose implementation horizon is considered to require more than 2 years are rated with a score of 1. To facilitate presentation to the decision makers, the JPT should prepare Project Profiles for each of the priority projects, using the Project Profile Template of **APPENDIX 7.** After the JPT has technically rated the project packages, the team is ready to present the PLAN and the priority PROJECTS, to the decision-making and resource allocation meetings of the LGA and WSSA for final prioritisation. Note: For well-defined project proposals, JPT may consider applying the **"Decision Guidance Tool"** which is also being developed with GIZ support. A link to this tool and its user manual, will be provided as soon as it has been made fully operational (est. by end 2019).	

RECAP

Agreed priority scoring criteria:

- Contributing to set targets on water supply (and sanitation chain) services
- Environmental and public health benefits for the entire town
- Total number of beneficiaries
- Investment cost per person in relation to the prevailing average cost in the town value for money
- Benefiting low income underserved areas in line with 'leave no one behind'. As cautioned earlier, people living in low income areas are at a higher risk of contracting water supply and sanitation related diseases such cholera.
- Governance demands, in terms of the magnitude of re-adjustments required to have the project implemented and impacts sustainable.
- Technology required
- Financing project packages that can be assisted by the WSSA and the LGA or can be mobilised locally to receive higher score
- Project packages that utilise private sector resources should also receive higher scores.

Additional prioritisation criteria may be considered but it is important to note that extra criteria call for additional data. It is therefore recommended that the criteria should not exceed ten and the data required should be easily available and not time consuming.

Issues for the JPT to note:

- The calculated water consumption volumes (Step 2 above) give an indication of the expected development of consumption patterns over time as a result of implementation of proposed/planned short-term service improvements. These figures should provide the utility insight into the required increase in water production and water distribution volumes in particular areas, which may of course be further influenced by other circumstances, like rising living standards accompanied by higher water consumption habits.
- Particular attention is required where it concerns decentralised stand-alone solutions (e.g. boreholes with mini-distribution systems), which may either be private or communally-operated systems providing only interim water supply services.
- All parties especially the utility management must be reassured that the stand-alone system fits to the long-term plans, and that its management and operation may eventually be absorbed into the overall structure and mandate of the utility.
- At this final stage, after Step 4 in the planning process, the JPT will have produced a prioritised list of projects that can be implemented straight away, or that can be implemented in the coming financial year with a high degree of certainty.

MODULE 6 - SHORT-TERM SANITATION SERVICES IMPROVEMENT PLANNING

6.1 INTRODUCTION

This is a strategy to implement measures toward achieving the long-term plans, step-by-step, in doable phases, of say of 3 to 5 years each. After each phase, a next short-term plan should be developed. The utility Business Plan may provide some guidance or may be adjusted accordingly.

By implementing the proposed measures, the target populations will climb one or more steps in the sanitation service ladder and be provided access to improved sanitation chain services. For instance, for people who now practice open defecation, the measures helping them to start climbing the ladder should focus on eradicating open defecation, by behaviour change and by promoting the use of pit latrines and where applicable introduce communal toilets.

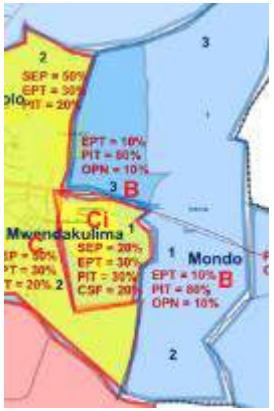
In Wards/Mtaas where the use of toilet facilities is already common practice, the respective measures to be taken should be to introduce safe emptying, transportation and safe disposal services.

Although the identified improvement measures are to be implemented at Ward/Mtaa level, in most cases there will be additional town-level interventions required to support those Ward-level interventions as outlined. The JPT should therefore assess the proposed short-term Ward/Mtaa-level improvement measures, but also assess what short-term town-level interventions may be needed from respective WSSA or LGA, to ensure the viability of a particular Ward/Mtaa-level measure.

For instance, promoting the use of improved pit latrines in a given Ward, requires supportive action by the respective LGA to give the campaigns a legal backing. By categorising the town-level measures into those to be managed by the WSSA and by the LGA, the JPT contributes towards ensuring that key measures are mainstreamed into the planning and budgeting systems of both the WSSA and the LGA. In most cases, the identified measures should be included in the WSSA/LGA annual plans and respective budgets.

In the following sections, the Guide proposes steps that should be followed by the JPT in identifying the measures to improve sanitation chain services in the entire town.

6.2 SHORT-TERM PLANNING PROCESS MATRIX - SANITATION

SHORT-TERM SANITATION IMPROVEMENT MEASURES	OUTPUT	ACTION DESCRIPTION	
Module 6 STEP 1 **Map-out the proposed short-term improved sanitation situation for each Ward/Mtaa**	Short-term sanitation improvements proposals ready	The task at this stage is to propose short-term measures to improve the sanitation chain facilities (especially for containment systems) and corresponding services (emptying, transport, treatment and disposal) in each Ward, in relation to the broad land uses, the proposed short-term water supply improvements, and contributing to realising the long-term sanitation situation already agreed upon through Module 4 and presented as Chapter 5 of the Joint Plan. In developing the proposals, the JPT should consult the respective experts from the LGA especially the Public Health Officer and the Community Development Officer (if they are not members of the JPT) first, to achieve realistic feedback on current predominant toilet facilities and emptying services (if applicable) and secondly, to jointly develop a short-term strategy on how to improve the situation. The key targets of the short-term plan are to: ➢ support step-by-step implementation of the proposal put forward in the long-term plan; ➢ support households, public and private institutions as well as industries climb some steps in the sanitation chain service ladder within the short-term period; ➢ provide immediate access to currently underserved parts of the population; and ➢ increase the share of households using latrines that can be emptied and eliminate open defecation in the entire town. Ward/Mtaa level short-term measures should be guided by the principle of 'leave no one behind'. In that sense, they should target Wards/Mtaas that are predominantly served by un-regulated sanitation systems. Results from the activities in this stage should be as exemplified in planning **MAP 6** which is found in Chapter 7 of the Joint Plan.	 *Mapped-out short-term planned sanitation situation, around Mondo Ward, Kahama*

		For example, the long-term plan for Mondo Ward in Kahama aims to reduce the percentage of households currently using pit latrines (60%) and those practicing open defecation (40%) to a situation where 60% use septic tanks, 25% use emptiable pit latrines, 10% use communal sanitation facilities and only 5% use pit latrines. Taking into account the short-term principles outlined above, the JPT may come up with the proposal that in the short-term the realistic change from the current situation is that 80% of the households will use pit latrines and 10% will still be practicing open defecation and only 10% will have improved their pit latrines to emptiable ones. It is important to note that open defecation will have been reduced from 40% to 10% in the short-term which is in many ways significant. Similar analysis is carried out for each Ward/Mtaa in the long-term plan where the JPT agrees to proposals which can be fully or partly be included in the short-term plan. The main differences between the long-term and short-term plans are that the long-term is more of a visionary outlook, pointing to the preferred situation in the long-term future; whereas the short-term plan identifies measures to be implemented soon in order to realise the longer-term vision. The short-term plan includes measures in fewer Wards (critical Wards) where improvements must be made unlike the long-term plan which covers more or less all Wards in the town. The short-term plan measures should therefore carry more details to facilitate prioritisation. Such details include the type of measure in terms of area of investment and a rough budget. • Institutional and organisational development in the WSSA or the LGA systems and procedures • Physical infrastructure investment • Studies to collect additional information to support further planning and implementation The short-term measures and their activities in the three areas, Wards/Mtaa served and number of people to benefit are shown in planning **MAP 6** and described in Chapter 7 of the Plan document, as the short-term sanitation chain improvement proposals.	

Module 6 STEP 2 **Quantify identified town-level measures that need to support the implementation of Ward-level proposals**	Short-term sanitation volumes estimated	Using the results from Step 1 above, the JPT estimates the short-term volumes of sludge and wastewater using the calculation sheet in which the proposed percentage shares of the different sanitation systems are filled, as marked during the joint planning sessions on **MAP 10** for the proposed short-term planned sanitation situation. The estimation is calculated using population data, the percentages of the proposed sanitation facilities, average faecal sludge production per person and other relevant information. The result are indicative volumes of (dry) in-situ disposed FS, (wet) FS in emptiable onsite sanitation containment systems, and wastewater generated evacuated by sewerage (if in place) in each Ward/Mtaa, at the end of the short-term period. Calculation results are as exemplified on **TAB 9.** The calculated figures from each Ward will contribute to the cumulative figures for the entire town and thus providing a short-term outlook regarding the: • volume to be evacuated from each Ward and the entire town and business potential from such services; • required capacities in infrastructure such as a suitable size of WSP or (Resource Recovery Facility); and • other requirements (institutional) such as human resource and governance structures to run the system effectively. Once the short-term volumes of sludge and wastewater data is available and shown on TAB 9, the JPT should relate that with existing capacities and propose short-term capacity improvement measures which must be implemented in the short-term. The following question may be useful in assessing the capacity of the WSSA to manage the sludge and wastewater estimated. • Is the current town capacity in regulating safe emptying, transport and treatment able to cater for the short-term demand? If not propose short-term measures which should be included in Section 6.8 of Chapter 6 of the short-term plan.	 *Mapped-out short-term planned sanitation situation, around Mondo Ward, Kahama*  *Quantified sanitation service volumes*

Module 6 STEP 3 **List out the proposed measures to facilitate prioritisation**	Table of key characteristics of the short-term measures drawn	After revising the Plan in **MAP 10** and the list of measures as a result of Step 2 above, the JPT mobilises additional information to further describe the measures so as to facilitate prioritisation. The required additional information is mainly drawn from reference documents most of them already collected as part of the preparations (Module 2), and information generated during the assessment of the current situation (Module 3). The additional information includes the following: ➢ Geographical coverage of the measure, number and names of Wards/Mtaas or the whole town area. ➢ Number of households (people), institutions and industries to benefit from implementation of the measure. ➢ Potential for PPP arrangements during implementation. ➢ Per capita expenditure and thus value for money. ➢ Setting targets on sanitation chain facilities and services. **An** overview of the sanitation service chain improvement measures should be provided preferably in table form.	
Module 6 STEP 4 **Preliminarily rate the individual project packages and assign agreed weighting factors in the priority list**	A weighted score for each water supply project package to facilitate ranking by management assigned	In this step the JPT applies the agreed priority scoring criteria and respective weights and assigns a score for each project package. Examples of important prioritisation criteria are the following: ➢ environmental and public health benefits for the entire town; ➢ benefit by low income underserved areas in line with the 'leaving no one behind' philosophy; ➢ governance demands in terms of the magnitude of re-adjustments required to have the project implemented with sustainable impacts; ➢ technology required; and ➢ Project packages that can be financed by the WSSA and the LGA or can be mobilised locally to receive higher scores. Additional prioritisation criteria may be considered but is important to note that adding criteria calls for additional data. It is therefore recommended that the criteria should not exceed ten and the data required should be easily available from reliable and official sources and not time consuming. Once the list of criteria has been agreed upon, the JPT should thus assign weights for each, taking into account relevant policy statements and standards.	

		The information obtained in this task is included in TAB 10 with the rating by JPT filled with score number 3 assigned to project packages that can be implemented in the next financial year and score 2 as those which will be implemented after the next financial year. Project packages whose implementation horizon is considered to require more than 2 years are rated with a score of 1. After the JPT has technically rated the project packages, the team presents the PLAN and the priority PROJECTS to the decision-making and resource allocation meetings of the LGA and WSSA for final prioritisation. To facilitate presentation to the decision makers, the JPT should prepare Project Profiles for each of the sanitation priority projects, as shown in **APPENDIX 9.**	

RECAP

The JPT should note the following:

a) The calculated sludge and wastewater volumes that are expected to be generated in different Wards/Mtaas, currently in the long-term and following implementation of the short-term sanitation improvement projects, provide at least a trend of the quantities of sludge and wastewater services that will be required over time. These figures may give useful business opportunity information to attract investors in sanitation services, e.g. private companies bringing in sludge and wastewater extraction equipment (gulpers and vacuum trucks), and even private investments in the construction and operation of disposal and treatment facilities.

b) Particular attention is required where it concerns decentralised stand-alone solutions/facilities, which may either be private or communally operated systems providing only interim sanitation services.

c) All parties especially the utility management must be reassured that the stand-alone system fits in the long-term plans, and that its management and operation may eventually be absorbed into the overall structure and mandate of the utility.

d) At this final stage, after Step 4 in the planning process, the JPT will have produced a prioritised list of projects that can be implemented straight-away, or that can be implemented in the coming financial year, with a high degree of certainty.

MODULE 7 - SHORT-TERM SOLID-WASTE SERVICES IMPROVEMENT PLANNING

7.1 INTRODUCTION

This is a strategy to implement measures toward achieving the long-term plans, step-by-step, in doable phases, of say of 3 to 5 years each. After each phase, a next short-term plan should be developed. The utility Business Plan may provide some guidance or may be adjusted accordingly.

By implementing the proposed measures, the target populations will climb one or more steps in the solid-waste service ladder and be provided access to improved solid-waste chain services. For instance, for people who currently practice crude dumping, throwing away, burying or burning of solid-waste, the measures should help climbing the ladder. The immediate focus should be the eradication of the practice of burying and open-air burning of household waste. A behaviour change should be achieved in the communities by establishing solid-waste drop-off/collection points and promoting their use. The active participation of all households and institutions is a prerequisite for improving the solid-waste management in the town.

Some guiding notes about solid-waste management in urban and semi-urban areas is provided as **APPENDIX 11** to this Guide.

7.2 SHORT-TERM PLANNING PROCESS MATRIX – SOLID-WASTE MANAGEMENT

SHORT-TERM SOLID-WASTE MANAGEMENT SERVICES	OUTPUT	ACTION DESCRIPTION	
Module 7 STEP 1 **Map-Out Water Risk Areas and propose short-term mitigation measures for each Ward/Mtaa**	Short-term solid-waste services improvement proposals are prepared	The task at this stage is to propose short-term measures to improve the solid-waste service chain facilities (household storage systems) and corresponding services (drop-off and interim storage, collection and transport, sorting for recycling and Reuse or disposal) in each ward, in relation to broad land uses, the proposed short-term water supply improvements, and contributing to the long-term solid-waste management situation already agreed upon in Module 4 and presented as Chapter 5 of the Joint Plan. In developing the proposals, the JPT should first consult the respective experts from the LGA, especially the Public Health Officer, the Environmental Engineer and the Community Development Officer (if they are not members of the JPT) to achieve realistic feedback on the current status of solid-waste management services, and secondly, to jointly develop a short-term strategy on how to improve solid-waste services in the framework of water safety.	

		The key targets of the short-term plan are to: • Support step-by-step implementation of the proposal put forward in the long-term plan • Support WSSAs on how water sources can be protected from poor solid-waste management services within the short-term period • Provide immediate mitigation measures to protect water sources which are likely to be polluted/contaminated by poorly managed solid-waste. • Increase number of water sources protected from solid-waste pollution and contamination. The short-term measures should target Wards/Mtaa that do not have well organized solid-waste management services. Similar analysis should be carried out for each Ward/Mtaa in the long-term plan where the JPT agrees to proposals which can be fully or partly included in the short-term plan. The main differences between the long term and short-term plans are that the long-term is more of a visionary outlook, pointing to the preferred situation in the long-term future; whereas the short-term plan identifies measures to be implemented soon, to realize the long-term vision. The short-term include measures in fewer Wards/Mtaas (critical Wards/Mtaas) where improvement must be made unlike the long-term plan which covers more-or-less all wards in the town. The short-term measures, therefore, should carry more details to facilitate prioritization. Such details include the types of measures in terms of area of catchments/sources and a rough-budgets. • Institutional and Organizational development in the WSSAs or LGAs systems and procedures • Community mobilization and Awareness • Physical Infrastructure investment • Studies to collect additional information to support further planning and implementation The short-term measures and their activities in the four areas, Wards/Mtaa served and number of people to benefit are shown in TAB 11. and described in Chapter 7 of the plan document, as the short-term solid-waste management improvement proposals.	

Module 7 STEP 2 **Quantify Identified town-level measures to support the implementation of Ward/ Mtaa-level proposals**	Short-term solid-waste generated is estimated	Using the results from Step1 above, the JPT estimates the short-term quantities of solid-waste generated using the calculation sheet (TAB 11) in which the proposed solid-waste generated are filled The estimation is calculated using population data and average solid-waste generation per person per day. The results are indicative amount generated (in kgs/day) in each Ward/Mtaa. Calculation results as shown in TAB 11. The calculated figure from each Ward/Mtaa will contribute to the cumulative figures for the entire town and thus providing a short-term outlook regarding the: • Amount to be collected from each Ward/Mtaa and the entire town and business potential from such services • Potential areas of water sources pollution/contamination • Required capacities in infrastructures such as collection points, land fill areas/dumping sites etc. • Other requirements (Institutional) such as human resources and governance structures to run the system effectively. Once the short-term solid-waste generated is available as shown in TAB 11, the JPT should relate this to existing capacities, and propose short-term capacity improvement measures which need to be implemented in the short-term. The following question may be useful in assessing the capacity of town (LGA) to manage the solid-waste generated: • Is the current town capacity to provide solid-waste services able to cater for the short-term demand? If not propose short-term measures which should be included in section 6.3 of Chapter 6 of the short-term plan.	 TABLE 11 - DOMESTIC SOLID WASTE MBEYA CITY SOLID WASTE GENERATED 0.50 [kg/cap/day] Solid Waste (for forecast) Current / Short-term / Long-term Ward Nr / Ward Name / land use predomina / Pop.Year 2020 / Pop.Year 2023 / Pop.Year 2037 1 Sisimba CBD 5,553 6,189 11,034 2,777 3,095 5,517 2 Ghana mixd 6,542 7,291 13,000 3,271 3,646 6,500 3 Nonde mixd 3,306 3,685 6,570 1,653 1,842 3,285 4 Maendeleo CBD 3,742 4,170 7,435 1,871 2,085 3,718 5 Majengo mixd 4,385 4,887 8,712 2,192 2,443 4,356 6 Ifisi mixd 5,510 6,140 10,948 2,755 3,070 5,474 7 Mbeliti Road CBD 7,927 8,835 15,752 3,964 4,418 7,876

Module 7 STEP 3 **List out proposed measures to facilitate prioritization**	Table of key characteristics of the sort-term measures drawn	After revising the Plan as a result of Step 2 above, the JPT mobilizes additional information to further describe the measures so as to facilitate prioritization. The required additional information is mainly drawn from reference documents most of them already collected as part of preparations (Module 2). And information generated during the assessment of the current situation (Module 3). The additional information includes the following: • Geographical coverage of the measure, number and names of Wards/Mtaa or the whole town area. • Number of households (people), institutions and industries from implementation of measure • Potential for PPP arrangements during implementation • Per capita expenditure and thus the value for money • Setting targets on solid-waste chain facilities and services An overview of the solid-waste service chain improvement measures should be provided preferably in table form.	
Module 7 STEP 4 **Preliminarily rate individual packages and assign agreed weighting factors in the priority list**	A weighted score for each solid-waste project package to facilitate ranking management assigned	In this step the JPT applies the agreed priority scoring criteria and respective weights and assigns a score for each project package. • Water safety, • Environmental and public health benefits for the entire town, • Benefit by low income underserved areas, • Governance demands in terms of magnitude of re-adjustments require to have the project implemented with sustainable impact. • Technology required; and • Project packages that can be financed by WSSA and LGA or can be mobilized locally to receive higher scores. Additional prioritization criteria can be considered but it is important to note that adding criteria calls for additional data. It is therefore recommended that the criteria should not exceed ten and data required should be easily available from reliable and official sources and not time consuming. Once the list of criteria has been agreed upon, the JPT should assign weights for each, taking into account relevant policy statements and standards.	

		The information contained in this task is included in TAB 11 with the rating by JPT filled with score number 3 assigned to project packages that can be implemented in the next financial year and score 2 as those which will be implemented after the next financial year. Project packages whose implementation horizon is considered to require more than 2 years are rated with the score of 1. After the JPT has technically rated the project packages, the team presents the PLAN and the priority PROJECTS to the decision making and resource allocation meetings of the LGA and WSSA for final prioritization. To facilitate presentation to decision makers, the JPT should prepare Project Profiles for each of the solid-waste priority projects, as shown in **APPENDIX 9**. Some guidance about solid-waste management can be found in the **APPENDIX 11** to this Guide.	

RECAP

The JPT should note the following:

a) The calculated figure of expected solid-waste generation in different Wards / Mtaas, currently in the long-term and following implementation of short-term solid-waste projects, provide at least a trend of the quantities of solid-waste services that will be required over time. These figures may give useful business opportunity information to attract investors in solid-waste management services, e.g. private companies can bring in solid-waste sorting equipment, investment in construction, collection and disposal facilities.
b) At this final stage, after Step 4 in the planning process, the JPT will have produced a prioritized list of projects that can be implemented straight-away, or that can be implemented in coming financial years, with a high degree of certainty.

