

# CWIS SAP

A TOOL TO SUPPORT INCLUSIVE SANITATION

**LEARNING BRIEF SERIES**



Roll-out of CWIS SAP in  
**LUSAKA**

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# INTRODUCTION

## About CWIS SAP

The Citywide Inclusive Sanitation Services Assessment and Planning (CWIS SAP) tool is a software tool to help decision-makers compare the outcomes of different sanitation interventions or investments based on criteria of equity, financial sustainability and safety of sanitation services. In 2019-2020, the Water and Sanitation Regulatory Board (WASREB) and Nakuru Water Supply and Sanitation Company (NAWASSCO) in Kenya and the National Water and Sanitation Supply Council (NWASCO) and Lusaka Water and Sanitation Company (LWSC) in Zambia piloted the tool.



The tool starts with a mapping of current city-level sanitation coverage and the costs to provide services, revenues and safety levels associated with each of the sanitation systems in use. It then allows the user to model up to three scenarios that consider changes to hardware, alternative revenue and service delivery models, or any mix of those interventions. Using data provided by utilities and regulators, the tool compares the outcomes of each scenario on:

- **Equity**, with indicators on coverage rates for different income groups, how public funds are targeted, and affordability for service users;
- **Financial sustainability**, measured by the cost coverage ratio and the net income of service providers; and
- **Safety**, defined as the percentage of waste safely managed.

The tool results allow decision-makers to weigh the trade-offs between different options and assess which intervention best meets their objectives. The CWIS SAP tool is intended to support utilities, regulators, and

other stakeholders including ministries, local governments, and development finance institutions to make informed decisions about how to prioritize limited resources for new investments in sanitation, structure tariffs, and design business models to deliver inclusive sanitation services. The process of gathering the data the tool requires can also provide a framework for identifying data points necessary to analyze sewered and non-sewered services and guide utilities and regulators to strengthen data collection and management.

### About this learning brief

This learning brief is part of a series of learning briefs produced to document the piloting of CWIS SAP in Nakuru and Lusaka. Athena Infonomics, Aguaconsult and the Eastern and Southern Africa Water and Sanitation Regulators Association (ESAWAS) provided technical assistance to regulators and utilities involved.

This brief presents how CWIS SAP can be used to support the implementation of inclusive sanitation policies, with a specific focus on Zambia. In recent years, Zambia has made significant progress in reforming the legal, policy, regulatory and institutional framework for sanitation, especially to enable public institutions to embrace their mandates with regards to non-sewered sanitation services.

The brief is organised as follows:

- It starts with a presentation of key developments of the sanitation sector in Zambia and highlights reforms that have been brought about to support inclusive sanitation;
- It then presents at which points of policy implementation, including investment planning, CWIS SAP can be used; and
- It presents some of the limits of CWIS SAP and additional complementary analysis that should be carried out.

While this brief aims to extract learning on the use of CWIS SAP at national level in Zambia, a large part of the lessons presented here have been drawn in discussion with LWSC based on the situation in its service area.

## SECTOR REFORMS TO BOOST INCLUSIVE SANITATION

### Context of sanitation services

**Zambia has witnessed significant sector reforms in recent years. These reforms are a response to the daunting challenges of sanitation provision in the country.** In the past 20 years, sanitation service coverage in urban areas has deteriorated, notably due to urban population increase. The Joint Monitoring Program (JMP) estimates that 36% of Zambia's urban population had access to at least basic sanitation services in 2017, compared with 46% in 2000. At the same time, the prevalence of shared sanitation facilities increased, with an estimated 33% of the urban population using such facilities in 2017. An estimated 30% of the urban population uses unimproved latrines or practice open defecation. Another key shift is that the proportion served by sewered sanitation has fallen from 36% to 21% since 2000.

**This situation is the result of a lack of adequate sanitation infrastructure.** In the district of Lusaka, only 16% of its 2.7 million population benefit from sewer services. More than half of households using non-sewered facilities do not have adequate containment solutions that safely separate excreta from human contact and the environment. Further, an estimated 83% of all wastewater and faecal sludge produced find its way untreated into the environment (Kappauf, Heyer, Makuwa, & Yulia, 2018). As in other districts of the country, this lack of sanitation causes chronic occurrences of water borne diseases such as cholera, typhoid and dysentery, in addition to severe environmental pollution.

