



water for people
RWANDA

DEVELOPING A FULL LIFE CYCLE COSTING WASH INVESTMENT PLAN

***WATER FOR PEOPLE—RWANDA
EXPERIENCE IN GICUMBI DISTRICT***

Updated October 2018

1. INTRODUCTION

To fast track on achieving SDGs targets and indicators to attain universal access to water and sanitation services, many actors in the water, sanitation and hygiene are using several different programmatic approaches when implementing water, sanitation and hygiene programs. Rwanda has embraced the use of the District Wide Approach (DWA), in delivery of Water, Sanitation and hygiene (WASH) services that reach the most poor and vulnerable communities, using the district local government as an entry point to service delivery.

Water For People has been using a similar approach –Everyone Forever—in Rulindo district, which served as a model to the Government of Rwanda.

The Gicumbi WASH Program aiming at ensuring that every community, every school, every health care facility gets access to clean drinking water, sanitation and hygiene services by the year 2024 and Forever is being implemented under the District Wide Approach Agenda.

This guidance note describes the key steps of the process that were undertaken in developing a Full life cycle costing WASH investment plan in Gicumbi District, which encompasses both hardware and software components required to ensure sustainability of WASH services.

2. FULL LIFE CYCLE COSTING- DISTRICT WASH INVESTMENT PLAN

An investment plan is the process of matching an objective with financial resources. The objective is understood as the provision of universal and sustainable services and financial resources as all types of financial resources (the 3Ts), not just capital investment, but also recurrent costs and direct support costs.

Other characteristics of a WASH investment plan include the following:

- **A broad scope** for all types of WASH services (water, sanitation and hygiene), considering both domestic services as well as services in public institutions (schools and health care facilities). This could consider all the planning aspect, infrastructure development (CapEx), Capital replacement and major repair of infrastructure (CapManEx), Operation and Maintenance of existing infrastructure (OpEx), Cost for monitoring and administration (Direct and Indirect Support). However, it can be progressively adjusted as more information becomes available.
- **The management of different timescales** (short, medium, long): It provides a long- term horizon (5-10 years), derives medium term targets and short- term activities (1 to 3 years) from it. The level of detail provided is high for the first years of the plan and decreases over time. For Gicumbi WASH Program, the partners agreed to reach a universal access to safe drinking water services by 2024, however they recognized that the sustainability aspect might take longer.
- **An iterative process**: although the steps are presented in a linear manner for simplicity-sake, the nature of the process is iterative and involves revisiting the vision, targets and approaches based on the assessment of current service provision, costs and available financial resources. The process was interactive, and we made sure all the partners are involved.
- **A trade-off between strategic vision and detailed analysis**: the process should seek to articulate the district's broad vision to achieve universal and sustainable services as well as the steps required to achieve it in terms of construction, maintenance or support activities and financing. At each step of the process, a balance will be sought to ensure the analysis/calculation enables the formulation of a broad vision, whilst also providing timely data to calculate ballpark cost estimates required for a long-term plan.

Developing a WASH investment plan is a process, resulting in an overarching output- the plan itself, both of which support district-decision making through three channels:

- **Technical:** the plan is developed on the basis of evidence generated through data collection activities and technical studies.
- **Strategic:** the plan articulates a vision supported by district-level decision makers, which includes a long-term horizon, as well as medium-term targets.
- **Engagement** was sought at each step of the process. At community, service provider and district levels, to understand WASH needs and demands, and ensure understanding, ownership and usefulness of the output.

3. STEP-BY STEP PROCESS AND RESULTS

3.1. Baseline assessment

The assessment phase consists in a data gathering and analysis exercise, aiming at establishing rigorous evidence of i) existing infrastructure assets, ii) existing service levels iii) district and service providers' capacities, to serve as a basis for developing a district-level vision.

This phase results in the development of the following outputs:

- A district-wide assessment presenting the current levels of service at district level, against national standards and indicators. Service levels categories used in Gicumbi were No improved service, Inadequate level of service, Basic level of service, Intermediate level of service and High level of service.
- An asset registry, providing details on existing water asset components, in terms of age, condition and level of priority for maintenance activities;
- An assessment of districts and service providers' capacities and current gaps.