MODULE 8 - RESOURCE MOBILISATION AND PROJECTS IMPLEMENTATION

8.1 INTRODUCTION

In Module 5, 6 and 7 of this Guide, the JPT has identified priority projects for improving the water supply and sanitation services, but also solid-waste management in the town. The priority projects must now also be presented to the decision makers (of WSSA and LGA) and are then ready for financing and implementation. The main task of the JPT at this stage in the process is to ensure that the priority projects are effectively mainstreamed into the planning and budgeting system of both the LGA and the Utility (as appropriate) and are included in the next planning and budgeting cycle so that they are part of the next annual plan and budget (including external funding options). To achieve this, the JPT should observe the critical dates and meetings of the planning and budget cycle of the two institutions and ensure that the plan becomes part of the agenda items in the LGA and utility management meetings.

In the following sections, the Guide proposes steps that should be followed by the JPT in identifying the measures to improve the water supply and sanitation chain services in the entire town. This may also be applied to improvement measures for solid-waste management in the town, but generally this will be a responsibility that lays entirely with the LGA.

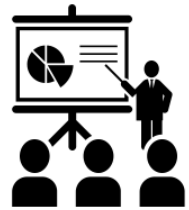
8.2 PROCESS MATRIX FOR IMPLEMENTATION, MONITORING AND REVIEW

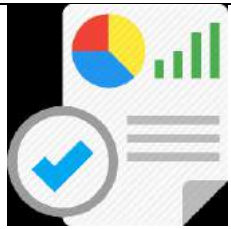
Prior to presenting the priority projects to the decision makes, it is advisable that the JPT also explores the potential funding options for each of the priority projects.

To start with, the JPT must agree, which priority projects (whether water supply, sanitation, or solid-waste) are best handled by which institution, i.e. who finances and implements these. Secondly, the best avenue for securing funding for each project must be chosen, taking into consideration the amount of funding required, available budget lines within each institution, and for instance the potentials of repaying loans or private sector investors.

The JPT may make use of the “Water Sector Funding Compendium” (which may be accessible through MoW or NWF)) to explore possible external sources of funding, by considering the eligibility criteria, financing time windows, focal areas of funding, the application procedures including the national legal framework needing to be respected.

For the writing of good, finance-ready proposal documents for the priority projects, the MoW and NWF may be provide advice and guidance.

MAIN ACTIVITIES	OUTPUT	ACTION DESCRIPTION	
Module 8 STEP 1 **Prepare Management briefings**	Prepare dossier (Kabrasha) for presentation to Utility and Council Management	The main task of the JPT is to prepare a summary of the Plan, including the Project Profiles for the short-term priority projects, indicating potential funding options for each of the projects, that may potentially be accessible for either the Utility or the Council, with respect to their mandates. For instance, a funding option may be suitable only for infrastructure investment, while other funding options target awareness raising at community level. The **Sector Funding Compendium** may provide ideas. The **project profiles** should indicate the amount and proposed source of funding for each project. This preferably comes from own sources, utility revenue, LGA levies and taxes or from regular annual budgets. Some project may qualify for external funding options, through the relevant Central Government Department, commercial loans or credit agreements with local banks, collaboration with NGOs, or by negotiating private sector partnerships arrangements, such PPP (refer to the Sector Financing Guidelines, and the PPP Guidelines)	
Module 8 STEP 2 **Present Plan to both Managements**	Adoption of the PLAN by both Managements	The main activity of the JPT is to present and justify the proposed Plan document and specifically the proposed priority projects for water supply and sanitation improvement, to the Council Management and the Utility Management. JPT ensures that the respective e Managements are conversant with the Plan, especially the priority projects, and adopt it, present and defend it in the Council Meeting of the LGA and Board Meeting of the Utility.	
Module 8 STEP 3 **Obtain approval from WSSA and LGA for the priority projects**	Water Supply and Sanitation improvement projects are approved for funding	The main activity of the JPT is to assist the respective Management in the preparation and presentation of the Plan and priority projects, to the full Council Meeting and the Utility Board Meeting. Approval of the priority projects by the highest decision-making level of Council and Utility, ensures that the priority projects are part of the annual plan and included in the next financial year's budget.	

Module 8 STEP 4: **Prepare for implementation**	Projects are procured	Once fund allocations for the priority projects have been included in the annual plans and budgets of the Utility and the Council, the JPT assists the respective units in the Utility and the Council in taking the necessary steps towards implementation, including detailed feasibility studies, technical designs and procurement.	
Module 8 STEP 5 **Joint Monitoring of the project implementation and progress reporting**	Implementation progress reports are produced	The JPT should continue their joint meetings, field visits and actively monitor and make follow-ups on implementation of the projects. The findings of the project monitoring reports become an important input into the process of reviewing the Joint short-term Plan.	
Module 8 STEP 6 **Reviewing the Joint Plan and initiate next phases of joint prioritisation and implementation**	The Joint Plan is revised on annual basis and new priority projects proposed for implementation	The main activity of the JPT is to update the existing short-term Plan, by developing subsequent "Addenda" to the initial Plan document. Such Addenda should consider completing past improvement projects and introduce new ones, and thus starting a next planning and implementation cycle.	

RECAP

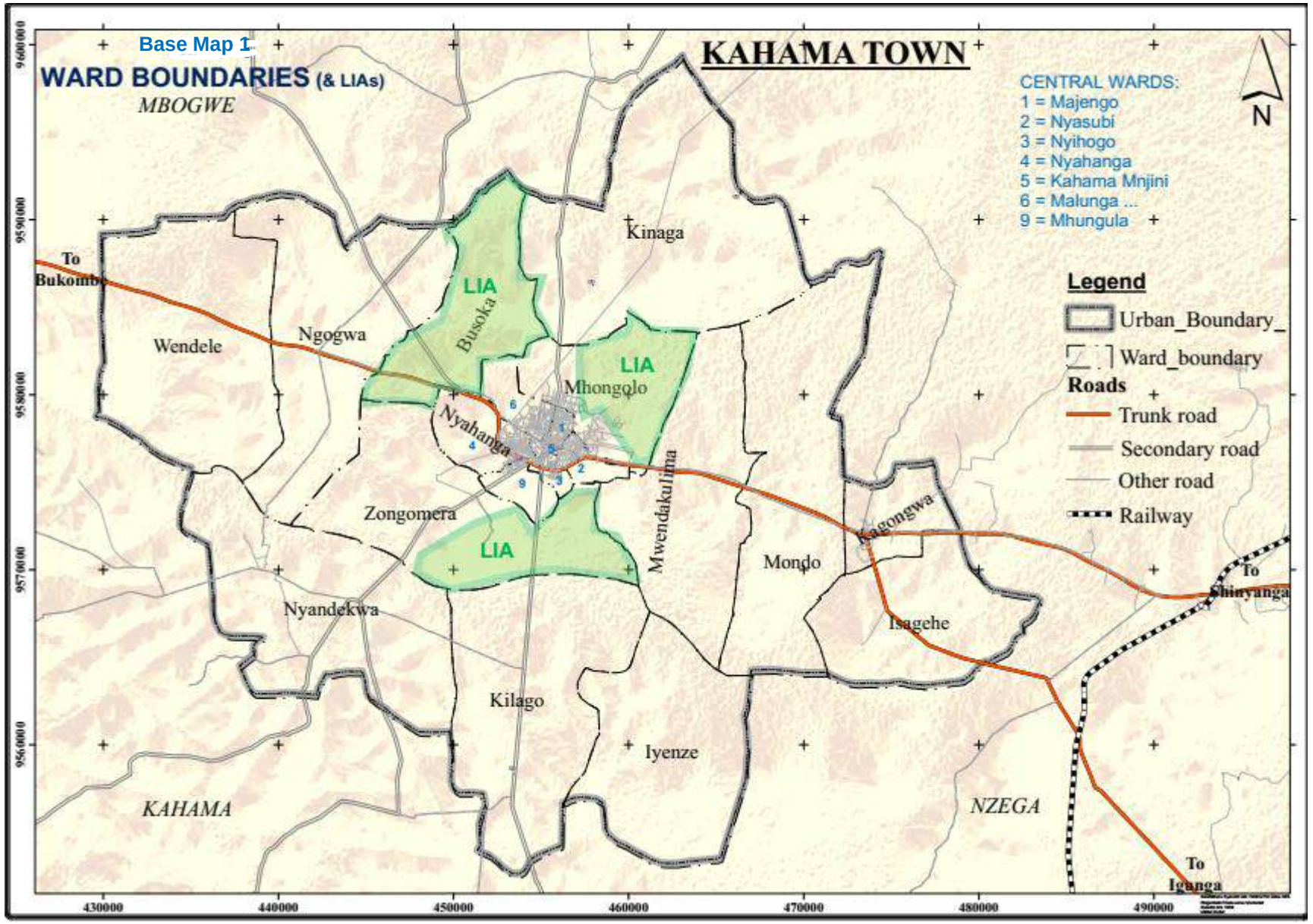
JOINT PLANNING AS COMMON PRACTICE:

It is expected, that the Joint Planning process described in this Guide in a step-by-step approach, will become a prevailing planning practice between LGAs and WSSAs in all towns in Tanzania. The process is designed to bring the two town authorities closer together, help create a common understanding of their individual mandates and capacity limitations, while highlighting the potentials of their joint efforts and the pooling of their generally limited resources.

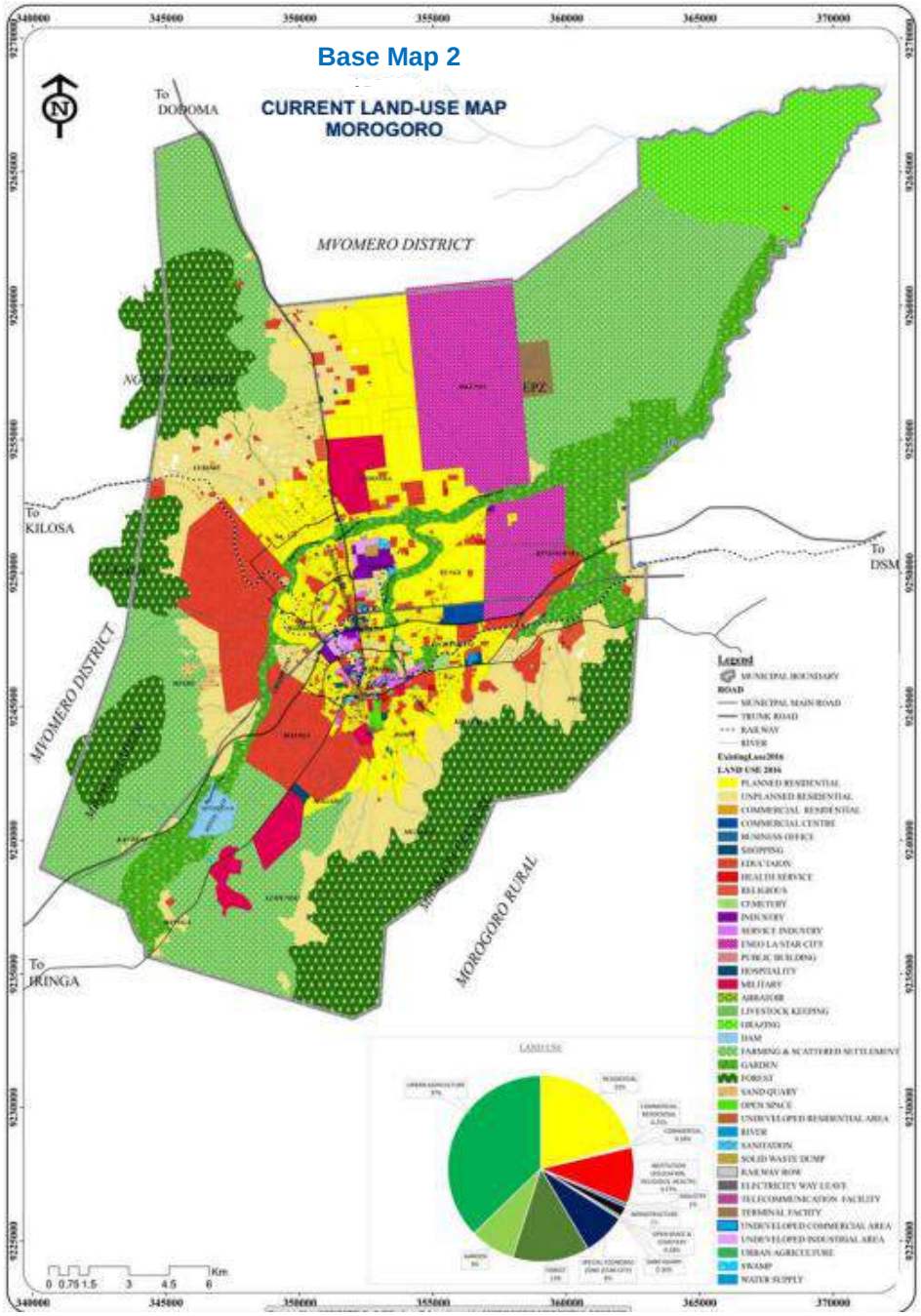
The joint planning approach is to replace the culture of isolated and non-transparent planning of interventions, and the uncoordinated resource allocations by each of these two town authorities, as was often the case in the past. The culture of un-coordinated planning and budgeting proved to undermine the efficient, effective and sustainable development of the water sector.