**Over the years, a de facto vacuum of public oversight over non-sewered sanitation has intensified the crisis.** Until recently, the private sector has exclusively financed and delivered non-sewered sanitation services and the 11 publicly-owned utilities, also known locally as Commercial Utilities (CUs) have delivered sewerage services. Some CUs, such as LWSC in Lusaka, made attempts to provide faecal sludge treatment services. CUs and municipalities provided little oversight over the quality of household sanitation facilities and private operators providing faecal sludge emptying and transport services. The result has been sub-optimal levels of sanitation services from containment up to treatment.

**At the same time, the limited public investments in sanitation (especially compared with water) have been skewed towards the development of sewerage services.** Whilst actual data on the scale of public investments in sanitation country-wide is limited – due to a lack of disaggregated expenditures – Lusaka is a case in point. Of the nearly US\$ 300 million allocated to the Lusaka Sanitation Programme (LSP), only US\$ 21 million has been allocated to the development of non-sewered services (representing 7% of the envelope).

**Until recently, the costs of non-sewered sanitation have fallen on households themselves.** Those costs can be prohibitive, however, for those with low-incomes. For example, in Lusaka, a latrine of an acceptable upfront standard costs up to ZMW 10,500 (US\$ 775), compared with ZMW 3,000 (US\$ 223) on average in upfront sewer connection charges for households.

**In light of the government's commitment towards the Sustainable Development Goal 6, the country has stepped up efforts to clarify roles and mandates with regards to non-sewered services.** Reforms are ongoing to improve the legal, policy and regulatory environment to enable CUs and municipalities to target interventions in an inclusive manner, i.e. so that they cater both for low-income and non-low-income areas.

## **Policies and regulations to strengthen public authorities' oversight over non-sewered sanitation**

**Sanitation improvement is a policy priority under the Zambia 2030 vision and the 7th National Development Plan.** In this vision, the government has set a specific target of attaining 90% coverage by 2030. However, specific instruments to enable public authorities to act upon these aspirations were lacking. For example, up to 2018, CUs were not required to report on any performance indicator related to non-sewered sanitation provision apart from septic tanks.

**The sector regulator NWASCO has led efforts to enable public authorities in Zambia to fully embrace their mandates for sanitation.** In practice, this meant improving the policy and regulatory framework for sanitation to provide policy makers, regulators and service providers with the tools to embed non-sewered sanitation within their activities.

**The Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP), together with NWASCO, led the process of revising the national water supply and sanitation policy in 2019-20.** In addition to updates for the water sub-sector, the aim of these revisions was, among others, to strengthen provisions for non-sewered sanitation.

**In addition, NWASCO, under MWDSEP oversight, led the development of a regulatory framework for non-sewered sanitation in urban areas.** Published in 2018, this framework highlighted regulatory gaps regarding non-sewered containment, collection, transport and treatment services. For example, up to 2018 and the publication of the framework document, there were no service level indicators regarding faecal sludge management and therefore no oversight over this type of service. Additionally, there was a lack of clarity on responsibilities falling under CUs versus those falling under to the respective municipal authorities.

**This regulatory framework introduced resolutions at multiple levels to clarify roles and responsibility and establish regulatory instruments.** NWASCO specified that licenses to CUs cover both sewered and non-sewered services in the entire district (urban, peri-urban and rural growth centers). The framework identified a number of areas where more regulations were needed: the operations and maintenance of non-sewered sanitation facilities, for emptying and transport services and standards for faecal waste disposal; the need for service level agreements and guarantees (contained in CUs' licenses) to include indicators for non-sewered sanitation; and the development of tariff guidelines, especially for emptying services. As of 2020, NWASCO had made significant progress in drafting these regulations.

**NWASCO developed specific guidelines for CUs to engage with private operators, who are the main providers of these services.** NWASCO is developing contract types or terms of engagements between CUs and those who provide emptying and transport services. As CUs are legally in charge of all sanitation services through their licences, any entity such as a private operator or a CBO will be required to enter into a contract with the relevant CU to deliver sanitation services. The principles of this contractual arrangement include, among others:

- The definition of a service area or “zone” guaranteed exclusively for the operator, effectively eliminating competition and providing some economies of scale;
- A price fixed according to NWASCO’s tariffs guidelines;
- A charge to be paid by the operators to the CU (in exchange for the permit to operate);
- A desludging schedule, which provides operators a guaranteed stream of revenues and provides CUs and regulators with a basis to assess their performance; and
- Standard operating procedures to be met by the operators.