The supporting tools used in Gicumbi District are presented in table 1 below.

Table 1: Overview of outputs and tools for assessment phase

Output	Supporting tool	Content
Asset registry	Data collection questionnaire and Excel-based template for asset registry for piped schemes.	Questionnaire to carry out the asset inventory and collect data on water asset components, including age, condition and activities required for maintenance. Excel-based template for the asset registry.
Service level assessments	Service level definitions	Definitions of service level standards according to government guidelines and indicators approved by the Ministry of Infrastructure for the pilot phase of District Wide Approach
Capacity assessment	District capacity assessment tool (Excel based template)	Document, which supports the assessment of existing district skills against core functions; district WASH budget and maps number of days spent against key activities.

	Service provider/private operator capacity assessment	Document which supported the assessment of service provider capacities (skills, human resources).
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3.1.1. Service level assessment

a) **Baseline indicators**

The table below shows the indicators considered during WASH level of service assessment at household level and in all public places and their corresponding scoring categories:

Household:

Table 2: list of baseline indicators considered at household level

Household Water Level of Service indicators	Score
Households Use Drinking Water from Improved Water Point	1
Water Is Available from Improved System on The Day Of The Visit	1
There Are No Seasonal Water Shortages or Periods of Irregular or Unplanned Rationing	1
The Water Point/System Was Not Broken Or Out Of Service For More Than 1 Day Per Month In The Last Year	1
Water Tariff Meets Affordability Criteria	1
Distance To Water Point/System Meets Government Standards	1
Household Satisfied With Water Service	1
Total	7

Public places:

Table 3: List of baseline indicators used for public places

Public Institution Level of Services Indicators	Score
Public Institution Has Access to An Improved Water Point	1
There Are No Seasonal Shortages That Limit the Availability of Water Significantly	1
The Quantity of Water Available Meets Government Standards	1
The Quality of Water Meets Government Standards for E Coli Water Point/System Has Adequate Water Quality (bacteria, turbidity and other contaminates of concern)	1
Drinking Water Was Available on The Day Of The Visit	1
Funds Are Available For The Public Institution For Operation And Maintenance Of WASH Infrastructure	1
Public Institution Access to Sanitation Facilities	1
No Long Lines at Latrines At Any Point In The Day	1

Sanitation Facility Sub-Structure (Slab and Pit/Tank) in Good Physical Condition and Performing Function of Providing Barrier Between User And Faeces	1
Sanitation Facility Super-Structure (Walls, Door, Roof) In Good Physical Condition	1
Sanitation Infrastructure is in Hygienic Condition	1
Hygiene Practice	1
Hygiene Knowledge	1
Feacal Sludge Management	1
Disposal Facilities for Menstrual Hygiene Are Available for All Girls And Women	1
Solid Waste Management	1
Total	16

b) Data collection

The data were collected at household level and in all public places using service of 19 enumerators selected from a list of young graduates recommended by the district. The idea was to create database of resource persons with experience to conduct subsequent future surveys in the district. The selected enumerators where trained on the questionnaire, android phones handling and access to survey questionnaire, and how data are collected and submitted to the AKVO-FLOW Dashboard. The 19 remunerators were grouped into 3 teams each led by a supervisor responsible for the coordination, collecting phones each evening, submitting any hanging surveys, charging the phones, and organizing the team for the next day.

c) Sampling method and Sample Size

A stratified random sampling method was adopted for the baseline assessment, and a sample size was determined based on a 95% confidence level, and the samples were spread across all types of households (very rich, rich, poor and destitute). In each village a sample of 5 households were randomly surveyed.

All public places, including private and public schools, clinics, market places and all churches were surveyed, using the same questionnaire as for the household surveys.

In total 19 data collectors/enumerators were used for a period of 21 days

The table below shows the budget used for the service level assessment in Gicumbi District

Table 4: Budget for level of service data collection

Service Level Assessment					
No	Item	Qty	Days	Amount	Total in \$
1	Cars (Hire)	3	19	59	3,363
2	Payment to Enumerators	21	19	18	7,182
4	Withholding tax	1	1	1,056	1,056
6	Internet Bundles	21	19	1	399
8	Group Insurance	21	1	12	252
9	Extension Cable	3	1	12	36
10	Badge	21	1	1	21
Total					12,309

After data collection, data were cleaned up and scored by WFP M&E and the results (see below figures) were presented to all District WASH partners for discussion and validation.