APPENDICES

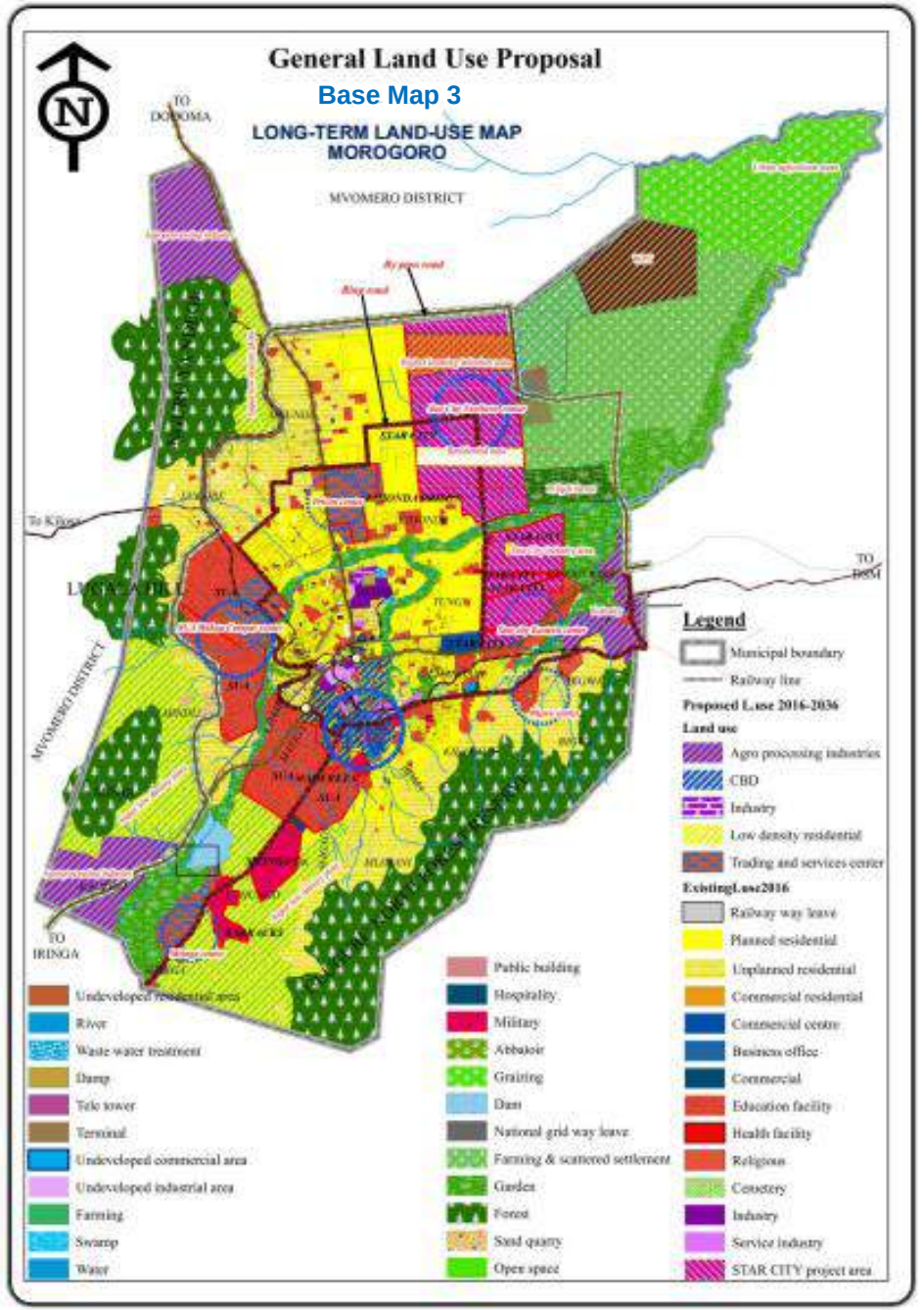
APPENDIX 1A- EXAMPLE MAPS

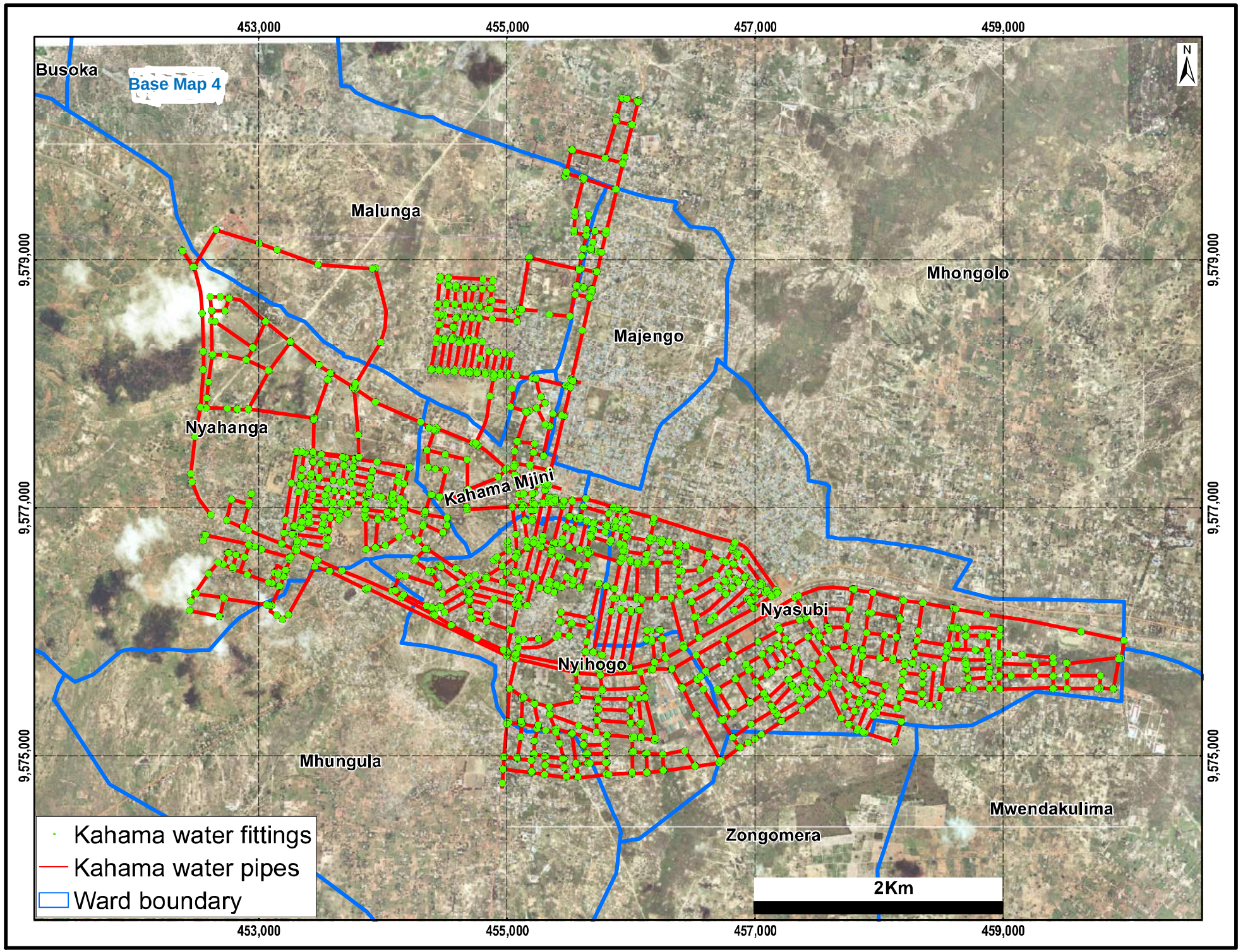


Base Map 2



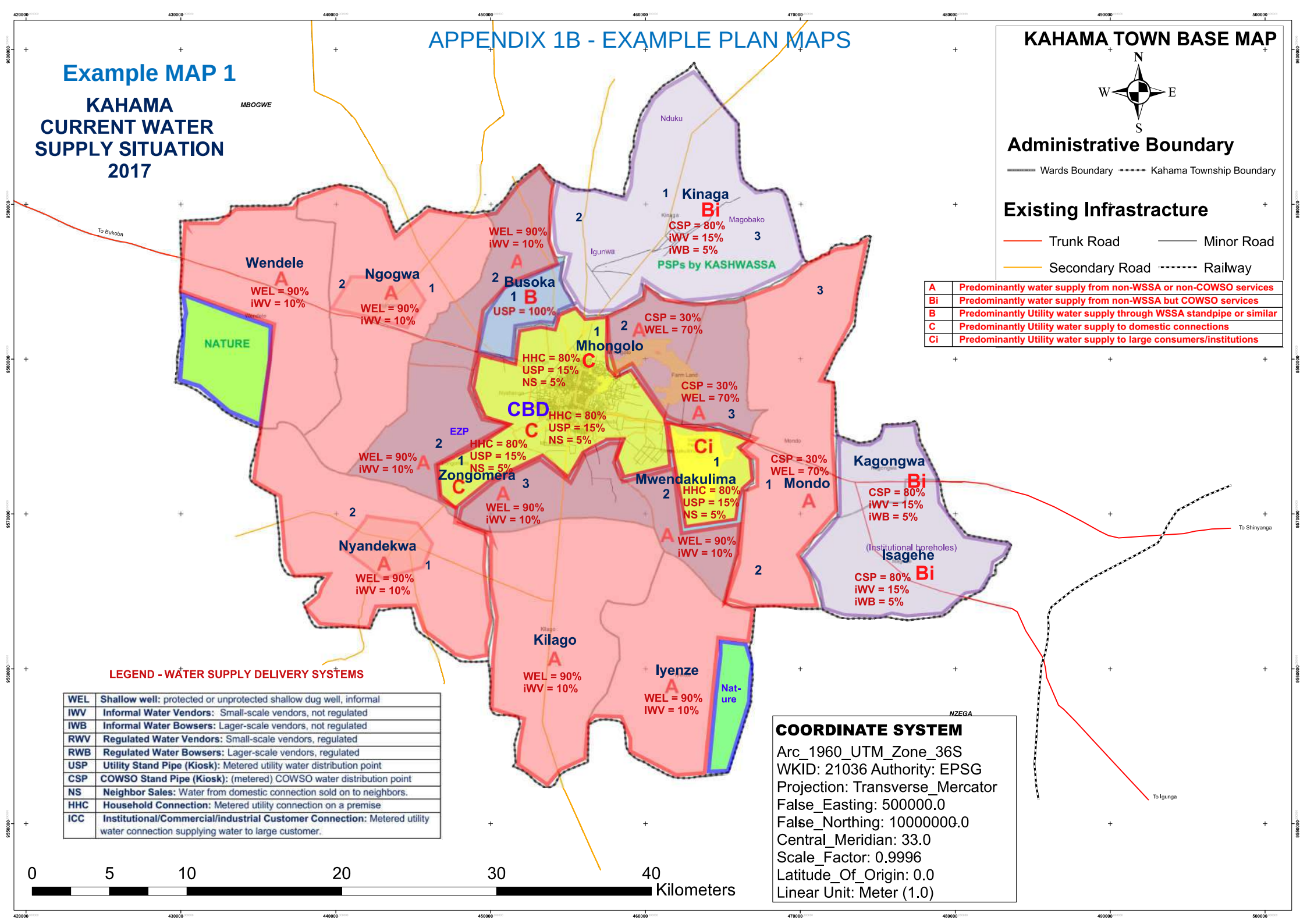
Base Map 3




Base Map 4
Busoka
Malunga
Majengo
Mhongolo
Nyahanga
Kahama Mjini
Nyasubi
Nyihogo
Mhungula
Zongomera
Mwendakulima
453,000
455,000
457,000
459,000
9,579,000
9,577,000
9,575,000
N
Kahama water fittings
Kahama water pipes
Ward boundary
2Km

Example MAP 1

KAHAMA CURRENT WATER SUPPLY SITUATION 2017



A	Predominantly water supply from non-WSSA or non-COWSO services
Bi	Predominantly water supply from non-WSSA but COWSO services
B	Predominantly Utility water supply through WSSA standpipe or similar
C	Predominantly Utility water supply to domestic connections
Ci	Predominantly Utility water supply to large consumers/institutions

LEGEND - WATER SUPPLY DELIVERY SYSTEMS

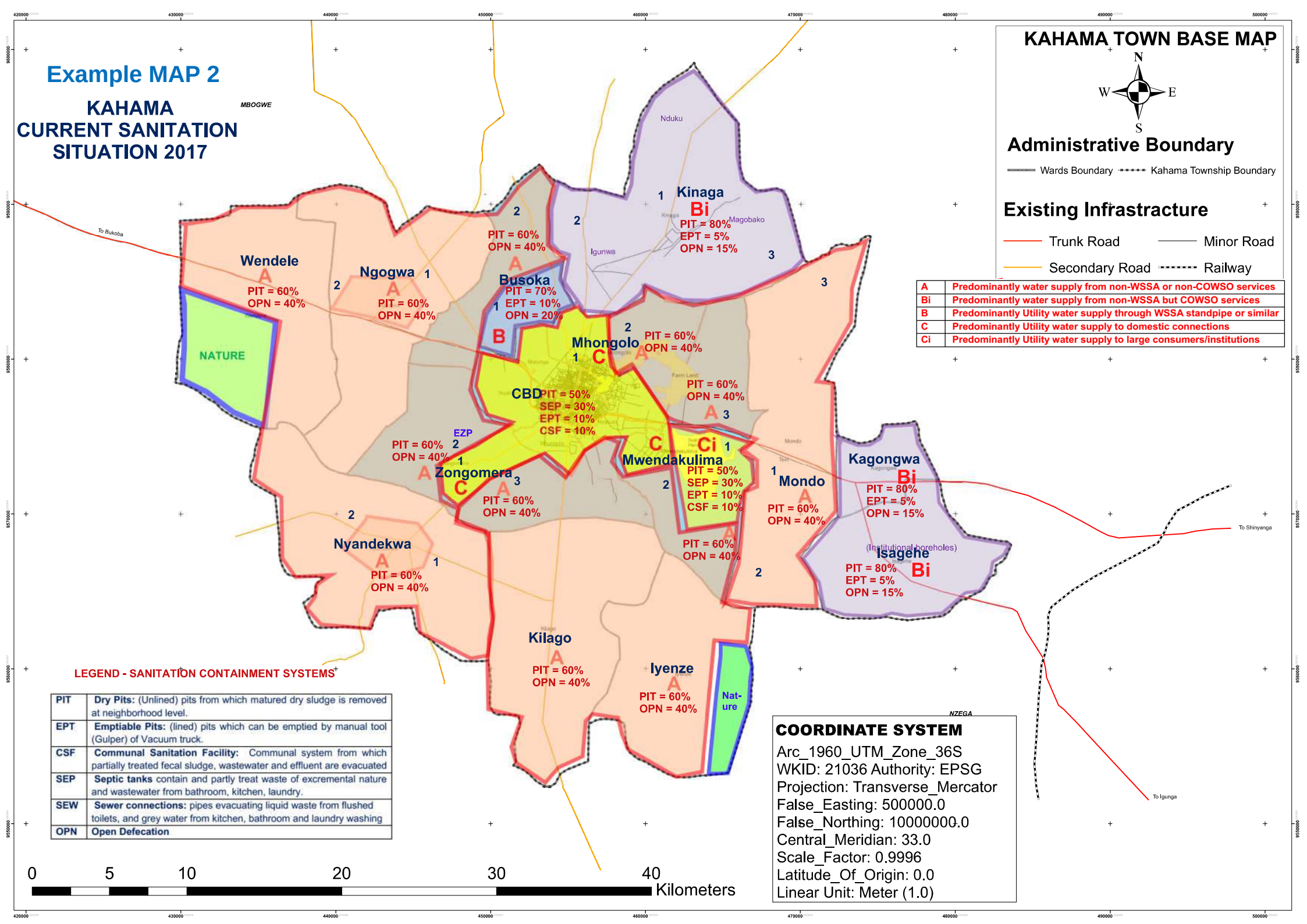
WEL	**Shallow well:** protected or unprotected shallow dug well, informal
IWV	**Informal Water Vendors:** Small-scale vendors, not regulated
IWB	**Informal Water Bowsers:** Lager-scale vendors, not regulated
RWV	**Regulated Water Vendors:** Small-scale vendors, regulated
RWB	**Regulated Water Bowsers:** Lager-scale vendors, regulated
USP	**Utility Stand Pipe (Kiosk):** Metered utility water distribution point
CSP	**COWSO Stand Pipe (Kiosk):** (metered) COWSO water distribution point
NS	**Neighbor Sales:** Water from domestic connection sold on to neighbors.
HHC	**Household Connection:** Metered utility connection on a premise
ICC	**Institutional/Commercial/industrial Customer Connection:** Metered utility water connection supplying water to large customer.

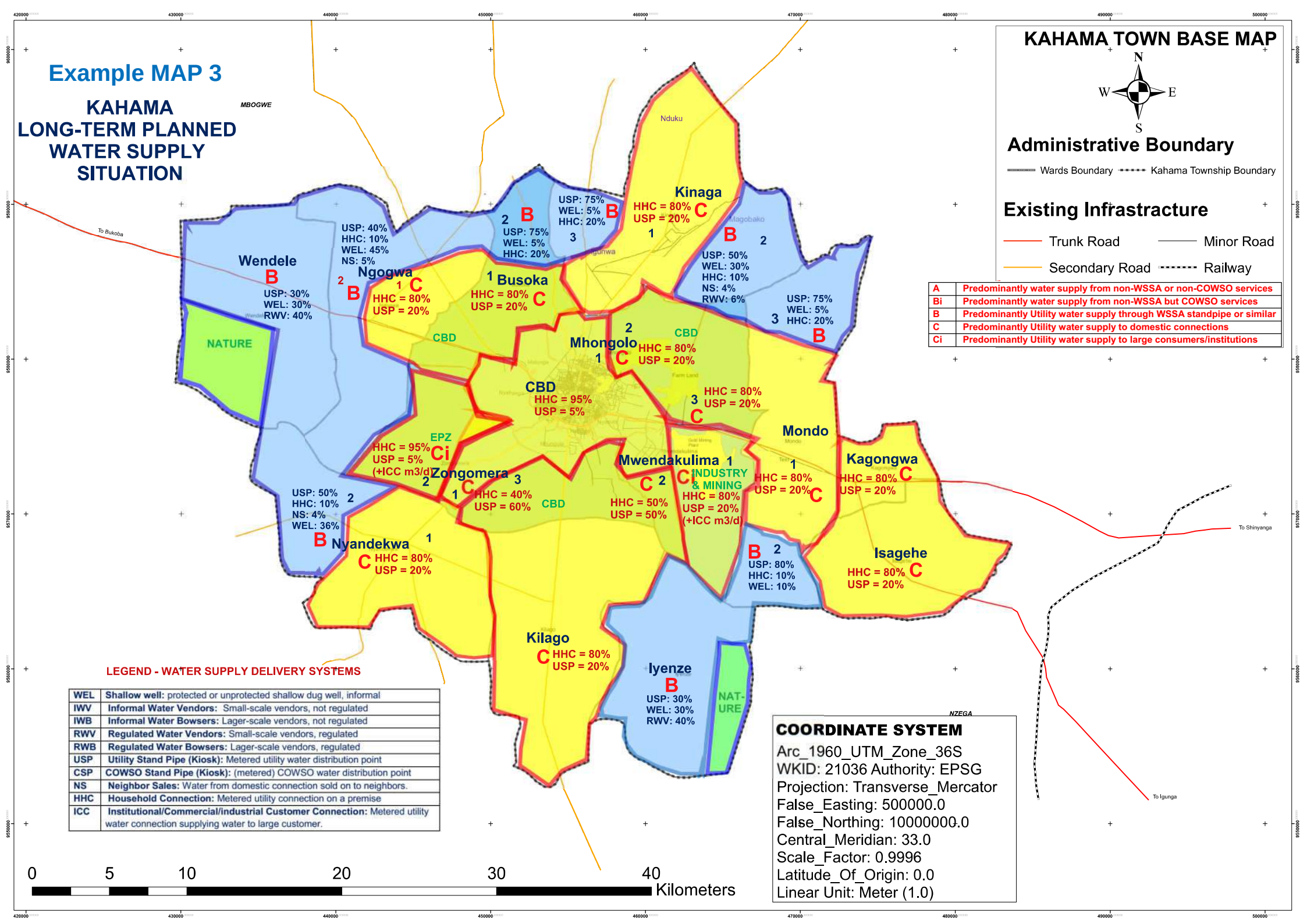
COORDINATE SYSTEM

Arc_1960_UTM_Zone_36S
WKID: 21036 Authority: EPSG
Projection: Transverse_Mercator
False_Easting: 500000.0
False_Northing: 10000000.0
Central_Meridian: 33.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear Unit: Meter (1.0)

Example MAP 2

KAHAMA CURRENT SANITATION SITUATION 2017




Example MAP 3
KAHAMA LONG-TERM PLANNED WATER SUPPLY SITUATION
KAHAMA TOWN BASE MAP
N
W
E
S
Administrative Boundary
Wards Boundary
Kahama Township Boundary
Existing Infrastracture
Trunk Road
Minor Road
Secondary Road
Railway
A Predominantly water supply from non-WSSA or non-COWSO services
Bi Predominantly water supply from non-WSSA but COWSO services
B Predominantly Utility water supply through WSSA standpipe or similar
C Predominantly Utility water supply to domestic connections
Ci Predominantly Utility water supply to large consumers/institutions
MBOGWE
Nduku
To Bukoba
To Shinyanga
To Igunga
NZEGA
Wendele
B
USP: 30%
WEL: 30%
RWV: 40%
NATURE
USP: 40%
HHC: 10%
WEL: 45%
NS: 5%
Ngogwa
2 B
1 C
HHC = 80%
USP = 20%
2 B
USP: 75%
WEL: 5%
HHC: 20%
3
Busoka
1
HHC = 80%
USP = 20%
C
USP: 75%
WEL: 5%
HHC: 20%
B
Kinaga
HHC = 80%
USP = 20%
C
1
Magobako
B
2
USP: 50%
WEL: 30%
HHC: 10%
NS: 4%
RWV: 6%
USP: 75%
WEL: 5%
HHC: 20%
3
B
CBD
Mhongolo
2
1
C
HHC = 80%
USP = 20%
CBD
HHC = 80%
USP = 20%
3
C
CBD
HHC = 95%
USP = 5%
EPZ
HHC = 95%
Ci
USP = 5%
(+ICC m3/d)
Zongomera
2
2
C
1
3
HHC = 40%
USP = 60%
CBD
Mwendakulima
1
C
2
HHC = 50%
USP = 50%
Ci
INDUSTRY & MINING
HHC = 80%
USP = 20%
(+ICC m3/d)
Mondo
1
HHC = 80%
USP = 20%
C
Kagongwa
HHC = 80%
C
USP = 20%
B
2
USP: 80%
HHC: 10%
WEL: 10%
Isagehe
HHC = 80%
C
USP = 20%
USP: 50%
HHC: 10%
NS: 4%
WEL: 36%
2
B
Nyandekwa
1
C
HHC = 80%
USP = 20%
Kilago
C
HHC = 80%
USP = 20%
Iyenze
B
USP: 30%
WEL: 30%
RWV: 40%
NAT-URE
LEGEND - WATER SUPPLY DELIVERY SYSTEMS
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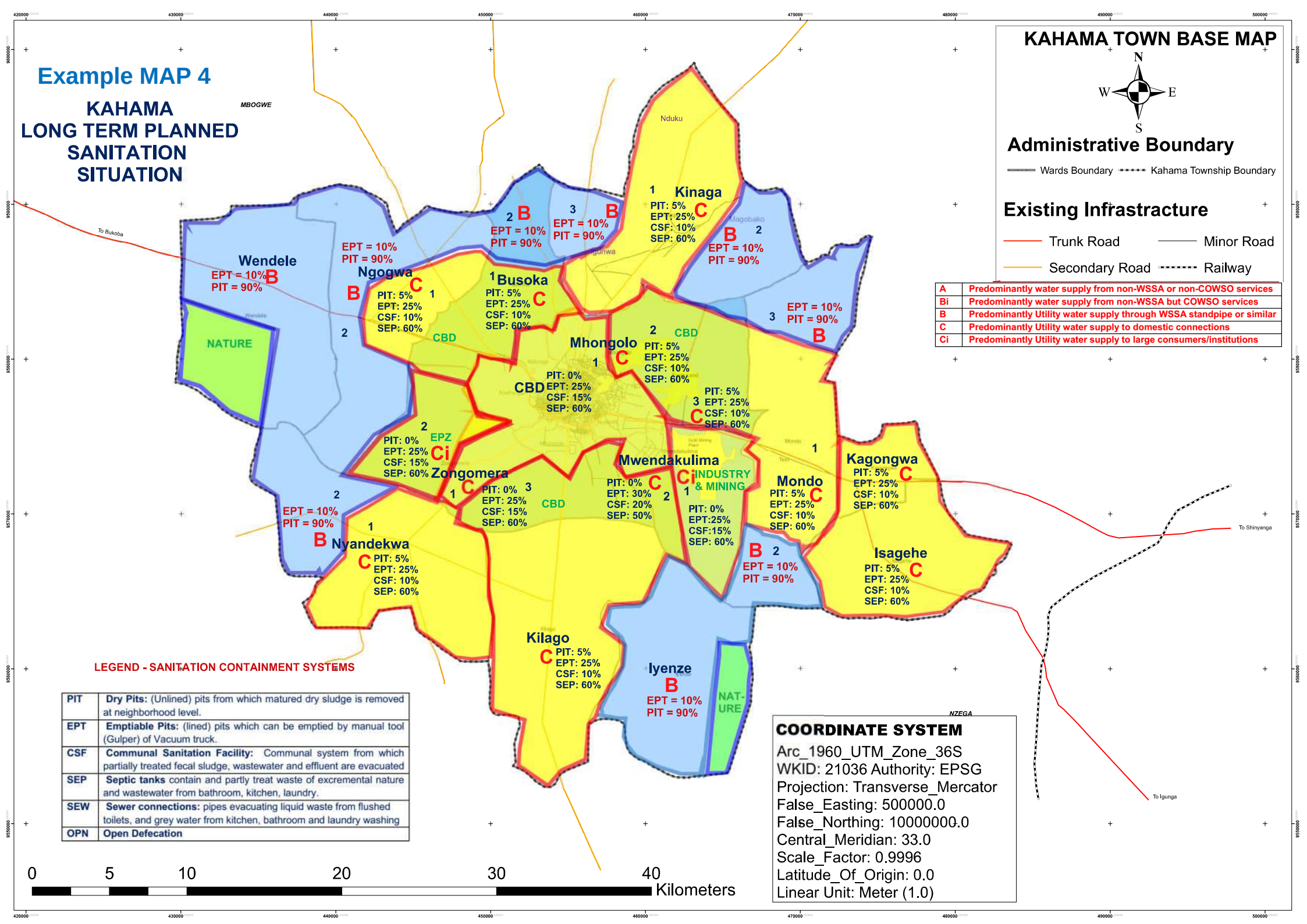
NS Neighbor Sales: Water from domestic connection sold on to neighbors.
HHC Household Connection: Metered utility connection on a premise
ICC Institutional/Commercial/industrial Customer Connection: Metered utility water connection supplying water to large customer.
0 5 10 20 30 40 Kilometers
COORDINATE SYSTEM
Arc_1960_UTM_Zone_36S
WKID: 21036 Authority: EPSG
Projection: Transverse_Mercator
False_Easting: 500000.0
False_Northing: 10000000.0
Central_Meridian: 33.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear Unit: Meter (1.0)