**In Lusaka, this framework was complemented with a by-law specifying norms and standards for non-sewered containment solutions.** The by-law also specified Lusaka City Council (LCC)’s power in case of infringement. The by-law aims to increase the number of containment facilities that provide hygienic separation of excreta and can be emptied in a professional manner. However, at the time of the report, the by-law was not yet published.

## HOW CAN CWIS SAP COMPLEMENT THESE EFFORTS TO DELIVER INCLUSIVE SANITATION SERVICES?

CWIS SAP can support CUs, the regulator and policy makers deliver on their policy objectives and mandates at many levels. The section provides a brief overview of CWIS SAP before highlighting three use cases:

- Supporting CUs in identifying the most financially viable option, whilst reaching the largest number of people;
- Assessing affordability and subsidy requirements to enable access to sanitation services; and
- Providing advocacy material for more sustainable, equitable and safe interventions.

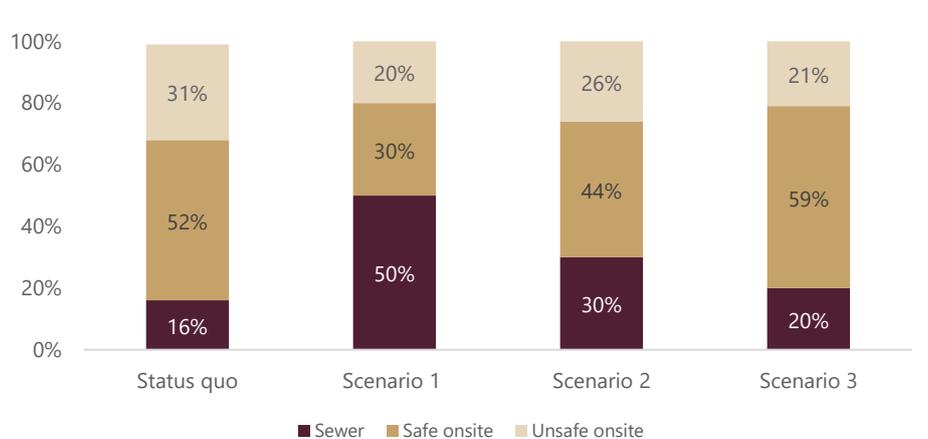
### CWIS SAP: a brief overview

CWIS SAP is organised along three key steps: investment scenarios development, data input and results visualisation. Results are presented for each investment scenario at the level of three outcomes: equity, financial sustainability and safety.

Each scenario developed is based on coverage rates for different hardware choices across three broad categories: sewer, safe onsite and unsafe onsite. CWIS SAP also enables users to specify the sanitation systems (and their components) that are promoted in each scenario along the sanitation service chain. In Lusaka, where the tool was piloted, three main scenarios were developed as shown in Figure 1 below and compared with the status quo (current situation):

- Scenario 1 was based on Lusaka’s master plan and was the “sewer-heavy” scenario;
- Scenario 2 increased the targeted coverage rate of non-sewered sanitation compared with the master plan scenario; and
- Scenario 3 further increased the targeted coverage rate for non-sewered sanitation.

Figure 1: Scenarios modelled in Lusaka during piloting



*Note: Preliminary scenarios developed by LWSC in September 2019*

Once scenarios on coverage rates are identified, the user inputs related data on service models, costs (including who bears the costs) and revenue streams. CWIS SAP also helps to identify whether interventions are likely to benefit low-income or non-low-income households or both. Additionally, the tool builds on the Shit Flow Diagram (SFD) approach to estimate the proportion of the population who benefit from collection, conveyance, treatment and disposal services for each scenario.