Figure 1: Household Water level of service

Gicumbi	Number of Households	Frequency
No Improved System	426	13.5%
Inadequate Level of Service	251	7.9%
Basic Level of Service	1021	32.3%
Intermediate Level of Service	952	30.1%
High Level of Service	512	16.2%
Total Households	3162	100.0%
	<i>Intermediate and High Level of Service = 46.3%</i>	

Figure 2: Household Sanitation and Hygiene Level of service

Gicumbi Sanitation & Hygiene Service	Number of Households	Frequency
No Sanitation Service	133	4.2%
Inadequate Level of Service	95	3.0%
Basic Level of Service	1294	41.2%
Intermediate Level of Service	1490	47.5%
High Level of Service	125	4.0%
Total Households	3137	100.0%
	<i>Intermediate and High Level of Service = 51.5%</i>	

Figure 3: Gicumbi DWA 2017 Public Institution Sanitation Level of Service

Gicumbi Public Institution Sanitation Level of Service	Number of Public Institutions	Frequency
No Sanitation Services	24	3.2%
Inadequate Level of Service	7	0.9%
Basic Level of Service	495	65.3%
Intermediate Level of Service	191	25.2%
High Level of Service	41	5.4%
Total Public Institutions	758	100.0%
	<i>Intermediate and High Level of Service = 30.6%</i>	

3.1.2. Asset analysis

The asset analysis consists of an asset inventory and a detailed description of each component of a water system to determine the status of the water scheme, to inform the service authority what is functioning, what doesn't, which components will be replaced in a near future, and which ones need immediate replacement.

This description is done through observation, and filling in a questionnaire downloaded into android phones, and submission of data collected to the dashboard. An excel sheet showing each system and the status of each component is then generated, and all water systems can be later on classified into three categories/colors: Green, Yellow and Red, with Green standing for systems that are in perfect working condition, Yellow for systems that need repair or replacement of some of the components, and Red for systems that need immediate attention or replacement.

The cost for this activity was amounting to RWF 13,186,060 (15,889\$), made of transport for engineers (car hire), per diem for engineers, group insurance, and internet bundles daily submission of the surveys.

3.1.3. Capacity assessment

The capacity assessment tool approved for use under the DWA is a combination of the WFP sustainable check list, the direct cost tool and a human resources skills assessment developed by JICA.

The exercise consists of assessing the human and financial gaps in an organization (district), the current skills of the staff within the organization and gaps, and a checklist developed to verify whether a conducive environment has been created to ensure sustainability of WASH Services within the district.

The assessment is made through a consultative workshop that brings together district staff from the human resources department, the water and sanitation department, the planning department, the finance department and all the stakeholders involved in the WASH sector in a district.

The budget used for this exercise was 200,000 Frw (\$ 235), covering lunches for the participants and transport for non-district staff.

3.2. Assessment of infrastructure needed to achieve full coverage

To have a clear picture of the investment required to bring the entire district to full and sustainable WASH services, detailed engineering designs were undertaken for community water supply, and a thorough assessment of the status of existing water and sanitation facilities, needs of these facilities and estimated costs to bring all public schools and health care facilities to full water and sanitation coverage as well as capacity needs to sustain these services were undertaken.

3.2.1. Community Water Supply

Water For People provided both technical and financial support, using a team of experienced Freelance Engineers (civil engineers, hydraulic and environmental engineers who were trained by WASAC) who carried out the below tasks. The design process entailed data collection, data processing, hydraulic calculation using excel spreadsheet, cost estimation of proposed new water networks plus others which might require rehabilitation, layouts of both new and proposed rehabilitation of existing networks were provided and finally detailed bill of quantities for each system designs were provided.