Example MAP 4
KAHAMA
LONG TERM PLANNED
SANITATION
SITUATION
KAHAMA TOWN BASE MAP
N
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Administrative Boundary
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Ci Predominantly Utility water supply to large consumers/institutions
MBOGWE
NZEGA
Nduku
Igunwa
Magobako
To Bukoba
To Shinyanga
To Igunga
Wendele
B
EPT = 10%
PIT = 90%
NATURE
Ngogwa
B
C
1
2
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
CBD
EPT = 10%
PIT = 90%
2 B
EPT = 10%
PIT = 90%
3 B
EPT = 10%
PIT = 90%
1 Busoka
C
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
1 Kinaga
C
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
B 2
EPT = 10%
PIT = 90%
3 B
EPT = 10%
PIT = 90%
Mhongolo
C
1
2 CBD
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
CBD
PIT: 0%
EPT: 25%
CSF: 15%
SEP: 60%
3
C
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
2 EPZ
Ci
PIT: 0%
EPT: 25%
CSF: 15%
SEP: 60%
Zongomera
C
1
3
PIT: 0%
EPT: 25%
CSF: 15%
SEP: 60%
CBD
Mwendakulima
Ci
1
2
PIT: 0%
EPT: 30%
CSF: 20%
SEP: 50%
INDUSTRY & MINING
PIT: 0%
EPT:25%
CSF:15%
SEP: 60%
Mondo
C
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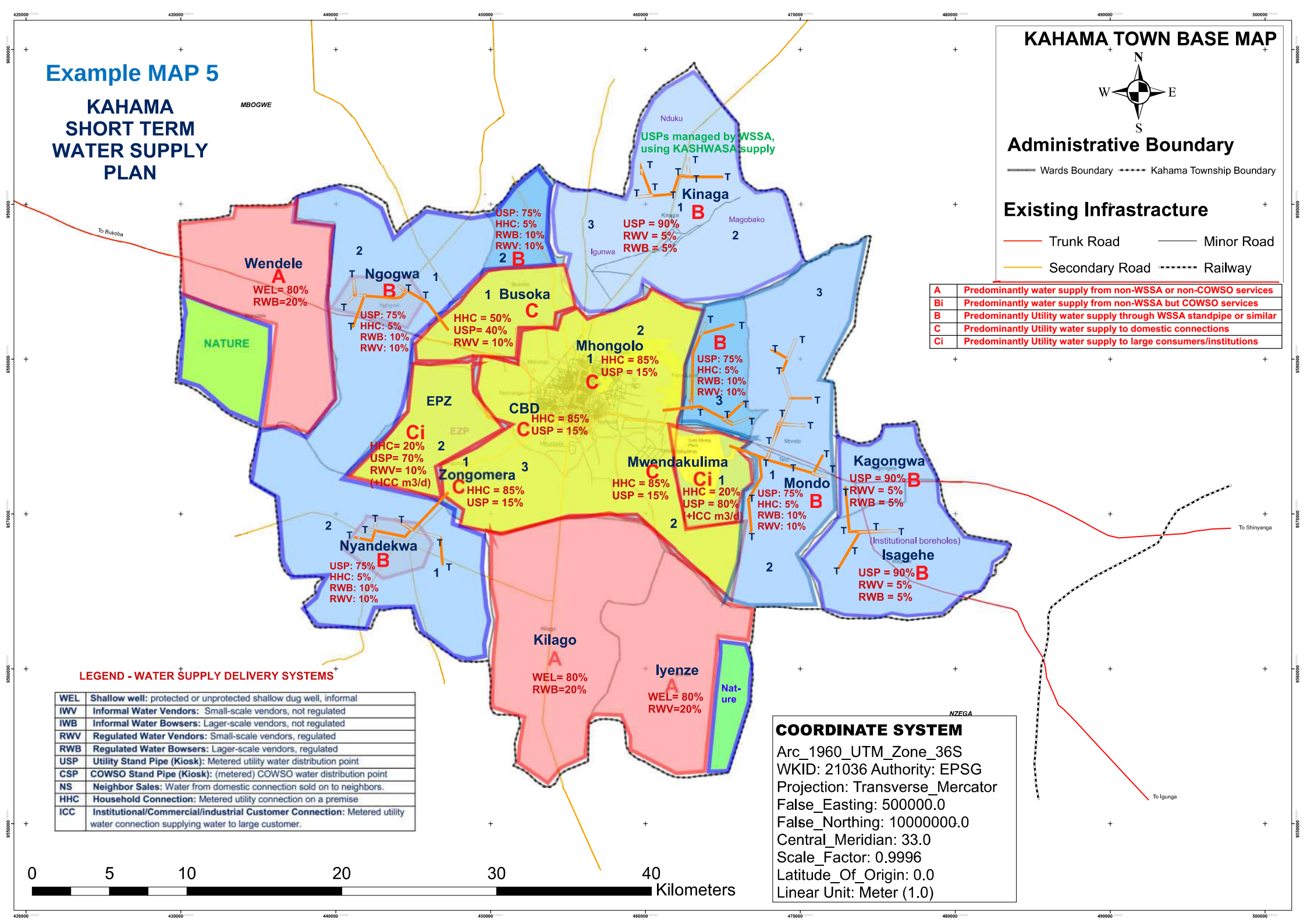
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
Kagongwa
C
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
B 2
EPT = 10%
PIT = 90%
Isagehe
C
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
2
EPT = 10%
PIT = 90%
B
1
Nyandekwa
C
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
Kilago
C
PIT: 5%
EPT: 25%
CSF: 10%
SEP: 60%
Iyenze
B
EPT = 10%
PIT = 90%
NAT-URE
LEGEND - SANITATION CONTAINMENT SYSTEMS
PIT Dry Pits: (Unlined) pits from which matured dry sludge is removed at neighborhood level.
EPT Emptiable Pits: (lined) pits which can be emptied by manual tool (Gulper) of Vacuum truck.
CSF Communal Sanitation Facility: Communal system from which partially treated fecal sludge, wastewater and effluent are evacuated
SEP Septic tanks contain and partly treat waste of excremental nature and wastewater from bathroom, kitchen, laundry.
SEW Sewer connections: pipes evacuating liquid waste from flushed toilets, and grey water from kitchen, bathroom and laundry washing
OPN Open Defecation
0 5 10 20 30 40
Kilometers
COORDINATE SYSTEM
Arc_1960_UTM_Zone_36S
WKID: 21036 Authority: EPSG
Projection: Transverse_Mercator
False_Easting: 500000.0
False_Northing: 10000000.0
Central_Meridian: 33.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear Unit: Meter (1.0)


Example MAP 5
KAHAMA SHORT TERM WATER SUPPLY PLAN
KAHAMA TOWN BASE MAP
N
W
E
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Administrative Boundary
Wards Boundary
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Existing Infrastracture
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MBOGWE
To Bukoba
Nduku
USPs managed by WSSA, using KASHWASA supply
Kinaga
B
USP = 90%
RWV = 5%
RWB = 5%
Magobako
Igunwa
USP: 75%
HHC: 5%
RWB: 10%
RWV: 10%
Wendele
A
WEL= 80%
RWB=20%
NATURE
Ngogwa
B
USP: 75%
HHC: 5%
RWB: 10%
RWV: 10%
Busoka
C
HHC = 50%
USP= 40%
RWV = 10%
Mhongolo
C
HHC = 85%
USP = 15%
EPZ
Ci
HHC= 20%
USP= 70%
RWV= 10%
(+ICC m3/d)
CBD
C
HHC = 85%
USP = 15%
Zongomera
C
HHC = 85%
USP = 15%
Mwendakulima
C
HHC = 85%
USP = 15%
Ci
HHC = 20%
USP = 80%
+ICC m3/d
Mondo
B
USP: 75%
HHC: 5%
RWB: 10%
RWV: 10%
Kagongwa
B
USP = 90%
RWV = 5%
RWB = 5%
(Institutional boreholes)
Isagehe
B
USP = 90%
RWV = 5%
RWB = 5%
Nyandekwa
B
USP: 75%
HHC: 5%
RWB: 10%
RWV: 10%
Kilago
A
WEL= 80%
RWB=20%
Iyenze
A
WEL= 80%
RWV=20%
Nat-ure
NZEGA
To Shinyanga
To Igunga
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COORDINATE SYSTEM
Arc_1960_UTM_Zone_36S
WKID: 21036 Authority: EPSG
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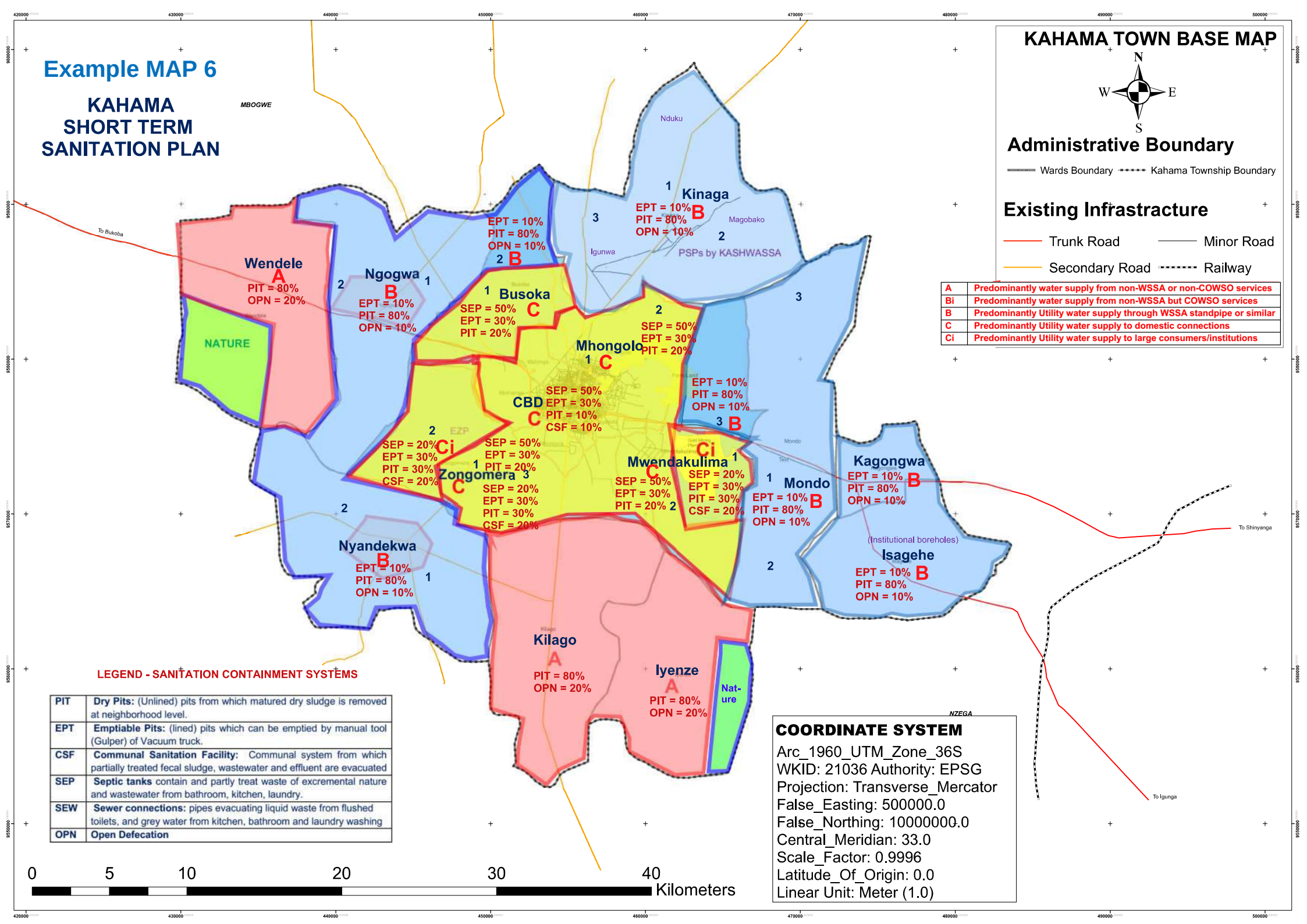
False_Northing: 10000000.0
Central_Meridian: 33.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear Unit: Meter (1.0)
0
5
10
20
30
40
Kilometers


Example MAP 6
KAHAMA
SHORT TERM
SANITATION PLAN
KAHAMA TOWN BASE MAP
N
W
E
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Administrative Boundary
Wards Boundary
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MBOGWE
To Bukoba
Nduku
Kinaga
EPT = 10%
PIT = 80%
OPN = 10%
B
Magobako
Igunwa
PSPs by KASHWASSA
Wendele
A
PIT = 80%
OPN = 20%
NATURE
Ngogwa
B
EPT = 10%
PIT = 80%
OPN = 10%
Busoka
C
SEP = 50%
EPT = 30%
PIT = 20%
Mhongolo
C
SEP = 50%
EPT = 30%
PIT = 20%
CBD
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SEP = 50%
EPT = 30%
PIT = 10%
CSF = 10%
EZP
Ci
SEP = 20%
EPT = 30%
PIT = 30%
CSF = 20%
Zongomera
C
SEP = 50%
EPT = 30%
PIT = 20%
SEP = 20%
EPT = 30%
PIT = 30%
CSF = 20%
Mwendakulima
C
SEP = 50%
EPT = 30%
PIT = 20%
Ci
SEP = 20%
EPT = 30%
PIT = 30%
CSF = 20%
Mondo
EPT = 10%
PIT = 80%
OPN = 10%
B
Kagongwa
EPT = 10%
PIT = 80%
OPN = 10%
B
(Institutional boreholes)
Isagehe
EPT = 10%
PIT = 80%
OPN = 10%
B
Nyandekwa
B
EPT = 10%
PIT = 80%
OPN = 10%
Kilago
A
PIT = 80%
OPN = 20%
Iyenze
A
PIT = 80%
OPN = 20%
Nat-
ure
NZEGA
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LEGEND - SANITATION CONTAINMENT SYSTEMS
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OPN Open Defecation
0 5 10 20 30 40
Kilometers
COORDINATE SYSTEM
Arc_1960_UTM_Zone_36S
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False_Northing: 10000000.0
Central_Meridian: 33.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear Unit: Meter (1.0)

APPENDIX 2 - EXAMPLE CALCULATION TABLES (TABs)

TABLE 1 - INDICATIVE POPULATION FIGURES — **TOWN NAME**

Populations for Current, Short-term and Long-term years

S/N	Ward Name	Mtaa name	land use	Pop.Year:	Area	Density	Current	Short-term	Long-term
		(if applicable)	predominant	2012	[km2]	[p/km2]	Pop.Year 2017	Pop.Year 2020	Pop.Year 2027
1	MAJENGO		CBD	15,950	8.0	3,438	19,127	21,330	27,507
2	NYASUBI		CBD	19,911	12.7	2,709	23,877	26,627	34,338
3	NYIHOGO		CBD	13,709	10.8	2,198	16,440	18,333	23,642
4	NYAHANGA		CBD	15,772	10.8	2,514	18,914	21,092	27,200
5	KAHAMA MJINI		CBD	6,626	6.3	1,807	7,946	8,861	11,427
6	MALUNGA		CBD	10,085	19.1	913	12,094	13,487	17,392
7	MWENDAKULIMA		CBD	13,583	67.2	349	16,289	18,165	23,425
8	BUSOKA		Residential	5,292	22.9	398	6,346	7,077	9,126
9	MHUNGULA		CBD	10,415	16.1	1,118	12,490	13,928	17,961
10	ZONGOMERA		Res	10,262	78.7	225	12,306	13,723	17,698
11	MHONGOLO		Res	15,379	48.0	552	18,443	20,566	26,522
12	NYANDEKWA		ScatSet + Agric	11,621	119.1	168	13,936	15,541	20,041
13	NGOGWA		ScatSet + Agric	8,312	124.6	115	9,968	11,116	14,335
14	WENDELE		ScatSet+Nat	7,528	283.5	46	9,028	10,067	12,983
15	KINAGA		ScatSet+Agr+Gra	14,730	174.2	146	17,664	19,698	25,403
16	ISAGEHE		Res+Agric+Min	10,772	87.5	212	12,918	14,405	18,577
17	MONDO		Scat+Graz+Min	11,382	70.2	280	13,649	15,221	19,629
18	KAGONGWA		Res+Agric+Min	21,460	52.6	703	25,735	28,699	37,009
19	KILAGO		ScatSet + Agric	11,317	170.2	115	13,571	15,134	19,517
20	IYENZE		Res+Agric+Min+Na	7,932	132.8	103	9,512	10,607	13,679
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
	annual growth rate:		3.7	244,050	1,515	161	290,253	323,678	417,412
			%/yr	2012	km2	p/km2	2017	2020	2027

[%] annual growth rate: 3.7%

TABLE 2 - FORMAT FOR WATER CONSUMPTION RECORDS PER ZONE — **TOWN NAME**

DATA FROM WSSA: TOWN NAME

WATER CONSUMPTIONS BY ZONES

ZONE	AVERAGE PER MONTH Cons. (m3)	NOV.16 Cons. (m3)	DEC.16 Cons. (m3)	JAN.17 Cons. (m3)	WARDS
1	2,008	1,958	1,862	2,204	IZEHE, MAGA, BABAB
2	28,484	31,365	29,926	24,160	IZEHE
3	190,971	195,131	197,725	180,058	
4	3,206	2,353	3,908	3,357	
5	20,891	30,004	15,850	16,818	
6	5,981	6,493	6,451	5,000	
7	43,000	36,000	46,500	46,500	
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
TOTAL	294,541	303,304	302,222	278,097	

TABLE 3 - FORMAT FOR SANITATION RECORDS PER ZONE — **TOWN NAME**

DATA FROM WSSA: TOWN NAME

WASTEWATER/SLUDGE PER ZONE

ZONE	AVERAGE PER MONTH Volume (m3)	NOV.16 Vol. (m3)	DEC.16 Vol. (m3)	JAN.17 Vol. (m3)	WARDS
1					IZEHE, MAGA, BABAB
2					IZEHE
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
TOTAL	-	-	-	-	

TABLE 4 - CURRENT PREDOMINANT WATER SUPPLY SYSTEMS 2017

TOWN NAME

Split WARDS into SUB-WARDS by maximum appearance in current-short-longter

S/N	Ward Name	sub	land use	econ.	2017	WS Cat	WSSA BILLED WATER SUPPLY					INFORMAL				VOLUMES		
		#	predominant	status	Ward Pop.	ZONE	HHC %	USP %	RWV %	RWB %	NS %	IWV %	IWB %	WEL %	CSP %	BILLED m3/mth	NOT m3/mth	TOTAL m3/mth
1	MAJENGO		CBD		19,127	C	80%	15%			5%					30,986	-	30,986
2	NYASUBI		CBD		23,877	C	80%	15%			5%					38,681	-	38,681
3	NYIHOGO		CBD		16,440	C	80%	15%			5%					26,633	-	26,633
4	NYAHANGA		CBD		18,914	C	80%	15%			5%					30,640	-	30,640
5	KAHAMA MJINI		CBD		7,946	C	80%	15%			5%					12,872	-	12,872
6	MALUNGA		CBD		12,094	C	80%	15%			5%					19,592	-	19,592
7	MWENDAKULIMA	1	Res+Indus/Min		8,144	Ci	80%	15%			5%					6,597	-	6,597
7	MWENDAKULIMA	2	Res+Agric+Min		4,887	A						10%		90%		-	1,319	1,319
7	MWENDAKULIMA	3	Res+Agric		3,258	A								70%	30%	-	586	586
8	BUSOKA	1	Residential	LIA	2,538	B		100%								914	-	914
8	BUSOKA	2	Res+Agric	LIA	3,808	A						10%		90%		-	2,056	2,056
9	MHUNGULA		CBD		12,490	C	80%	15%			5%					20,233	-	20,233
10	ZONGOMERA	1	CBD		6,153	C	80%	15%			5%					4,984	-	4,984
10	ZONGOMERA	2	Res+EPZ		3,692	A						10%		90%		-	997	997
10	ZONGOMERA	3	Res+Agric	LIA	2,461	A						10%		90%		-	443	443
11	MHONGOLO	1	CDB		12,910	C	80%	15%			5%					14,640	-	14,640
11	MHONGOLO	2	Res+Agric	LIA	5,533	A								70%	30%	-	1,494	1,494
12	NYANDEKWA	1	ScatSet + Agric		8,362	A						10%		90%		-	4,515	4,515
12	NYANDEKWA	2	ScatSet + Agric		5,574	A						10%		90%		-	2,007	2,007
13	NGOGWA	1	ScatSet + Agric		3,987	A						10%		90%		-	1,435	1,435
13	NGOGWA	2	ScatSet + Agric		5,981	A						10%		90%		-	3,230	3,230
14	WENDELE		ScatSet+Nat		9,028	A						10%		90%		-	8,125	8,125
15	KINAGA	1	ScatSet+Agr+Gra		10,599	Bi						15%	5%		80%	-	6,009	6,009
15	KINAGA	2	Res+Agric+Min		3,533	Bi						15%	5%		80%	-	668	668
15	KINAGA	3	Scat+Graz+Min		3,533	Bi						15%	5%		80%	-	668	668
16	ISAGEHE		Res+Agric+Min		12,918	Bi						15%	5%		80%	-	12,207	12,207
17	MONDO	1	Scat+Graz+Min		8,190	A								70%	30%	-	4,422	4,422
17	MONDO	2	Res+Agric+Min		1,365	A								70%	30%	-	123	123
17	MONDO	3	Res+Agric		4,095	A								70%	30%	-	1,106	1,106
18	KAGONGWA		Res+Agric+Min		25,735	Bi						15%	5%		80%	-	24,320	24,320
19	KILAGO		ScatSet + Agric		13,571	A						10%		90%		-	12,214	12,214
20	IYENZE		Res+Agric+Min+Nat		9,512	A						10%		90%		-	8,561	8,561
																-	-	-
																-	-	-
																-	-	-
																-	-	-
																-	-	-
																-	-	-
																-	-	-
																-	-	-
	growth rate:		3.7		290,253	WS Cat	HHC	USP	RWV	RWB	NS	IWV	IWB	WEL	CSP	206,773	96,505	303,279
			%/yr		current pop	ZONE	60	30	30	60	30	30	60	30	30	m3/mth	m3/mth	m3/mth