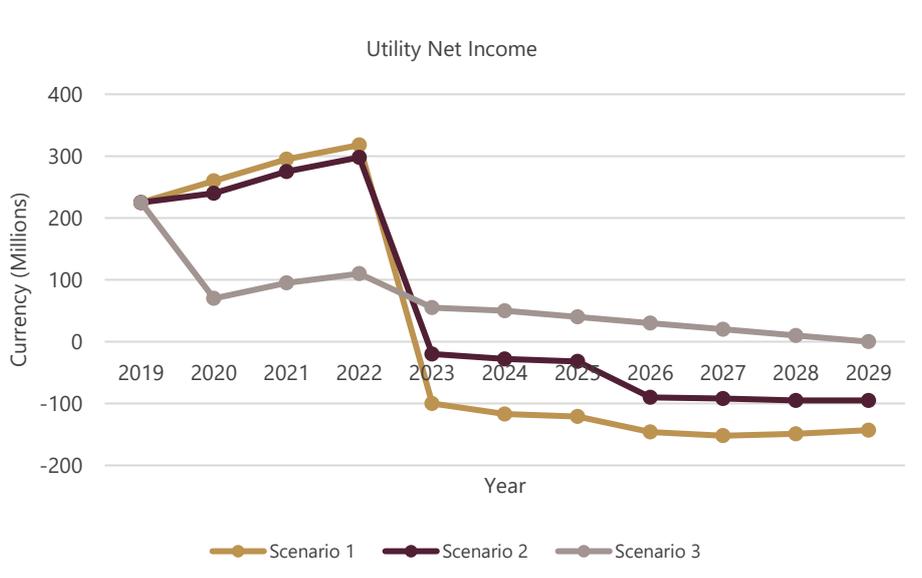
Finally, scenarios and data input enable CWIS SAP to present a visualisation of scenario outcomes using a range of indicators. For example, for equity, CWIS SAP presents results in terms of coverage increase by income groups as well as projected household expenditure, to help assess affordability. At the same time, CWIS SAP provides estimates of the cost coverage ratio for each intervention, both for the CUs and private operators, as well as expected net income.

### Supporting CUs decision-making based on financial viability

CUs, like all water and sanitation utilities, are confronted with the dual challenge of achieving cost recovery while delivering the high standards of service, starting with reaching universal service coverage. In practice, however, the low coverage rates throughout Zambia show that CUs, to date, are far from achieving this policy objective. Investments in the urban sanitation sub-sector are critically lacking. Further, CUs' investments are constrained by the policy requirement to achieve gradual full cost recovery through user charges in the long run (a key principle of Zambia's water sector policy since 1994). Finally, the government of Zambia requires any loan contracted by CUs to sit on their balance sheet, with the central government acting only as a guarantor.

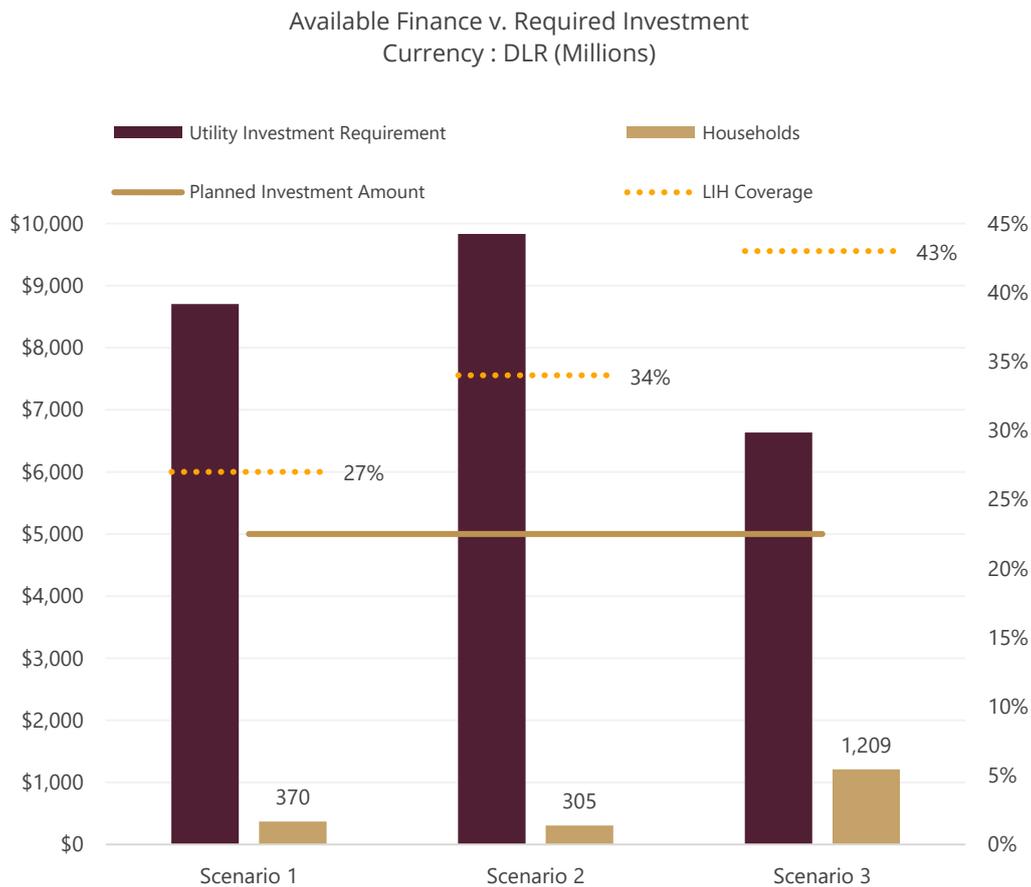
In this context, it is becoming imperative for CUs to identify investments and service models that are the most cost-effective, i.e. that deliver the highest coverage rates with the lowest capital requirements, while generating revenues. CWIS SAP can support CUs on precisely this aspect, by enabling them to compare the outcomes of different investment scenarios on their financial position and identify those scenarios which are the most attractive from a net income perspective. For example, in the hypothetical scenarios below (Figure 2), none of the scenarios are attractive from an income perspective, but Scenario 3 clearly outperforms the others in this respect.