The following tasks were undertaken:

- Inventory of all water sources in all sectors;
- Assess water demand, and design possible extensions and new systems in all population planned settlements across the 21 sectors that make up the district of Gicumbi;
- Data collection and analysis by using appropriate modern equipment and software such as GPS, Arch-view GIS, Auto-Card or COVADIS, Google Earth, Google map and map sources;
- Provide digitalized maps, plans and drawings for proposed water supply networks, extensions and interconnections and ensure harmonized data;
- Provide detailed hydraulic calculations for proposed water systems in all sectors;
- Carry out an overall site plan with identification of existing water supply systems and planned water systems (civil and hydraulic engineering) by using appropriate scale;
- Digitalize all water systems in one map of Gicumbi (Topographic and Ortho-photo Maps);
- Provide location and general arrangement plan for existing and planned networks as well as location of available resources to be exploited for subsequent studies. Use Scale of 1: 1000 or any other scale deemed appropriate to present the maps;
- Analyze the geo-demographic aspect and socio-economic situation and water demand analysis: Review and up-date data on current and future population by respecting the horizon of 25 years while analyzing water demand;
- Pegging of new proposed water supply networks, extensions and interconnections to show the routes of the pipelines and locations of main water infrastructure (tanks and tap stands).

Outcome of the entire design process:

- Ninety-two (92) water networks have been identified with estimated length of 990.4km including sixty-three (63) networks which require rehabilitation and 29 new proposed water schemes;
- Gicumbi town that requires a treatment plant and a distribution network, was dissociated from the 92 water schemes, and it was proposed to upgrade and reinforcement the existing water treatment plant (Nyamabuye) constructed in 1980, as well as construction of a new water treatment plant on Mwange river to supplement Nyamabuye Water treatment plant in order to meet current and future water demand.

Budget for detailed engineering designs for water supply

Table 5: Budget for water supply detailed engineering designs

Designation	Unity	Qty	Days / Months	Unit price (US\$)	Total price (US\$)
Perdiem for Freelance Engineers	Man/Day	15	120	29	52,941
Withholding taxes	LS	1	1	9,343	9,343
Car rental	Daily rate	3	60	71	12,706
Accommodation for Freelance Engineers (females)	Monthly Rate	1	2	471	941
Accommodation for Freelance Engineers (males)	Monthly Rate	1	2	471	941

Team leaders (communication Fee)	Monthly Rate	3	3	18	159
Technical Validation meeting (s)	Participants	8	2	6	94
Accommodation for Technical Support Team during validation	Participants	6	2	47	565
Meals for the Technical Support Staff	Participants	6	2	6	71
Insurance for Freelance Engineers during field work	LS	1	1	588	588
Miscellaneous (Guiding Plumbers, Marking with peg and other Tools)	LS	1	1	588	588
Total					78,937

3.2.2. Sanitation in Schools and Health care facilities

Sanitation activities in schools and health facilities consist in constructing school toilets as well as providing rainwater harvesting systems.

The needs assessment in schools was guided by guidelines provided of the Ministry of Education that recommend 40 students per toilet cabin in single shifts schools and 80 students per cabin in double shift schools. All the primary schools in Gicumbi are double shifts. The assessment was done with the great support of the district's education department which provided information regarding the status of toilets and rainwater harvesting systems as well as current number of students.

Rainwater is harvested for environmental protection and cleaning purposes. All school blocs whose roofs were still in good condition and where there was no rainwater storage tanks installed were quantified and costs estimated based on the quantity of gutters needed, and storage capacity of the tanks to be installed.

The assessment indicated that to supply all the schools and health centers with the tanks needed, a total budget of 912,730 \$ was needed, while the cost for providing new latrines was estimated at 117,094 US\$

3.2.3. Collective sanitation in urban areas

a) Fecal Sludge Treatment Plant

Gicumbi Town with a total population close to 100,000 people had no sludge treatment plant, thus sludge emptying services were outsourced from Kigali for the households and institutions with septic tanks, while households with pit emptying would either do manual emptying or had to dig new toilets.

A Decentralizes Fecal Sludge Treatment (DEFAST) was designed to improve sanitation status in the town and in rural sectors of Gicumbi and cut down sludge emptying costs. The technology is designed to have six units of inlet screen for non-biodegradable solids, the dewatering unit, anaerobic baffled reactors, anaerobic filters, planted gravel filter and drying bed as shown in the below picture.