TABLE 5 - CURRENT SANITATION CONTAINMENT 2017

Calculation of estimated Faecal Sludge and Wastewater volu

TOWN NAME

EMPTIER TRUCKS

S/N	Ward Name	sub	land use	econ.	2017	WS Cat	in-situ	FS & WW to be safely processed by WSSA				X	FS	WW	COLLECTED
		#	predominant	status	Ward Pop.	ZONE	PIT %	EPT %	CSF %	SEP %	SEW %	OPN %	WSSA removed m3/d	WW truck collected m3/d	WW+FS MIX m3/d
1	MAJENGO		CBD		19,127	C	50%	10%	10%	30%			1.57	17.29	18.87
2	NYASUBI		CBD		23,877	C	50%	10%	10%	30%			1.96	21.59	23.55
3	NYIHOGO		CBD		16,440	C	50%	10%	10%	30%			1.35	14.86	16.21
4	NYAHANGA		CBD		18,914	C	50%	10%	10%	30%			1.55	17.10	18.65
5	KAHAMA MJINI		CBD		7,946	C	50%	10%	10%	30%			0.65	7.18	7.84
6	MALUNGA		CBD		12,094	C	50%	10%	10%	30%			0.99	10.93	11.93
7	MWENDAKULIMA	1	Res+Indus/Min		8,144	Ci	50%	10%	10%	30%			0.33	3.68	4.02
7	MWENDAKULIMA	2	Res+Agric+Min		4,887	A	60%					40%	-	-	-
7	MWENDAKULIMA	3	Res+Agric		3,258	A	60%					40%	-	-	-
8	BUSOKA	1	Residential	LIA	2,538	B	70%	10%				20%	0.02	0.03	0.05
8	BUSOKA	2	Res+Agric	LIA	3,808	A	60%					40%	-	-	-
9	MHUNGULA		CBD		12,490	C	50%	10%	10%	30%			1.03	11.29	12.32
10	ZONGOMERA	1	CBD		6,153	C	50%	10%	10%	30%			0.25	2.78	3.03
10	ZONGOMERA	2	Res+EPZ		3,692	A	60%					40%	-	-	-
10	ZONGOMERA	3	Res+Agric	LIA	2,461	A	60%					40%	-	-	-
11	MHONGOLO	1	CDB		12,910	C	50%	10%	10%	30%			0.74	8.17	8.91
11	MHONGOLO	2	Res+Agric	LIA	5,533	A	60%					40%	-	-	-
12	NYANDEKWA	1	ScatSet + Agric		8,362	A	60%					40%	-	-	-
12	NYANDEKWA	2	ScatSet + Agric		5,574	A	60%					40%	-	-	-
13	NGOGWA	1	ScatSet + Agric		3,987	A	60%					40%	-	-	-
13	NGOGWA	2	ScatSet + Agric		5,981	A	60%					40%	-	-	-
14	WENDELE		ScatSet+Nat		9,028	A	60%					40%	-	-	-
15	KINAGA	1	ScatSet+Agr+Gra		10,599	Bi	80%	5%				15%	0.05	0.10	0.15
15	KINAGA	2	Res+Agric+Min		3,533	Bi	80%	5%				15%	0.01	0.01	0.02
15	KINAGA	3	Scat+Graz+Min		3,533	Bi	80%	5%				15%	0.01	0.01	0.02
16	ISAGEHE		Res+Agric+Min		12,918	Bi	80%	5%				15%	0.11	0.20	0.30
17	MONDO	1	Scat+Graz+Min		8,190	A	60%					40%	-	-	-
17	MONDO	2	Res+Agric+Min		1,365	A	60%					40%	-	-	-
17	MONDO	3	Res+Agric		4,095	A	60%					40%	-	-	-
18	KAGONGWA		Res+Agric+Min		25,735	Bi	60%					40%	-	-	-
19	KILAGO		ScatSet + Agric		13,571	A	60%					40%	-	-	-
20	IYENZE		Res+Agric+Min+N		9,512	A	60%					40%	-	-	-
													-	-	-
													-	-	-
													-	-	-
													-	-	-
													-	-	-
													-	-	-
													-	-	-
													-	-	-
	growth rate:		3.7		290,253		PIT	EPT	CSF	SEP	SEW	OPN	11	115	126
			%/yr		current pop	[*1000]	131	14	13	38	-	37		m3/d (collected)	
						% town	65%	5%	4%	13%	0%	13%			

TABLE 6 - LONG TERM WATER SUPPLY SYSTEMS PLANNED

TOWN NAME

VOLUMES

Calculation of estmated Water Supply Consumption (Lo

WSSA BILLED WATER SUPPLY | INFORMAL | [m3/mth]

S/N	Ward Name	sub	land use	2027	WS Cat	HHC	USP	RWV	RWB	NS	IWV	IWB	WEL	CSP	BILLED	NOT	TOTAL
		#	predominant	Ward Pop.	ZONE	%	%	%	%	%	%	%	%	%	m3/mth	m3/mth	m3/mth
1	MAJENGO		Res	27,507	C	95%	5%								56,320	-	56,320
2	NYASUBI		Res	34,338	C	95%	5%								70,307	-	70,307
3	NYIHOGO		Res	23,642	C	95%	5%								48,407	-	48,407
4	NYAHANGA		Res	27,200	C	95%	5%								55,692	-	55,692
5	KAHAMA MJINI		Res	11,427	C	95%	5%								23,397	-	23,397
6	MALUNGA		Res	17,392	C	95%	5%								35,611	-	35,611
7	MWENDAKULIMA	1	Res+Indus	11,712	Ci	80%	20%								11,068	-	11,068
7	MWENDAKULIMA	2	Res	7,027	C	50%	50%								3,320	-	3,320
7	MWENDAKULIMA	3	Res+Agric	4,685	C	80%	20%								1,771	-	1,771
8	BUSOKA	1	Res	5,476	C	80%	20%								6,210	-	6,210
8	BUSOKA	2	Res+Agric	3,651	B	20%	75%						5%		1,763	77	1,840
9	MHUNGULA		Res	17,961	C	95%	5%								36,776	-	36,776
10	ZONGOMERA	1	Res	8,849	C	95%	5%								9,059	-	9,059
10	ZONGOMERA	2	Res+Indus	5,309	Ci	95%	5%								3,261	-	3,261
10	ZONGOMERA	3	Res+Agric	3,540	C	40%	60%								1,041	-	1,041
11	MHONGOLO	1	Res	21,218	C	95%	5%								34,755	-	34,755
11	MHONGOLO	2	Res+Agric	5,304	C	80%	20%								2,005	-	2,005
12	NYANDEKWA	1	Res	16,033	C	80%	20%								24,242	-	24,242
12	NYANDEKWA	2	Res	4,008	B	10%	50%			4%			36%		623	303	926
13	NGOGWA	1	Res	8,601	C	80%	20%								9,753	-	9,753
13	NGOGWA	2	Res	5,734	B	10%	40%			5%			45%		1,565	1,084	2,649
14	WENDELE		Res	12,983	B		30%	40%					30%		9,542	4,090	13,632
15	KINAGA	1	Res+Agric	17,782	C	80%	20%								23,526	-	23,526
15	KINAGA	2	Res	3,810	B	10%	50%	6%		4%			30%		480	180	660
15	KINAGA	3	Res	3,810	B	20%	75%						5%		690	30	720
16	ISAGEHE		Res	18,577	C	80%	20%								35,111	-	35,111
17	MONDO	1	Res	13,740	C	80%	20%								18,178	-	18,178
17	MONDO	2	Res	1,963	B	10%	80%						10%		206	21	227
17	MONDO	3	Res	3,926	B	20%	75%						5%		948	41	989
18	KAGONGWA		Res	37,009	C	80%	20%								69,948	-	69,948
19	KILAGO		Res	19,517	C	80%	20%								36,887	-	36,887
20	IYENZE		Res	13,679	B		30%	40%					30%		10,054	4,309	14,363
															-	-	-
															-	-	-
															-	-	-
															-	-	-
															-	-	-
															-	-	-
															-	-	-
															-	-	-
															-	-	-
	growth rate:		3.7	417,412	WS Cat	HHC	USP	RWV	RWB	NS	IWV	IWB	WEL	CSP	642,517	10,134	652,651
			%/yr	long-term pop.	ZONE	70	35	35	70	35	35	70	35	35	m3/mth	m3/mth	m3/mth

TABLE 7 - LONG-TERM SANITATION CONTAINMI 2027

TOWN NAME

EMPTIER TRUCKS

Calculation of estimated Faecal Sludge and Wastewater volumes (Long-T

in-situ | FS & WW to be safely processed by WSSA | X

S/N	Ward Name	sub	land use	2027	WS Cat	PIT	EPT	CSF	SEP	SEW	OPN	FS	WW	COLLEC-TED
		#	predominant	Ward Pop.	ZONE	%	%	%	%	%	%	WSSA removed	WW truck collected	WW+FS MIX
												m3/d	m3/d	m3/d
1	MAJENGO		Res	27,507	C		25%	15%	60%			4.52	47.15	51.68
2	NYASUBI		Res	34,338	C		25%	15%	60%			5.64	58.87	64.51
3	NYIHOGO		Res	23,642	C		25%	15%	60%			3.89	40.53	44.42
4	NYAHANGA		Res	27,200	C		25%	15%	60%			4.47	46.63	51.10
5	KAHAMA MJINI		Res	11,427	C		25%	15%	60%			1.88	19.59	21.47
6	MALUNGA		Res	17,392	C		25%	15%	60%			2.86	29.82	32.67
7	MWENDAKULIMA	1	Res+Indus	11,712	Ci		25%	15%	60%			0.96	10.04	11.00
7	MWENDAKULIMA	2	Res	7,027	C		30%	20%	50%			0.35	3.42	3.76
7	MWENDAKULIMA	3	Res+Agric	4,685	C	5%	25%	10%	60%			0.15	1.50	1.65
8	BUSOKA	1	Res	5,476	C	5%	25%	10%	60%			0.51	5.27	5.79
8	BUSOKA	2	Res+Agric	3,651	B	90%	10%					0.02	0.04	0.07
9	MHUNGULA		Res	17,961	C		25%	15%	60%			2.95	30.79	33.74
10	ZONGOMERA	1	Res	8,849	C		25%	15%	60%			0.73	7.58	8.31
10	ZONGOMERA	2	Res+Indus	5,309	Ci		25%	15%	60%			0.26	2.73	2.99
10	ZONGOMERA	3	Res+Agric	3,540	C		25%	15%	60%			0.12	1.21	1.33
11	MHONGOLO	1	Res	21,218	C		25%	15%	60%			2.79	29.10	31.89
11	MHONGOLO	2	Res+Agric	5,304	C	5%	25%	10%	60%			0.17	1.70	1.87
12	NYANDEKWA	1	Res	16,033	C	5%	25%	10%	60%			2.00	20.59	22.59
12	NYANDEKWA	2	Res	4,008	B	90%	10%					0.01	0.02	0.04
13	NGOGWA	1	Res	8,601	C	5%	25%	10%	60%			0.81	8.28	9.09
13	NGOGWA	2	Res	5,734	B	90%	10%					0.04	0.07	0.11
14	WENDELE		Res	12,983	B	90%	10%					0.21	0.40	0.61
15	KINAGA	1	Res+Agric	17,782	C	5%	25%	10%	60%			1.94	19.98	21.92
15	KINAGA	2	Res	3,810	B	90%	10%					0.01	0.02	0.03
15	KINAGA	3	Res	3,810	B	90%	10%					0.01	0.02	0.03
16	ISAGEHE		Res	18,577	C	5%	25%	10%	60%			2.90	29.82	32.72
17	MONDO	1	Res	13,740	C	5%	25%	10%	60%			1.50	15.44	16.94
17	MONDO	2	Res	1,963	B	90%	10%					0.00	0.01	0.01
17	MONDO	3	Res	3,926	B	90%	10%					0.01	0.02	0.04
18	KAGONGWA		Res	37,009	C	5%	25%	10%	60%			5.78	59.40	65.18
19	KILAGO		Res	19,517	C	5%	25%	10%	60%			3.05	31.33	34.37
20	IYENZE		Res	13,679	B	90%	10%					0.22	0.42	0.64
												-	-	-
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												-	-	-
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												-	-	-
												-	-	-
	growth rate:		3.7	417,412		PIT	EPT	CSF	SEP	SEW	OPN	51	522	573
			%/yr	long-term po	Pers*1000	36	81	41	187	-	-	m3/day (be collected by truck)	m3/d (ww collected by truck)	m3/d (mix collected by truck)
					% of Town	26%	19%	10%	45%	0%	0%			

LE 8 - SHORT-TERM WATER SUPPLY SYS | YEAR: 2020

TOWN NAME | SHORT TERM

Calculation of estimated Water Supply Consumption vol

Ward Name	sub	land use	2020	WS Cat.	WSSA BILLED WATER SUPPLY					INFORMAL				[m3/mth]		
					HHC	USP	RWV	RWB	NS	IWV	IWB	WEL	CSP	BILLED	NOT	TOTAL
	#	predominant	Ward Pop.	ZONE	%	%	%	%	%	%	%	%	%	m3/mth	m3/mth	m3/mth
MAJENGO		Res	21,330	C	85%	15%								38,474	-	38,474
NYASUBI		Res	26,627	C	85%	15%								48,029	-	48,029
NYIHOGO		Res	18,333	C	85%	15%								33,068	-	33,068
NYAHANGA		Res	21,092	C	85%	15%								38,045	-	38,045
KAHAMA MJINI		Res	8,861	C	85%	15%								15,983	-	15,983
MALUNGA		Res	13,487	C	85%	15%								24,327	-	24,327
MWENDAKULIMA	1	Res+Indus/M	9,082	Ci	20%	80%								5,313	-	5,313
MWENDAKULIMA	2	Res	5,449	C	85%	15%								2,949	-	2,949
MWENDAKULIMA	3	Res+Agric	3,633	B	5%	75%	10%	10%						815	-	815
BUSOKA	1	Res	4,246	C	50%	40%	10%							3,726	-	3,726
BUSOKA	2	Res+Agric	2,831	B	5%	75%	10%	10%						1,270	-	1,270
MHUNGULA		Res	13,928	C	85%	15%								25,123	-	25,123
ZONGOMERA	1	CDB	6,862	C	85%	15%								6,188	-	6,188
ZONGOMERA	2	Indus EPZ	686	Ci	20%	70%	10%							40	-	40
ZONGOMERA	3	Res+Agric	6,176	C	85%	15%								5,013	-	5,013
MHONGOLO	1	Res	16,453	C	85%	15%								23,742	-	23,742
MHONGOLO	2	Res	4,113	C	85%	15%								1,484	-	1,484
NYANDEKWA	1	Res	10,879	B	5%	75%	10%	10%						8,538	-	8,538
NYANDEKWA	2	Res	4,662	B	5%	75%	10%	10%						1,568	-	1,568
NGOGWA	1	Res	5,558	B	5%	75%	10%	10%						3,116	-	3,116
NGOGWA	2	Res	5,558	B	5%	75%	10%	10%						3,116	-	3,116
WENDELE		Res	10,067	A				20%				80%		3,926	7,852	11,779
KINAGA	1	Res	13,789	B		90%	5%	5%						9,881	-	9,881
KINAGA	2	Res	2,955	B		90%	5%	5%						454	-	454
KINAGA	3	Res	2,955	B		90%	5%	5%						454	-	454
ISAGEHE		Res	14,405	B		90%	5%	5%						14,748	-	14,748
MONDO	1	Res	9,894	B	5%	75%	10%	10%						7,211	-	7,211
MONDO	2	Res	1,522	B	5%	75%	10%	10%						171	-	171
MONDO	3	Res	3,805	B	5%	75%	10%	10%						1,067	-	1,067
KAGONGWA		Res	28,699	B		90%	5%	5%						29,380	-	29,380
KILAGO		Res	15,134	A				20%				80%		5,902	11,805	17,707
IYENZE		Res	10,607	A				20%				80%		4,137	8,274	12,411
														-	-	-
														-	-	-
														-	-	-
														-	-	-
														-	-	-
														-	-	-
														-	-	-
														-	-	-
														-	-	-
growth rate:		3.7	323,678	WS Cat	HHC	USP	RWV	RWB	NS	IWV	IWB	WEL	CSP	367,255	27,931	395,186
		%/yr	short-term pop	ZONE	65	33	33	65	33	33	65	33	33	m3/mth	m3/mth	m3/mth

TABLE 9 - SHORT-TERM SANITATION CONTAINMENT

TOWN NAME | EMPTIER TRUCKS

Calculation of estimated Faecal Sludge and Wastewater volumes (Short-Term)