Figure 2: Visualisation of scenarios' outcomes on the utility's net income



In addition, CWIS SAP can assist CUs in visualising the most cost-effective interventions. Figure 3 below provides hypothetical scenarios. Among the three scenarios, Scenario 3 appears to be the most cost-effective, with the largest coverage rates and the lowest investment requirement by the utility. Figure 3 also indicates the potential investment gap, if the utility is to pursue any of those scenarios, i.e. the difference between the required investment and the planned investment.

**Figure 3: Cost-effectiveness of different interventions (investment requirements vs coverage rates)**



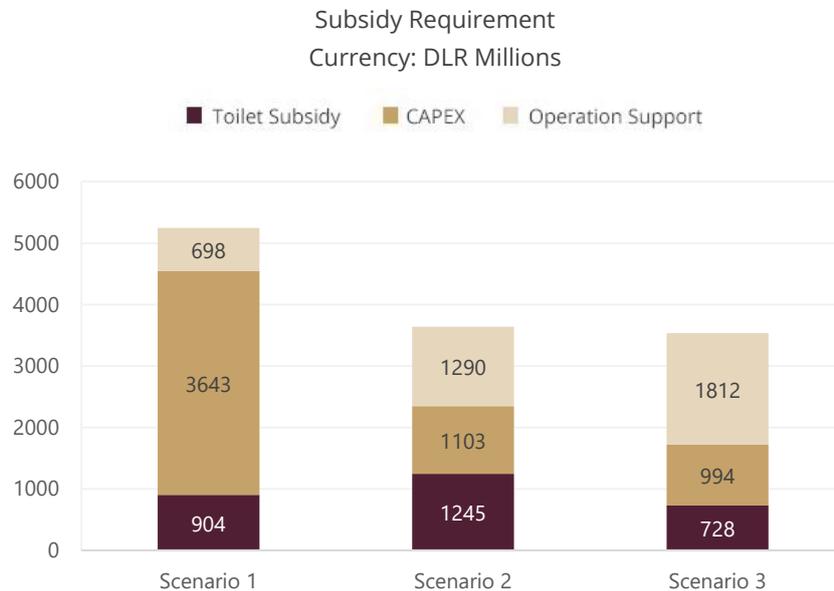
### Assessing affordability and potential subsidy requirement

A major constraint for the development of sanitation services is affordability for customers. In Lusaka, recent sanitation projects have acknowledged this constraint and are offering subsidies to households and private operators in order to incentivise demand. Under World Bank financing, LWSC is covering up to 86% of the cost of a standard latrine as a subsidy depending on the targeted beneficiaries and up to 70% of emptying costs. However, scaling-up such an approach would require significant investments from LWSC. As of 2020, LSP set a target of building and subsidising 5,500 individual household latrines.