The design and the construction of a DEFAST for Gicumbi costed One Hundred Thousand US\$ (100,000 US\$).

b) Solid waste management (modern landfill)

Gicumbi Town faces a severe problem of solid waste management. Currently all the waste from the market places, schools and other public places, and households is dumped in an open dumpsite, as shown on below picture:



Picture of the current Gicumbi solid waste dumpsite

Water For people is being supported by a WWC Volunteer to design a modern landfill. The cost for construction will be estimated once the design phase is completed and validated by the district and the Regulator, but a similar landfill constructed by Lake Victoria Water Supply and Sanitation Program (LVWATSAN) in other six cities of Rwanda estimated the costs at US\$.603,000

3.3. Software component

In order to ensure successful implementation of the above-mentioned infrastructure, ownership of the facilities by the population, and sustainability of WASH services, software and capacity building activities were identified and costed.

3.3.1. Behavior change

Behavior change encompasses:

- Community pre-mobilization meetings with community to introduce them to the project (s) that will be constructed in their communities and ask for their support in the form of labor, giving out pieces of land where small project infrastructures will be constructed, and engaging them into the entire project implementation process, payment of services once projects are completed;

- Post mobilization meetings;
- Establishment of management committees (water users committees, Community Health Clubs, and District WASH Board) and training them on their roles and responsibilities in the projects;
- Hygiene and sanitation campaigns.

The total budget estimated for behavior change required was estimated at 225,616.14 US\$, made of transportation fees and lunch for trainees, training materials and other behavior change materials, campaigns, and exchange visits.

3.3.2. Monitoring and Evaluation

In project management, monitoring and Evaluation (M&E) is quite crucial as it allows measuring the progress made after the implementation of projects.

Annual monitoring and other assessments such as functionality of the water users committees, District WASH Board, Community Hygiene clubs, etc. was estimated at RWF 10,404,355 (\$ 13,000) made of training and per diem for enumerators, car hire, field insurance for enumerators, internet bundles, etc.

3.3.3. Water Resources management plan

To ensure sustainability of water services, Water For People supported the development of a water sources management plan, that indicate a course of actions that need to be undertaken by the district to protect water sources so they have reliable water yields and free from any kind of contamination.

Based on WFP experience in Rulindo, the development of the WRM plan was estimated at 80 96,400US\$ at planning process, but the actual cost was \$ 75,235

3.3.4. District WASH board and Customer feedback platform

In its effort to improve water supply systems management in rural areas, the government of Rwanda through its ministry of infrastructure, is promoting local institutions involvement into the management by encouraging the creation of District WASH boards across the country.

Water For People and the Gicumbi WASH Program partners have supported the establishment and capacity development of the district WASH board through direct support, trainings, and learning trips to other regions of the country. The annual support to the district wash board is estimated at \$ 7,228

4. Recapitulation of costs

Table 6: Costs for the assessment phase

Phase	Cost in \$
Service level assessment	13,000
Asset analysis	15,889
Capacity assessment	235
Detailed engineering designs (water)	78,937
Total	108,061

5. Overall budget need for full infrastructure coverage

The following table gives a summary of all the costs estimated to bring Gicumbi District to full and sustainable WASH Services.

Table 7: Costed investment plan for Gicumbi (5 years)

Budget item	Total US\$
Water Supply Infrastructure development	49,671,643.34
Monitoring and evaluation	144,017.11
Behavior change activities and community mobilization	225,616.14
Water tanks in Schools	912,730.24
Toilets in Schools	117,094.43
Water tanks and toilets in Health facilities	543,521.07
Underground tanks IDP model villages	797,647.06
Sustainability (Support to DWB)	130,588.24
Sanitation as Business	55,016.24
Office expenses	887,757.23
Sanitation facilities (Landfill and DEFAST)	705,882.35
Total	54,191,513.45

Note: Hygiene and sanitation tools, as well as a full life cycle costing tool that combines CapManex, OpEx and Direct costs are still under development.

It is understood by all partners to Gicumbi WASH Program that the program investment plan is a guiding documents, and the estimate costs herein could be modified based on progress, challenges and new budget item that might have been forgotten during the assessment and planning phases.