S/N	Ward Name	sub	land use	2020	WS Cat.	in-situ	FS & WW to be safely processed by WSSA				X	FS	WW	COLLEC-TED
		#	predominant	Ward Pop.	ZONE	PIT	EPT	CSF	SEP	SEW	OPN	WSSA removed	WW truck collected	WW+FS MIX
						%	%	%	%	%	%	m3/d	m3/d	m3/d
1	MAJENGO		Res	21,330	C	10%	30%	10%	50%			3.16	29.90	33.06
2	NYASUBI		Res	26,627	C	10%	30%	10%	50%			3.94	37.33	41.27
3	NYIHOGO		Res	18,333	C	10%	30%	10%	50%			2.71	25.70	28.41
4	NYAHANGA		Res	21,092	C	10%	30%	10%	50%			3.12	29.57	32.69
5	KAHAMA MJINI		Res	8,861	C	10%	30%	10%	50%			1.31	12.42	13.73
6	MALUNGA		Res	13,487	C	10%	30%	10%	50%			2.00	18.91	20.90
7	MWENDAKULIMA	1	Res+Indus/Min	9,082	Ci	30%	30%	20%	20%			0.52	4.38	4.91
7	MWENDAKULIMA	2	Res	5,449	C	20%	30%		50%			0.21	1.93	2.15
7	MWENDAKULIMA	3	Res+Agric	3,633	B	80%	10%				10%	0.01	0.02	0.03
8	BUSOKA	1	Res	4,246	C	20%	30%		50%			0.34	3.02	3.35
8	BUSOKA	2	Res+Agric	2,831	B	80%	10%				10%	0.02	0.03	0.05
9	MHUNGULA		Res	13,928	C	10%	30%	10%	50%			2.06	19.53	21.59
10	ZONGOMERA	1	CDB	6,862	C	20%	30%		50%			0.45	4.06	4.51
10	ZONGOMERA	2	Indus EPZ	686	Ci	30%	30%	20%	20%			0.00	0.03	0.04
10	ZONGOMERA	3	Res+Agric	6,176	C	30%	30%	20%	20%			0.32	2.68	3.00
11	MHONGOLO	1	Res	16,453	C	20%	30%		50%			1.73	15.58	17.31
11	MHONGOLO	2	Res	4,113	C	20%	30%		50%			0.11	0.97	1.08
12	NYANDEKWA	1	Res	10,879	B	80%	10%				10%	0.13	0.23	0.36
12	NYANDEKWA	2	Res	4,662	B	80%	10%				10%	0.02	0.04	0.07
13	NGOGWA	1	Res	5,558	B	80%	10%				10%	0.05	0.08	0.13
13	NGOGWA	2	Res	5,558	B	80%	10%				10%	0.05	0.08	0.13
14	WENDELE		Res	10,067	A	80%					20%	-	-	-
15	KINAGA	1	Res	13,789	B	80%	10%				10%	0.16	0.29	0.45
15	KINAGA	2	Res	2,955	B	80%	10%				10%	0.01	0.01	0.02
15	KINAGA	3	Res	2,955	B	80%	10%				10%	0.01	0.01	0.02
16	ISAGEHE		Res	14,405	B	80%					20%	-	-	-
17	MONDO	1	Res	9,894	B	80%	10%				10%	0.11	0.20	0.30
17	MONDO	2	Res	1,522	B	80%	10%				10%	0.00	0.00	0.01
17	MONDO	3	Res	3,805	B	80%	10%				10%	0.02	0.03	0.04
18	KAGONGWA		Res	28,699	B	80%					20%	-	-	-
19	KILAGO		Res	15,134	A	80%					20%	-	-	-
20	IYENZE		Res	10,607	A	80%					20%	-	-	-
												-	-	-
												-	-	-
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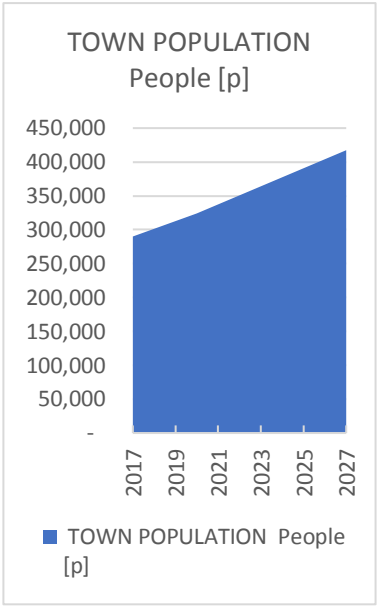
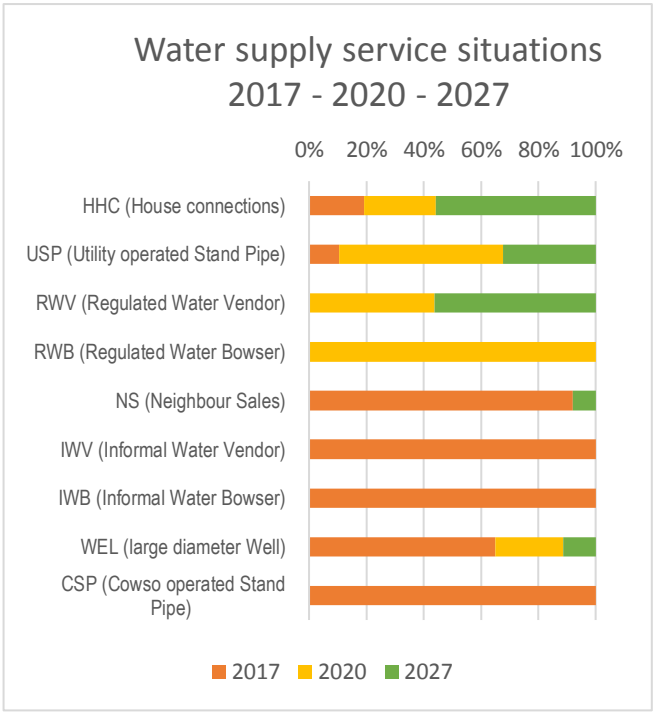
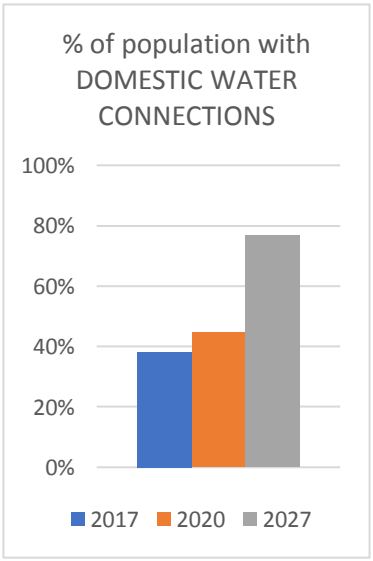
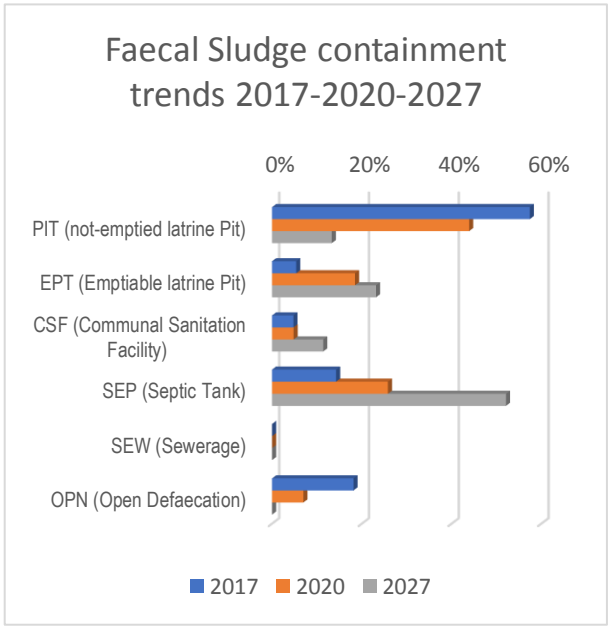
												-	-	-
												-	-	-
												-	-	-
												-	-	-
												-	-	-
												-	-	-
	growth rate:		3.7	323,678		PIT	EPT	CSF	SEP	SEW	OPN	23	207	230
			%/yr	short-term pop	Pers*100	110	49	14	74	-	19	m3/day (be collected by truck)	m3/d (ww collected by truck)	m3/d (mix collected by truck)
					% of Tow	52%	15%	4%	23%	0%	6%			

TABLE 10	TOWN NAME							
OVERVIEW OF WATER AND SANITATION DEVELOPMENT			PLANNING YEARS			IN PERCENTAGES [%]		
GROUP	ITEM	UNIT	2017	2020	2027	2017	2020	2027
BASIC WARD DATA	WARDS	number	20	20	20			
	TOWN POPULATION	People [p]	290,253	323,678	417,412	100%	112%	144%
	TOWN SURFACE AREA	[km2]	1,515	1,515	1,515			
	POPULATION DENSITY	[p/km2]	192	214	276	100%	112%	144%
			2017	2020	2027	2017	2020	2027
WATER SUPPLY DELIVERY SYSTEMS	HHC (House connections)	Nr. People	110,476	144,798	320,610	38%	45%	77%
	USP (Utility operated Stand Pipe)	Nr. People	23,253	126,630	71,379	8%	39%	17%
	RWV (Regulated Water Vendor)	Nr. People	-	8,467	10,893	0%	3%	3%
	RWB (Regulated Water Bowser)	Nr. People	-	15,136	-	0%	5%	0%
	NS (Neighbour Sales)	Nr. People	6,905	-	599	2%	0%	0%
	IWV (Informal Water Vendor)	Nr. People	15,534	-	-	5%	0%	0%
	IWB (Informal Water Bowser)	Nr. People	2,816	-	-	1%	0%	0%
	WEL (large diameter Well)	Nr. People	79,484	28,647	13,931	27%	9%	3%
	CSP (Cowso operated Stand Pipe)	Nr. People	51,786	-	-	18%	0%	0%
			2017	2020	2027	2017	2020	2027
MONTHLY WATER SUPPLY VOLUMES	Industries (billed)	m3/mth	40,000	100,000	120,000	13%	17%	13%
	Institutions (billed)	m3/mth	-	40,000	90,000	0%	7%	9%
	Commerce (billed)	m3/mth	60,000	80,000	100,000	20%	14%	10%
	Domestic (billed)	m3/mth	206,773	367,255	642,517	67%	63%	67%
	Total BILLED	m3/mth	306,773	587,255	952,517	69%	91%	99%
	Total NOT billed	m3/mth	136,505	57,931	10,134	31%	9%	1%
	TOTAL consumption	m3/mth	443,279	645,186	962,651	100%	100%	100%
			2017	2020	2027	2017	2020	2027
SANITATION CONTAIN-MENT SYSTEMS	PIT (not-emptied latrine Pit)	Nr. People	166,713	142,136	55,544	57%	44%	13%
	EPT (Emptiable latrine Pit)	Nr. People	15,593	59,822	96,670	5%	18%	23%
	CSF (Communal Sanitation Facility)	Nr. People	13,810	15,555	47,592	5%	5%	11%
	SEP (Septic Tank)	Nr. People	41,429	83,580	217,606	14%	26%	52%
	SEW (Sewerage)	Nr. People	-	-	-	0%	0%	0%
	OPN (Open Defaecation)	Nr. People	52,710	22,587	-	18%	7%	0%
			2,017.00	2,020.00	2,027.00	2017	2020	2027
MONTHLY SLUDGE AND WASTE-WATER VOLUMES	Faecal Sludge of OD practice	m3/mth	6.1	3.2	-	16%	7%	0%
	Not-collected Faecal Sludge	m3/mth	21.6	18.0	5.9	56%	41%	10%
	Collected FS (Faecal Sludge)	m3/mth	10.6	22.5	50.8	28%	52%	90%
	Total FS produced in town	m3/mth	38.3	43.7	56.7	100%	100%	100%
	WW (Waste Water) produced	m3/mth	5,094	7,685	13,877	100%	100%	100%
	WW collected by truck	m3/mth	115	207	528	2%	3%	4%
	WW evacuated by sewer	m3/mth	-	-	-	0%	0%	0%
	Effluent soaking-away into ground	m3/mth	4,978	7,478	13,349	98%	97%	96%
			2017	2020	2027	2017	2020	2027









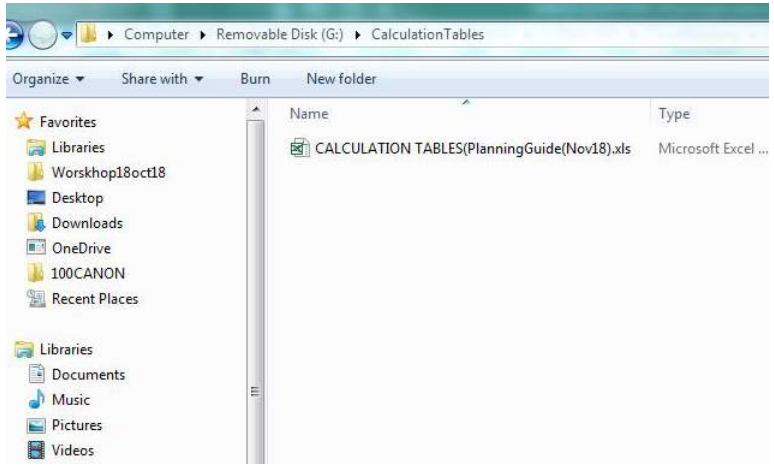
APPENDIX 3
BRIEF GUIDE TO USING THE QUANTIFICATION TABLES

The Joint Town-Level Planning Guide has a very useful calculation tool, based on Excel, which helps the calculation of indicative volumes of water supply, and volumes of faecal sludge and wastewater. Once the large paper-based maps have been converted into digital maps (e.g. using the "commenting" tool within the free PDF software Foxit Reader), including the markings of the indicative percentages of water supply types, respectively the sanitation facility types per Ward/Mtaa, these values can be transferred into the calculation tables that accompany the guide in electronic form.

The pre-programmed tables are doing most of the calculation work behind the screen, and with at least basic knowledge of Excel, the %-figures read from the maps ae easily typed into the white-coloured cells of the appropriate columns. All cells with formulas are protected, to prevent accidental deletion or corruption of the smart formulae,

OPEN THE EXCEL CALCULATION SHEETS

Open the blank calculation blank tables by (double-)clicking on the file name "Calculation Tables (Planning Guide)".



OPEN AND FILL THEWARD/MTAA DATA SHEET

Click on the tab "T1-WardData", which opens the template for entering the basic town data, by Ward or by Mtaa (depending on the detail once is able and willing to work).

U30

	A	B	D	E	F	H	J	K	L	P	Q	R
1	TABLE 1 - WARD STATISTICS - POPULATION AND AREA						KOROGWE TOWN			POPULATION DENSITIES		
2	Population data for Current + Short-term + Long-term yers				[%] annual growth rate	2.6%	Current	Short-term	Long-term	Current	Short-term	Long-term
3	Ward	Ward Name	Mtaa Name	land use	Pop.Year:	Area	Pop.Year	Pop.Year	Pop.Year	Pop.Year	Pop.Year	Pop.Year
4	Nr		(or sub-ward)	predominant	2016	[km2]	2018	2022	2036	2018	2022	2036
5	1	MGOMBEZI	Ngombezi	Agric+Res+Industr	4,694	33.3	4,941	5,476	7,843	185	205	293
6	1	MGOMBEZI	Mgambo	Agric+Res	495		521	577	827			
7	1	MGOMBEZI	Kitifu	Agric+Res	656		691	765	1,096			
8	2	MTONGA	Mtonga	CBD	6,521	14.3	6,865	7,607	10,896	835	925	1,325
9	2	MTONGA	Msambiazi	Res+Agric+Instit	3,116		3,280	3,635	5,206			
10	2	MTONGA	Kwamkole	Res+Agric	1,700		1,790	1,983	2,841			
11	3	MAGUNGA	Kwasemangube	CBD	2,476	4.3	2,606	2,888	4,137	1,671	1,852	2,652
12	3	MAGUNGA	Magunga	CBD+Instit	2,300		2,421	2,683	3,843			
13	3	MAGUNGA	Makwei	Agric+Res	2,050		2,158	2,391	3,425			
14	4	MASUGURU	Masuguru	CBD	1,922	4.2	2,023	2,242	3,211	898	995	1,425
15	4	MASUGURU	Zungnati	CBD	1,659		1,746	1,935	2,772			
16	5	KWAMNDOLWA	Mahenge	Agric+Res	1,351	37.0	1,422	1,576	2,257	160	178	255
17	5	KWAMNDOLWA	Kwamndolwa	Agric+Res+Instit	3,060		3,221	3,569	5,113			
18	5	KWAMNDOLWA	Kwameta	Agric+Res	1,230		1,295	1,435	2,055			

The table, once filled, will look like the one here above for Korogwe: in column B the Ward names are filled, and the Mtaa for each Ward in filled in Column C (otherwise r=simply repeat the name of the Ward). Column A shows the number assigned to the Ward, and the same number is repeated for all Mtaas in the same Ward.

It is important to fill the population data for each Mtaa (or Ward if not split into Mtaas) in the corresponding cells of column F, and in the heading the reference year for the population data used (in the example above it is the year 2016). In column E one may fill some land-use-characteristics for each Ward/Mtaa. In column H, the surface area for each Ward/Mtaa may be filled (for record purposes). Above the heading row of column H, there is a cell for entering the annual population growth rate (in %). The current, short-term and long-term years are filled in the white heading rows in columns J, K and L, and the same again in P, Q and R. The sheet now calculates the extrapolated population data for the subsequent planning years.

APPENDIX 4
BRIEF GUIDE TO USING FOXIT READER TO CREATE MAPS

The Joint Town-Level Planning Guide is very much relying on a mapped display of the town area, to guide the joint assessment and planning discussions and record the agreed situation parameters. The maps, possibly started as raw sketchy draft on a large A0/A1 size paper placed on pin-board or wall, shows the area boundaries (wards/mtaas), categorised urban zones, main roads and waterways, and most importantly the jointly agreed data reflecting the water supply and sanitation situations, as assessed currently, ad as planned in the long-term and short-term future. While the large paper-based maps will be very instrumental for leading the participatory discussion process, as visual supporting documentation inserted into the Town's Water Supply and Sanitation "Plan", the maps are best converted into digital maps.

Some utilities may have a dedicated GIS specialist in the team, many others, especially the smaller utilities, will not have easy access to relatively expensive GIS software and skills. Moreover, even if a utility has specialist GIS staff and the necessary software, the availability of such specialist staff throughout the joint planning process may be difficult to assure. It is therefore suggested, that the discussion sessions are guided by large printed maps, while the recorded conclusions and visually displayed using a simple mapping-tool coming with the cost-free PDF software: Foxit Reader.

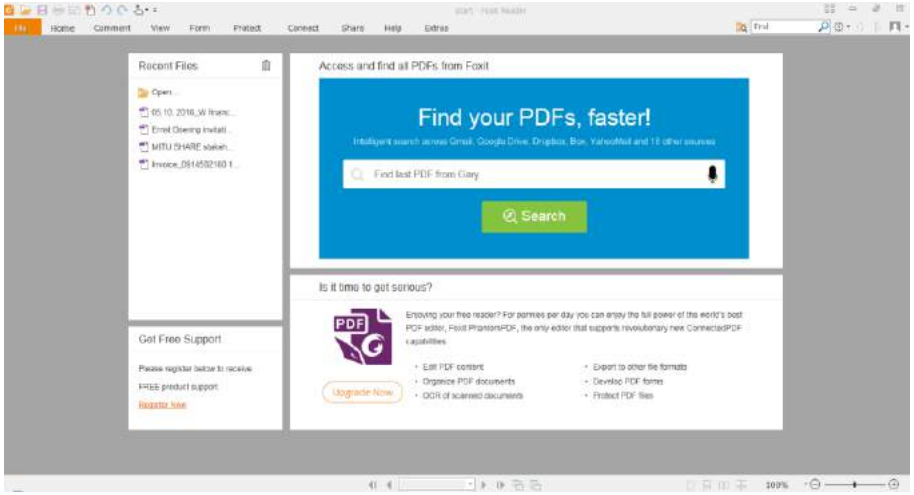
INSTALL FOXIT READER

Use the following hyperlink to download the free version of Foxit Reader (version https://www.foxitsoftware.com/pdf-reader/. User must select platform (Windows, Mac) and language before download.

Once downloaded, the installation process guides itself.

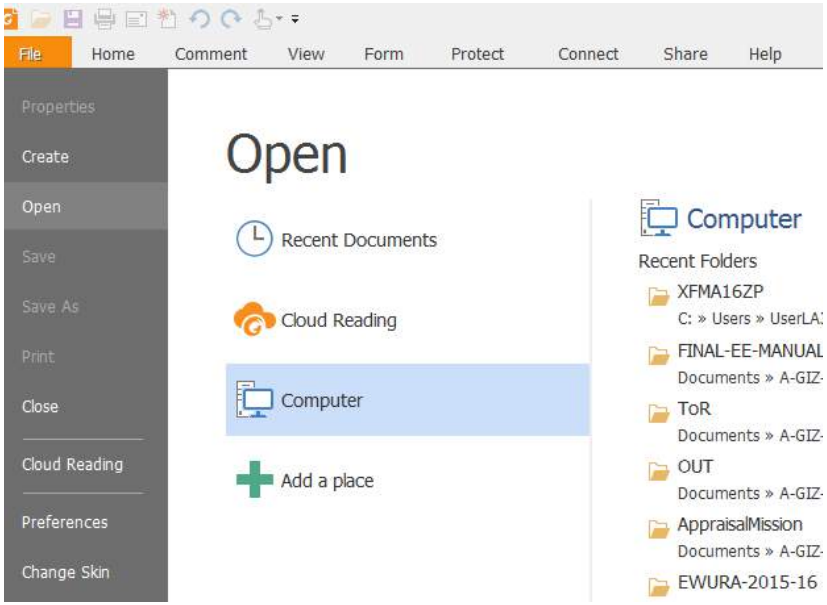
OPEN FOXIT READER

Once installed, Foxit Reader is opened by (double-clicking on the XX icon. Usually it should open with the following screen:

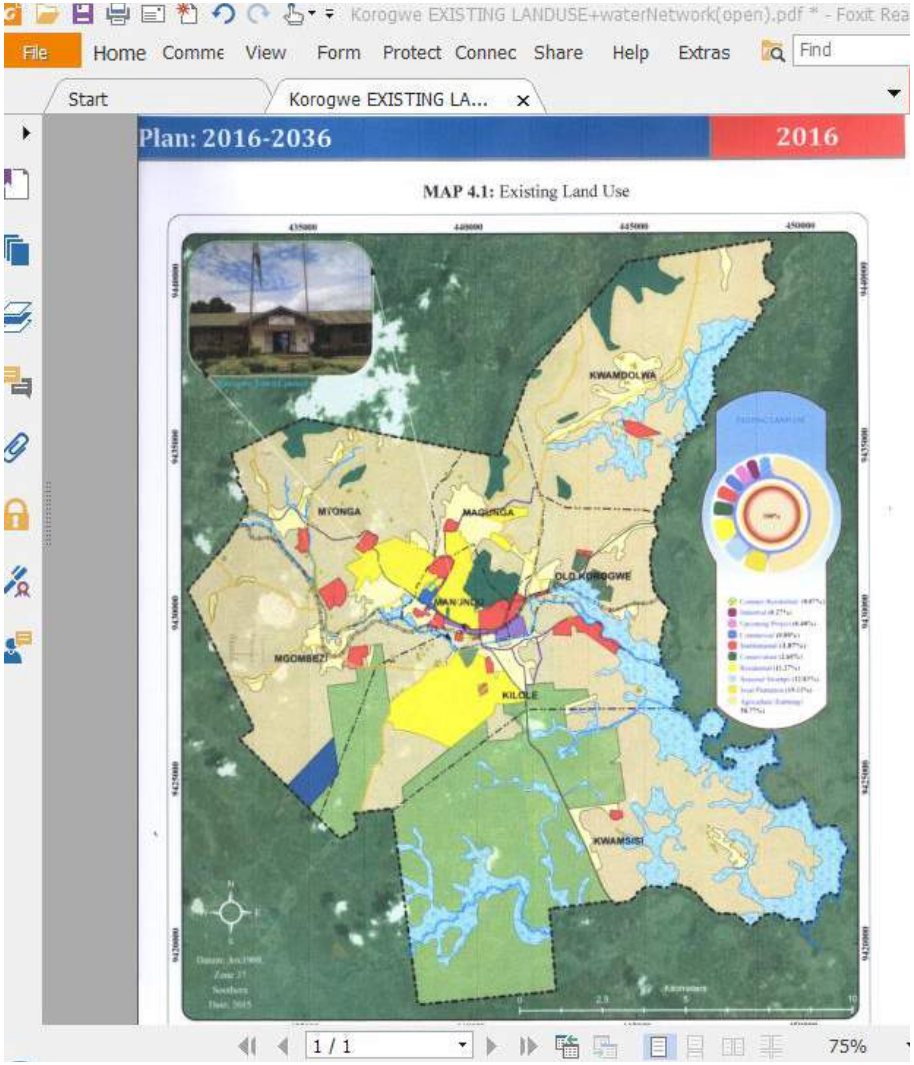


OPEN AN EXISTING MAP

Click on "File" -> "Open" -> "Computer", and then search and select the PDF Map of the town that you wish to use as basis for creating the base-map for your joint planning sessions.



VIEW EXISTING MAP



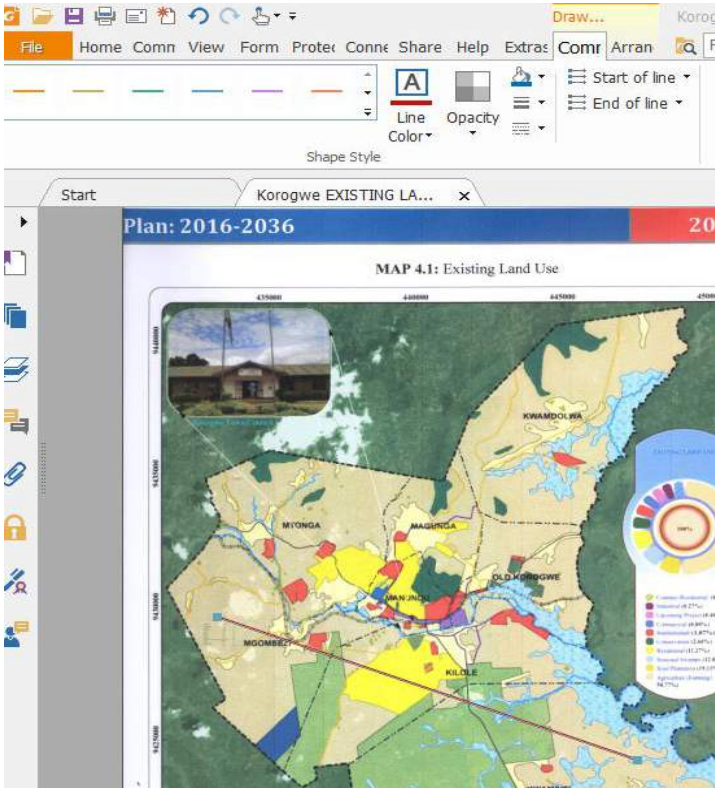
DRAWING LINES AND SHAPES ON THE MAP

In the Foxit Reader Menu: click on Comments → under “drawing” click on the symbol for “straight line” (or any other drawing tool you wish to use at the occasion). The selected item will be shaded in blue to indicate it is active.

Once the selected drawing tool is active, click on the starting point and then on the ending point (in case of straight line). Similarly, one can chose from a number of other drawing tools, like polygons, circles/ovals, arrows. Best is to experiment as much as possible using each of them,

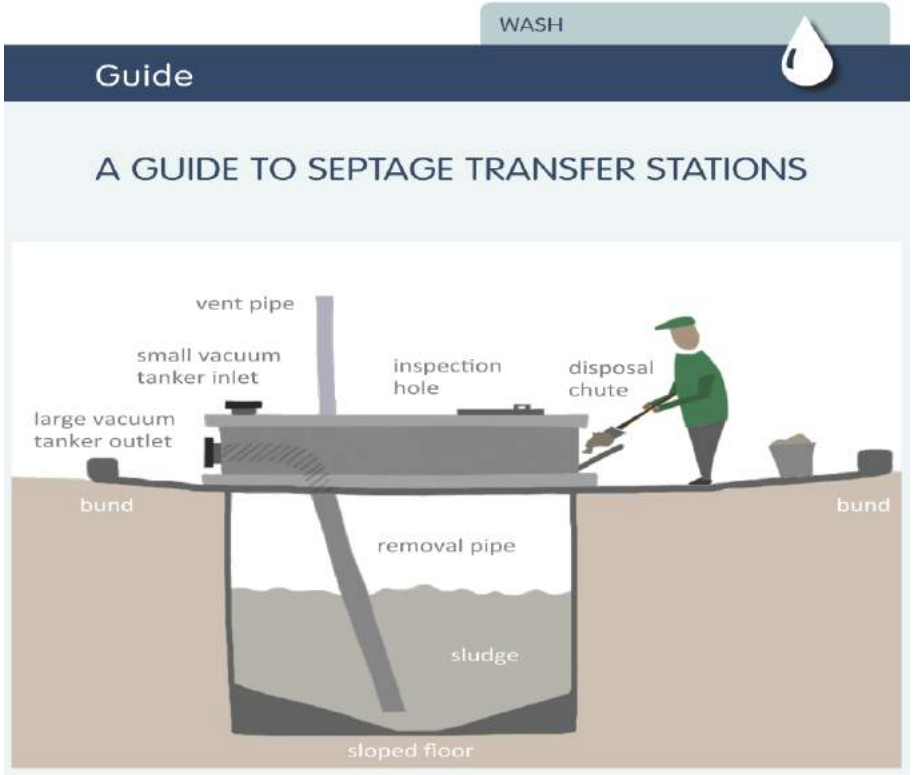
EDITING PEVIOUSLY DRAWN ITEMS

When one selects a drawing shape (by clicking on it or on its outlines, until marker dots appear on its outlines), a sub-menu labelled “drawing tool” and “comment format” will appear on the right-top of the screen, and if selected, it open options that allow you to change **colour**, thickness, **style** (e.g. dashed, dotted, continuous line) and **opacity**. The latter is very helpful to show the underlying layers of the original map and previously drawn shapes, in the intensity one choses.



APPENDIX 5
BRIEF GUIDE TO SEWAGE TRANSFER STATIONS

The Joint Town-Level Planning Guide recommends to timely plan the land acquisitions for the different onsite sanitation-chain components. One of these components are sewage(septage) transfer stations. The following contains extracts from a useful guide in this respect, by Mukheibir P. (2015) "A guide to septage transfer stations". Prepared for SNV Netherlands, Development Organisation by Institute for Sustainable Futures, University of Technology Sydney.



More information can be found on the following link of the "Sustainable Sanitation Alliance (SuSanA)": https://www.susana.org/en/knowledge-hub/resources-and-publications/library/details/2625

Below a few extracted sections:

A GUIDE TO SEPTAGE TRANSFER STATIONS

ABOUT INSTITUTE FOR SUSTAINABLE FUTURES

The Institute for Sustainable Futures (ISF) was established by the University of Technology, Sydney in 1996 to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protect and enhance the environment human well-being and social equity. We adopt an inter-disciplinary approach to our work and engage our partner organisations in a collaborative process that emphasises strategic decision-making. In international development we undertake strategic research and engagement in the areas of development effectiveness, water, sanitation and hygiene, climate change, urban development and energy policy and planning.

For further information visit: www.isf.uts.edu.au

ABOUT SNV NETHERLANDS DEVELOPMENT ORGANISATION

SNV is a not-for-profit international development organisation. Founded in the Netherlands more than 50 years ago, we have built a long-term, local presence in over 30 of the poorest countries in Asia, Africa and Latin America Our global team of local and international advisors works with local partners to equip communities, businesses and organisations with the tools, knowledge and connections they need to increase their incomes and gain access to basic services – empowering them to break the cycle of poverty and guide their own development.

For further information visit: www.snv.org

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CITATION

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3.1 Siting a transfer station

Regardless of whether the transfer station is permanent or mobile, the siting of the transfer station requires careful planning.

Geographic location:

The location of the transfer station must comply with any relevant municipal regulations and should be located in an optimal location which depends on balancing certain key factors.

- Minimising the time taken to transport the septage from the latrines to the transfer station.
- Maximising the coverage area to meet the demand generated by sludge collection using small-scale equipment (primary transport).
- The optimum size of the transfer station holding tank to match the collection volumes.
- The frequency that the holding tank will be emptied.
- The holding capacity of the larger secondary transport vehicles.
- The distance that the larger secondary transport vehicles will need to travel and the number of trips they will need to make in a day.
- The cost of primary and secondary transport methods being used need to be taken into account (Strande et al. 2014).

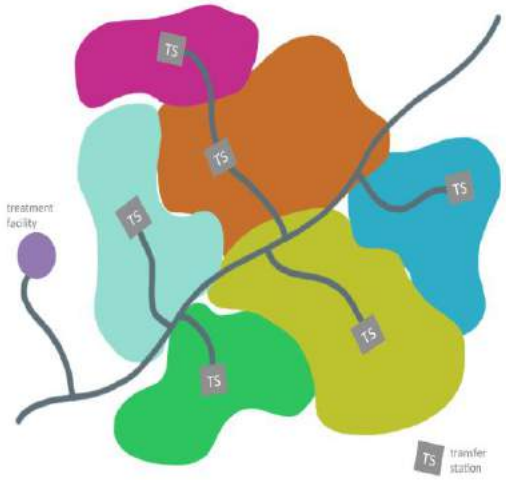


Figure 13. The spatial puzzle when locating a transfer station

4. Reported examples of transfer stations in operation

The following list provides some examples of where septage transfer stations have been implemented – it is by no means a comprehensive list:

Table 2. Examples of septage transfer stations

City	Country	Description
Accra	Ghana	60 Underground Holding Tanks (UHTs) were constructed in the 1990s. Only 33 (according to the WMD) were still in operation 10 years after their installation due to dry night soil and delays in secondary collection (Boot 2008).
Dakar	Senegal	Underground Holding Tank (UHT) with a capacity of 23kL. Four were located across the city 20 years ago, but are mostly not operational.
Dhaka	Bangladesh	WSUP has constructed Faecal Sludge Management (FSM) Transfer station at Mirpur, Dhaka. The overall function of the transfer station is to aggregate, dewater, and temporarily hold faecal sludge collected from the safe emptying of sanitation containment structures of residents found within 2-3 km of the facility. WSUP has also engaged medium scale entrepreneurs to provide septic tank/ pit emptying services using Vacutugs in the Mirpur and Gulshan areas.
Dhaka	Bangladesh	11 sewer lifting stations were used as septage transfer stations. This solution required a lot of negotiations with many relevant agencies. See the WaterAid/DSK programme in Dhaka.
Hai Phong	Vietnam	The transfer station is a large tank that is placed temporally in the street and can be transported away by a hook-lift truck when full. The transfer stations are placed where currently needed, and it is not intended to be a permanent installation.
Nakuru	Kenya	Nakuru County and Sanitation Programme (NCSP) has introduced the Primary Collection Point (PCP) which in principle is a large moveable tank with a disposal latch and an outlet. Emptiers can dispose the waste from toilets in the PCP. The PCP will be stationed for a fixed period at one location to ease the process of emptying by pit emptiers, after which it will be emptied and transported by NAWASSCO to its treatment work where further treatment and development of products is done. Soon after the PCP is emptied, it will be moved to another location or Zone for a month.

APPENDIX 6

LAND REQUIREMENTS FOR SEWAGE TREATMENT SYSTEMS

The table below provides some indicative values for the land requirements for non-mechanically assisted sewage treatment facilities. is provided here below.

System	Land requirements (m^2/capita)	Sludge Volume		Costs	
		Liquid sludge to be treated (L/ inhab.year)	Dewatered sludge to be disposed of (L/inhab. year)	Construction (US$/inhab.)	Operation and maintenance (US$/inhab. year)
Primary treatment (septic tanks)	**0.03-0.05**	110-360	15-35	12-20	0.5-1.0
Conventional primary treatment	**0.02-0.04**	330-730	15--40	12-20	0.5-1.0
Advanced primary treatment (chemically enhanced) (a)	**0.04-0.06**	730-2500	40-110	15-25	3.0-6.0
Facultative pond	**2.0--4.0**	35-90	15-30	15-30	0.8-1.5
Anaerobic pond + facultative pond	**1.2-3.0**	55-160	20-60	12-30	0.8-1.5
Anaerobic pond + facultative pond+ maturation pond	**3.0-5.0**	55-160	20-60	20--40	1.0-2.0
Anaerobic pond - facultative pond+ algae removal	**1.7-32**	60-190	25-70	20-35	1.5-2.5
Slow rate treatment	**10-50**	–	–	8-25	0.4-1.2
Rapid infiltration	**1.0-6.0**	–		12-30	0.5-1.5
Overland flow	**2.0-3.5**	–	–	15-30	08-1.5
Constructed wetlands	**3.0-5.0**	–	–	20-30	1.0-1.5
Septic tank + anaerobic filter	**0.2-0.35**	180-1000	25-50	30-50	2.5--4.0
Septic tank + infiltration	**1.0-1.5**	110-360	15-35	25--40	1.2-2.0

* Extract from source: Biological wastewater Treatment in Warm Climate Regions, Marcos von Sperling and Carlos Augusto de Lemos Chernicharo, Volume 1, IWA, 2005

SLUDGE DRYING BEDS

The following sections, regarding sludge drying beds including approximate land requirements, are sections extracted from ***NPTEL IIT Kharagpur Web Courses***.

It suggests, that drying beds usually require considerable space, between **0.1 to 0.25 m^2/capita** for anaerobically digested sludge.

22.6 Sludge Dewatering

The digestion of the primary or mixed sludge will bring down the water content to about 90%; however, treatment is necessary to reduce the water content further. When digested sludge is applied on the sludge drying beds, the water content of the sludge can be reduced to around 70%. Presence of excess oil and grease will interfere with this process. Sludge drying beds require large land area (nearly 40% of the total area required for sewage treatment plant), hence at the places where land is not available other alternatives such as, mechanical dewatering on vacuum filters, filter press or centrifuge followed by heat drying or incineration could be used after sludge conditioning.

22.6.1 Sludge Drying Beds

This is used where land available is adequate and the dried sludge is used for soil conditioning. The sludge is applied on the bed of sand, which is supported on gravel. Major portion of the liquid drains off in the first few hours after which drying occur due to evaporation. Sludge cake shrinks, producing cracks which further accelerate evaporation from the sludge surface. In dry regions generally, the sludge will get dried within two weeks. The drying period will depend on sunshine, rainfall, wind velocity, and relative humidity, apart from sludge characteristics. Under adverse weather condition, it may take up to four weeks. The sludge drying beds should be located at least 100 m away from houses to avoid smelling problem.

22.6.2 Design Criteria for Sludge Drying Beds

Area of beds: It depends on the volume of the sludge to be dried, cycle time required to retain sludge for dewatering, drying and removal of dried sludge, and making the sand bed ready for next application. Cycle time for dewatering and drying depends on the applied depth of the sludge. The cycle time depends on the climatic conditions, temperature, humidity, dry or wet weather, wind velocity, etc. and also depends on the sludge characteristics. **The land requirement can be substantial with the value of 0.1 to 0.25 m^2/capita for anaerobically digested sludge under unfavorable conditions** (CPHEEO, 1993). Generally, the **cycle time is up to 2 weeks** for warmer climate and 3 to 6 weeks in unfavorable conditions.

The specifications for preparation of sludge drying beds are as follows: ***Underdrains:*** It is made from the open joined vitrified clay pipe or tiles of at least 10 cm diameter. Pipe should not be laid more than 6 m apart from each other. Arrangement should be made to return the drained water to primary sedimentation tank. ***Gravel***: Gravel covers the under-drainage system. Graded gravel is placed around the under drains in layers up to 30 cm, with minimum of 15 cm above under drains (Figure 22.7). At least top 3 cm layer of gravel is of 3 to 6 mm size. ***Sand***: Sand of effective size 0.5 to 0.75 mm and uniformity coefficient not greater than 4 is used. The depth of the sand may vary from 20 to 30 cm.

APPENDIX 7
BRIEF GUIDE TO FSM TREATMENT SITE SELECTION

One of the environmental issues in urban planning is finding a suitable site for constructing infrastructures such as water and wastewater treatment plants. There are numerous factors to be considered for this purpose, which make decision-making a complex task.

BASIC SITE SELECTION CRITERIA

The Joint Town-Level Planning Guide cannot provide a one-fits-all guide to site selection for sewage treatment and disposal sites. Local laws, regulations, guidelines and directives should be consulted, but foremost, sites should be selected using common sense.

#	Distance to:	Minimum distance [m]	Maximum Distance [m]
1	Main road	500	3000
2	Nearest settlement	150	1500
3	Town centre	500	5000
4	Main river	500	3000
5	Geological fault	300	5000
6	Groundwater wells/springs	500	3500

* Example of suggested distance criteria (case study in Kurdistan, B.Shamoradi and A.Isalou, May 2013)

#	Site conditions	positive	negative
a	Population	low density	high density
b	Land use	vacant/scrubs	in use/water logged
c	Soil	loam/clay/sealing	sandy/porous
d	Slope	gentle <15%	steep >30%
e	Topography	gently slope	depression/wetland
f	Prevailing wind direction	away from town	towards town
g	Water table	well-below facility	may rise to surface

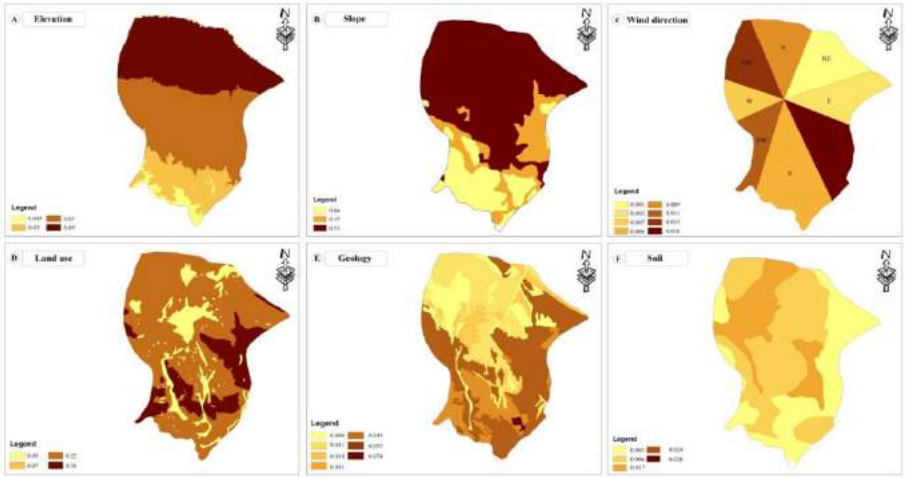
* Examples of site criteria that may be considered in site selection, non-exhaustive, for guidance only

For any larger size wastewater and sludge facility, before implementing its construction, and in fact well-before acquisition of the land for it, an environmental and social safeguards screening must be done by a certified party, which determines whether or not a detailed Environmental and Social Impact Assessment (ESIA) study must be conducted. In any case, it is highly advisable to timely initiate consultations with the National Environmental Management Council (NEMC), best done through the Environmental and Social Management Unit (ESMU) of the Ministry of Water

LAYERED MAPS

If the relevant data on the above criteria are available, preferably in the form of layered maps, this can help the decision-making process, by eliminating unsuitable areas, and continue comparing and evaluation the most suitable areas based on mutually agreed criteria.

An example of such layered maps is provided here below, borrowed from a case study in Kurdistan, by B.Shamoradi and A.Isalou, May 2013.



Of course, there exists a range of sophisticated software that may facilitate the decision-making process for relatively complex situations. In fact, the Kurdistan case study, from which the above examples in these notes were taken, describes the use of a “super decision” and a “Geographical Information System (GIS)” software using fuzzy logic and multicriteria decision models.

Less sophisticated analysis of the local conditions will generally provide at least a first step in the site section process.

APPENDIX 8
FSM TREATMENT DEVELOPMENT IN STAGES

Improving the sanitation services along the entire sanitation chain is often a costly affaire, and many WSSAs and LGAs will not be able to mobilise sufficient funds to acquire the necessary land and construct the Feacal Sludge Treatment plant in one go in its finally required capacity. The Joint Town-Level Planning Guide proposes, therefore, that the town authorities (the WSSA and the LGA jointly)consider at least to develop the sanitation services step-by-step, rather than waiting for the "big money" needed to implement the full-fledged sewerage and treatment system, all at once.

The following are interesting sections on deep-row-entrenchment approaches extracted from the Faecal Sludge Management Book(FSM 2014).

5.3.3 Deep row entrenchment

Deep row entrenchment is a technology that can be considered as both a treatment and enduse option, and is therefore also covered in Chapter 10. Deep row entrenchment was implemented for wastewater sludge in the US in the 1980s and has been adapted for FS in Durban, South Africa (Still *et al.*, 2012). Deep row entrenchment consists of digging deep trenches, filling them with sludge and covering them with soil. Trees are then planted on top, which benefit from the organic matter and nutrients that are slowly released from the FS. In areas where there is adequate land available, deep row entrenchment can present a solution that is simple, low cost, has limited O&M issues and produces no visible or olfactory nuisances. Benefits are also gained from the increased production of trees. However, the availability of land is a major constraint with deep row entrenchment, as is the distance/depth to clean groundwater bodies. In the application in Durban, limited nitrate leaching was found in the soil and tests conducted in the area showed that surrounding groundwater bodies remained free from pollution. It also appeared that the fast growing trees took up the additional nutrients (Still *et al.*, 2012). Deep row entrenchment is considered most feasible in areas where the water supply is not directly obtained from the groundwater source and where sufficient land is available, which means the sludge would have to be transportable to rural and peri-urban areas. In many countries legislation is still lacking for this option; in South Africa for example, environmental regulations will only allow deep row entrenchment for pit sludge disposal at the pilot scale in the foreseeable future.

Potential advantages and constraints of deep row entrenchment

The main advantage of deep row entrenchment is that very little is needed for it: no expensive infrastructure or pumps that are very susceptible to poor maintenance. In addition, growing trees has many benefits such as extra CO_2 fixation, erosion protection, or potential economic benefits. Constraints are that sufficient land has to be available in an area with a low enough groundwater table and, moreover, legislation still needs to catch up in many countries to allow for this technology.

Case Study 5.2: Deep row entrenchment in Durban, South Africa

(Adapted from Still *et al.*, 2002)

The water and sanitation unit (EWS) of the eThekweni municipality in Durban has been pursuing deep row entrenchment for disposal and treatment of both sludge from municipal wastewater treatment and FS derived from ventilated improved pit latrines (VIPs). The EWS project in Umlazi, south of Durban, started operation in 2009. Pit latrine sludge was buried at different loading rates in sandy soils (Figure 5.4; Still *et al.*, 2012). Positive effects were seen on the trees that were planted, however, there where substantial differences depending on the species and experimental conditions.

Figure 5.4 The Umlazi Deep Row Entrenchment Test Site – top the burial of faecal sludge from pit latrines in 1m deep trenches; below an overview picture of the filled trenches with trees planted on top. Groundwater wells were mapped to follow the fate of nutrients, organics and pathogens (photos: Jay Bhagwan, Water Research Council, South Africa).

At a second testing site near Durban it was observed that the relative difference in growth between trees grown with sludge and controls was reduced over time. After one year a 300% increase was observed for the trees growing with FS while at the end of the nine year growth cycle only a 30% to 40% more biomass was obtained, which is still a substantial increase. In addition to nutrients, Ascaris were also monitored. The South African researchers found that while a significant number of helminth ova were found in freshly exhumed pit latrine sludge, after 2.8 years of entrenchment less than 0.1% were found to still be viable (capable of growth or infection, Still *et al.*, 2012).

APPENDIX 9 - EXAMPLE PROJECT PROFILE

	PROJECT PROFILE	**SANITATION IMPROVEMENT MEASURES**	**CUSTODIAN = WSSA**
	SANITATION - 7	**SANITATION TREATMENT FACILITY**	**PRIORITY No. 2**
1	Brief description of Korogwe town	Korogwe town council covers an area of 212 km2; with 11 administrative Wards and 29 Mtaas. Population in 2018 (78,618 people with average household size 4.5), growing at 2.6% per year. Main economic base (agriculture); Water supply and sanitation services is a shared responsibility between the Town Council and the Korogwe Water supply and Sanitation Authority	
2	project description (key project components, it purpose/importance))	• Plan for and construct a Fecal sludge management facility for the entire • Prepare a design for a fully-fledged treatment facility and propose a step by step development approach and Bills of quantity to support construction • Mobilise resources for construction of infrastructures for safe disposal	
	Responsible Department Entity (within Council, or Utility etc)	The Utility is the custodian of this project, particularly the Technical Manager who is to be supported by the Health and Environment Departments of the Council	
4	ESIA requirements (Screening with NEMC, ESIA?)	This Project Requires ESIA screening → primary or full ESIA?	
5	project area (wards/mtaas or institutions, EPZ etc.)	Total number of Wards: (11), total number of Mtaas: (26); Feacal Sludge Disposal site No1 will be located in Old Korogwe Ward, Releni and Darajani Mtaas, serving the entire town	
6	total population in project area	This project must be implemented in consultation particularly with the people currently living in Releni and Darajani Mtaa: population 2018 (1,876 people)	
7	**Project lots**	1) Lot1 :Planning for and construction of Faecal Sludge Management facility 2) Lot 2 : Plan for a full-fledged sludge and waste water treatment facility to be developed on a step by step approach	
8	total beneficiaries (people/HH directly affected by project)	This project will improve the sanitation conditions in **the entire town**: Population of Korogwe town 2022 (87,119 people)	
9	quantification data (e.g. volume water, FS, number latrines etc.)	1) Volume of FS 2018 (393m3 per month), by 2022 (436m3per month) 2) Required area for disposal site	
10	total investment costs (e.g. by procurement/ investment packages, or annual budget-phases?)	**TOTAL EST.(TZS 500,000,000/=)**	
11	per capita investment cost (cost per beneficiary)	TZS 5,740/=	
12	Source of funding (community, LGA, WSSA, Ministries, DPs, PPP	Utility budget allocation by the Ministry of Water	
13	Urgency level (reasons: e.g. LIA, national priority etc.)	This project is very urgent:	
14	TIME FRAME (single or multiple year project, amounts/year)	It is a three years project	

15	Step	Activity	Who	When	Cost [TZS]	Funding	Status
	1	Planning, selection of technical options	WSSA	Dec.18	In-house	WSSA	GIZ-TA support?
	2	Design, land requirement, location study	WSSA	Jan.19	50,000,000	WSSA	GIZ-TA support?
	3	Env./social safeguards screening	WSSA	Jan.19	In-house	WSSA	MoW-TA support?
	4	Land demarcation (provisional)	WSSA/LGA	Feb-Mar.19	In-house	WSSA/LGA	MoW-TA support?
	5	Land acquisition, compensations	WSSA	Mar-Apr.19	100,000,000	WSSA/GoT	If budget approved
	6	Tender documents, procure contractor	WSSA	Mar-Apr.19	50,000,000	WSSA	If budget approved
	7	Construction supervision, operation	WSSA	Jul-Dec.19	300,000,000	WSSAMoW	If budget approved

APPENDIX 10
EXTRACTS FOR MOW DESIGN MANUAL

Water demands – Domestic

TABLE 4.3: WATER REQUIREMENTS

CONSUMER CATEGORY	RURAL AREAS (l/ca/d)			URBAN AREAS (l/ca/d)			REMARKS
	FR	M-UT	M-PBT	FR	M-UT	M-PBT	
Low income using kiosks or public taps	25	25	25	25	25	25	Most squatter areas, to be taken as the minimum
Low income multiple household with Yard Tap	50	450	40	50	45	40	Low income group housing No inside installation and pit latrine.
Low income, single household with Yard Tap	70	60	50	70	60	50	Low income group housing No inside installation and pit latrine
Medium Income Household				130	110	90	Medium income group housing, with sewer or septic tank.
High Income Household				250	200	150	High income group housing, with sewer or septic tank.
FR = flat rate; M-UT = metered with uniform tariff; M-PBT = metered with progressive block tariff.							

Water requirements in different areas

TABLE 4.4: CATEGORIES OF URBAN WATER CONSUMERS

CLASSIFICATION as per Section 4.3.3	INITIAL (CURRENT)				FUTURE (10 YEARS)				ULTIMATE (20 YEARS)			
	DP	LC	MC	HC	DP	LC	MC	HC	DP	LC	MC	HC
Rural Service Centre	60	20	15	5	50	25	20	5	40	30	20	10
District Centre	50	25	15	10	40	30	20	10	30	35	25	10
Municipal Centre	40	30	20	10	30	35	25	10	20	35	30	15
City Centre	30	35	25	10	20	40	30	15	10	40	35	15
DP = Domestic Point; LC = Low Cost Housing; MD = Medium Cost Housing; HC = High Cost Housing												

4.6.4 Agricultural and Livestock Requirements

Water requirement for livestock will be included in rural water supply designs where feasible, however, emphasis should be placed on the use of dams, charcos and water wells for livestock.

4.6.5.2 Institutional Water Demands

Public and private institutions include: Schools, Hospitals, Administration Offices, Police, Missions, Churches and Mosques, Prisons, etc. In Table 4.9, some figures for institutional water demand are given. The water requirements for staff working in the institutions should be estimated separately in the same way as for other domestic water consumption.

If large demand units are included in the scheme, such as Universities, major hospitals, boarding schools etc., a special study of their water requirements is recommended instead of using the average figures given in the table below.

TABLE 4.9: INSTITUTIONAL WATER DEMANDS

CONSUMER	UNIT	RURAL l/d	URBAN l/d	REMARK
Schools	l/std/d	10	10	With pit latrine
– Day Schools			25	With WC
– Boarding Schools	l/std/d	70	70	With WC
Health care Dispensaries	l/visitor/d	10	10	Out patients only
Health	l/bed/d	50	50	No modern facilities
Health	l/bed/d	100	100	With WC and sewer
Hospitals, District	l/bed/d	-	200	With WC and sewer
Hospitals, Regional	l/bed/d	-	400	With surgery unit
Administrative Offices	l/worker	10	-	With pit latrines
			70	With WC

4.6.5.3 Industrial Water Demands

The water· consumption in industry varies considerably depending on the kind and size of the· industry. There are dry industries which consume virtually no water in their processes, and the only water consumption is that for staff and cleaning of the premises. On the other hand the water requirements for wet industries such as for a paper or cotton processing factory can be a great deal. The following table gives some examples of the water consumption in different kind of industry.

For existing industry, the water consumption can be found out by checking their metered consumption or if there are-no records available by estimating according to the kind and size of production. The consumption figures for larger units must always be based on proper measurements not on estimates.

For future small industrial demands allowance can be made using the following table:

TABLE 4.10: SPECIFIC INDUSTRIAL WATER REQUIREMENTS

INDUSTRY	PRODUCT OR RAW MATERIAL UNIT	WATER CONSUMPTION IN m^3 PER UNIT OF RAW MATERIAL
Food Industry		
Dairy	Milk received (1000 1)	2 – 5
Abattoir	Animal slaughtered (gross weight)	4 – 10
Brewery	Beer (1000 1)	10 – 20
Sugar	Cane (tonne)	10 – 20
Wood processing industry		
Pulp mill	Bleached pulp (tonne)	100 – 800
Paper mill	High quality paper (tonne)	300 – 450
Chipboard factory	Chipboard (tonne)	50 – 150
Others		
Tannery	Raw skins (tonne)	50 – 120
Cotton mill	Cotton thread tufi	50 – 150

Larger and future development of industrial water requirements have to be found out by direct interviews of the technical management of existing industries and by contacts with the local planning officers and local government officials, e.g. municipal council officers. For future industries to be established, Ministry of Industries and Trade, the Regional Planning Officer or organizations such as the National Development Corporation (NDC), Small Industries Development Organization (SIDO) and owners of private industries shall be consulted.

Where there is only a reservation for an industrial area in the town plan but without any specifications; estimates of the future water requirements can be based on the figures below:-

TABLE 4.11: INDUSTRIAL WATER DEMAND (m3 /ha/d) FOR FUTURE INDUSTRIES

INDUSTRY TYPE	WATER DEMAND m^3 /ha/d
Medium Scale (water intensive)	50
Medium scale (medium water intensive)	20
Small scale (dry)	5

A basic or semi-domestic type of consumption of 25 l/ca/d is allowed for in the above figures.

If the requirement of a particular industry is large, then separate local sources must be examined whilst a part of the requirement can be supplemented from the town water supply system. The fire fighting water requirements for industrial areas must be estimated separately.

Septic tanks

Sludge should normally be removed every 2 to 3 yrs

Several rules of thumb have been published for tank capacity; of these the simplest is that included in the BSCP 302, which gives the volume below maximum water or scum level as $2000 + X \times p$ litres. Where p is the contribution population, and X is the water consumption per person per day.

In other words it allows for one day retention and gives a constant volume of 2,000 litres (2 m^3) for storage of sludge and scrum, irrespective of the size of the contributing population (assuming the sludge is removed every 12 months).

Thus formula is not commonly used in Tanzania, and instead the data in Table 9.4 has widely been used for several years in Tanzania.

TABLE 9.6: SEPTIC TANK SIZES

SEPTIC TANK SIZE (Depth is from top water level)						
TYPE	ALL WASTES No. OF USERS	SOLID WASTES ONLY No. OF USERS	DIMENSIONS			VOLUME
			LENGTH (cm)	WIDTH (cm)	DEPTH (cm)	V (m^3)
1	1 to 6	10	210	60	150	
2	7	20	260	75	170	
3	15	30	300	90	170	
4	30	45	350	105	180	
5	40	60	400	120	180	

Effluent disposal by infiltration is not applicable where soils are non–porous (e.g. clay or black cotton soil) or standard percolation rates are in excess of 60 1/min/25 m^2 (refer MLHUD).

9.15.3 Low Cost on-plot Sanitation – The Latrine

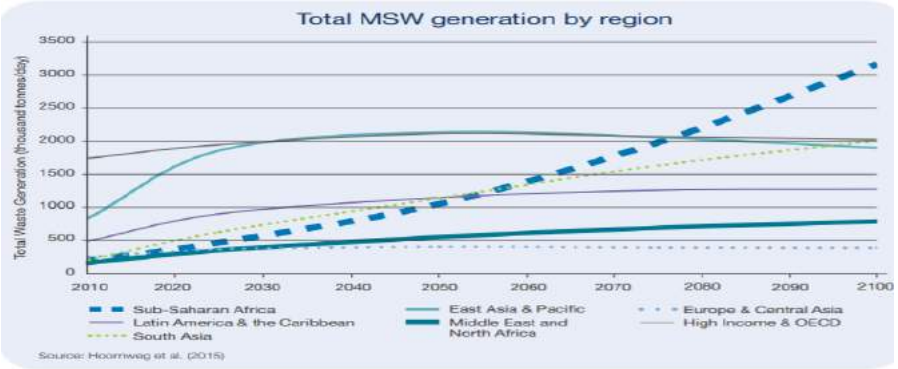
The basic unit of improved sanitation remains the ventilated improved pit latrine (VIP), notwithstanding the many variants of this that have been proposed over the years. Probably the best known reference work for the design of VIPs remains the UNDP / World Bank TAG Technical Assistance Note TAG 13 which despite the date of issuance (1984) is an excellent starting point for the designer new to the topic.

Another useful starting reference work is TAG 15 (1985) for the design of pour flush latrines.

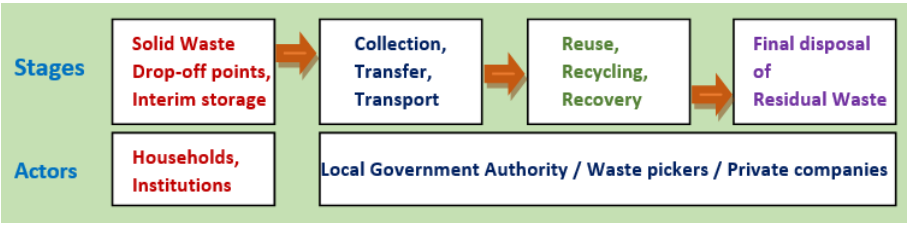
Over the intervening years in particular, many alternatives have been proposed including composting toilets, and more recently ecological sanitation units that separate urine and faeces. Here the best starting point for those interested is <www.ecosan.org>. However, except in circumstances where shallow groundwater pollution from pit latrines is a serious health hazard, the capital cost and need for a significant change in peoples sanitation practices makes this an unlikely contender, at least at present.

APPENDIX 11
BRIEF GUIDE TO SOLID WASTE DISPOSAL

The prospects for solid waste management, particularly in fast transforming Africa, is illustrated in *"Africa Waste Management Outlook – Summary for decision makers"* (https://wedocs.unep.org/20.500.11822/25515):



Solid waste management



Sanitary landfills

While preventing and minimising the generation of waste remains the most favourable option, landfills still are an important part of any urban waste management system — regardless of other waste disposal solutions used.

Even towns that recycle much of their waste, or practice incineration, need landfills for residual wastes and ashes.

Properly designed and managed sanitary landfills are a mature and proven waste management technique.

Yet, they are still too uncommon in towns in Tanzania. This is partly because of the costs of their establishment and operation, and also because of inadequate regulatory oversight. Uncontrolled, open dumps that lack basic environmental controls, too often put public health and safety at risk.

Recovery of valuable recyclable or reusable materials

Landfill life can be extended if recyclable and organic materials are removed or recovered before waste arrives at the landfill and will also likely result in lower costs. This could either be done at the community level, at a materials recovery facility, or at the landfill site itself. Landfill operators could benefit from partnering with waste pickers at the landfill site to ensure that these materials can be diverted and create alternative livelihoods. Formalizing waste pickers can lead to improved waste collection and recycling. National regulations and guidelines will help, but local municipalities are directly empowered to provide recognition and social benefits to waste pickers.

Reuse versus recycling of waste

BASIS FOR COMPARISON	REUSE	RECYCLE
Meaning	Reuse, means putting an item to same or a different use, after it has fulfilled its original function.	Recycle is a process, wherein a used item is turned into a new product, to reduce waste of potentially useful material.
Form	Does not change the original form of the product.	A new product is created, so form of product is changed.

Siting a solid-waste disposal area

A landfill is ideally geographically isolated from residential areas, airports, and drinking water aquifers. Depending on the area served by the landfill, proximity to rail lines or roads capable of handling heavy truck loads or volume may be necessary. The selected site should be assessed by engineers and geologists to ensure low risk for flooding, earthquakes, and landslides. Access to a regular supply of cover material is also critical. Communities near the selected site should be consulted to understand and address their concerns before the facility begins operation.

Selecting the right location for solid-waste disposal sites is a matter of public health concern and it needs a long-term planning approach for locating safe disposal areas. A carefully selected site will minimize negative environmental and social impacts and forms the basis for sound solid-waste management.

To locate a new solid waste landfill area, multiple aspects must be considered: land-use, soil and slope conditions, but also the proximity to rivers and streams, and to groundwater abstraction points. A closer look must be taken into the area's topography, hydrology, geology and its predominant climate and weather patterns. Potential air quality and odour problems, and the impact on flora and fauna, are equally important factors.

Other constraining factors will be the proximity to residential and industrial areas, to public facilities such as schools, health centres, offices, churches, mosques, and cultural sites. Also the current and future transportation routes taken by garbage trucks should be analysed, and the additional traffic that will be caused by these.

Finally, the design and lay-out of the landfill site itself, its operational management and the choice of equipment will determine the efficiency and sustainability of operating the solid-waste disposal site.

In some cases, such analytic approach to landfill planning, including costs and future solid waste volumes, may bring a municipality to decide transferring all solid-waste disposal services rather to the newly identified location, and close the existing dump site.

Some key landfill site selection criteria

Slope

Slope is one of the determining topographic factors in landfill site selection. Generally, a gentle slope is suitable for locating landfill site.. Indicatively, an almost flat terrain (slope 0-2%) is NOT considered very suitable, neither is a steeply sloped area (15-30% or more). More suitable are lightly sloped areas of 2-8%, or 8-15% in case of other favourable factors.

Distance from settlement and densely populated areas

It is not recommended to locate landfill sites in close proximity to human settlement areas. Landfill sites should usually be at least one kilometre away from both current, and future settlement areas.

Land use

Usually, land with less socio-economic, environmental, resource protection, and political value, and of course a low acquisition costs is preferred as a solid-waste disposal site.

Distance from main road

A landfill site should not be located too close to public main roads, considering potential harmful health effects. A 50-100m buffer zone is often seen as the minimum distance between landfills and roads. On the other hand, locating a landfill far from the road network impacts on transportation and site access.

Proximity to surface water

Improper disposal of municipal waste is the most common cause of environmental degradation: air pollution, soil contamination, surface, and ground water pollution. Especially water points must be protected from runoff and leaching of pollutants from landfills. Hence, waste disposal plots must be placed well-away and certainly not upstream from water abstraction points.

Multi-criteria Evaluation

A Multi-criteria Evaluation methodology is used for assigning criteria weights for each factor. The combined set of criteria must minimise the risk of the waste disposal site to cause irretrievable human and environmental damages, even far in the future.