CWIS SAP can support the modelling of the subsidy requirement, if the utility is considering this. Key input data of the tool include the costs of containment solutions considered under the different scenarios. Utilities can then identify different subsidy levels that could be introduced to bring those costs down to an affordable level for households. The tool shows what expenditures customers from different income levels would be expected to make (both for capital investment and operating expenditure), leaving the

decision as to what could be considered affordable to utilities (and regulators). In addition to subsidies on capital investments, the tool can assist with planning in estimating any subsidy requirements for operational expenditures.

**Figure 4: Mapping of subsidy requirements**



## Advocacy material for inclusive and sustainable sanitation investments

**CUs have to respond to the priorities of their shareholders and Board of Directors.** In presenting their investment plans, CUs need to balance commercial and political interests, since local governments are their shareholders. While political interests may skew investments towards water services (which are more visible and ribbon-cutting investments), CUs face an additional challenge to make the case for increasing investments in non-sewered services. CWIS SAP could support CUs convey how targeted investments can lead to increased coverage rates, in line with government policy objectives.

**In addition, CUs, as other utilities, do not operate independently when making investment decisions.** The regulator (NWASCO) and the policy maker (MWDSEP) contribute to these decisions, especially where:

- Investments are likely to lead to a tariff increase (or at least a request that tariffs are increased); and
- The central government is likely to act as a guarantor for accessing finance.

**CWIS SAP can support CUs' discussions with the regulator, the policy maker, shareholders as well as development partners at key points in the decision-making process:**

- To demonstrate that a range of options has been considered, including non-sewered sanitation, before formulating investment needs (and any corresponding tariff increases);
- To show possible trade-offs between policy requirements (increasing access to services) and financial viability and therefore possible needs for grant support; and

- To explore options to recover the costs of investments that have been incurred, such as increasing tariffs.

## COMPLEMENTARY ACTIONS TO CWIS SAP

CWIS SAP can bring substantial benefits for utilities. However, in order for the tool to deliver credible results, it should be complemented by a detailed technical planning exercise and an assessment of the supply and demand for non-sewered sanitation.

### Planning to identify infrastructure gaps and relevant technologies

**A detailed planning exercise can provide a strong basis for developing scenarios inputted in CWIS SAP.** In this planning exercise, utilities prepare situation assessments to analyse demand and existing assets (e.g. which latrines need to be upgraded, whether a faecal sludge treatment plant needs to be constructed, etc.) and feasibility studies to identify the most pertinent technologies (for example, conventional sewers vs. condominal). Such studies also generate important data on access levels, availability of infrastructure, households' expenditure levels and willingness to pay, among others, all of which can be used to inform CWIS SAP. In practice, however, very few utilities have carried out such planning for their entire service area. Even when it exists, it may not provide the range of data needed for sound decision-making.

**When detailed planning data is not available for the entire service area, CWIS SAP can still be relevant.** It can be used for decision-making over small-scale investments (targeted at specific areas, for which data is available). It can also assist utilities in identifying the data gaps and initiate a data collection process on this basis.

### Supply and demand assessment of non-sewered sanitation

**CWIS SAP provides evidence for decision-making mainly based on hardware or infrastructure development.** However, as utilities seek to engage with the private sector (and other operators) to build sustainable sanitation services, this engagement will require resources. In addition, if CUs rely on the private sector to deliver some services up to certain standards, then some capacity building may be necessary. Service providers may also face other constraints, such as a lack of demand and a fragmented and competitive market that leaves limited economies of scale. CUs and the regulator can provide support in lifting these constraints, if needed.

**Intervention outcomes that are highlighted by CWIS SAP should therefore be complemented with an assessment of the state of the market for non-sewered services, both the supply and demand side.** On the supply side, this assessment should focus on the capabilities of those alternative operators, including the private sector, to deliver on the policy objectives and extend their services areas, where necessary, especially to reach the poorer. On the demand side, in addition to understanding customer preferences regarding willingness to pay for services, public awareness campaigns are essential to scale-up desludging services and need to be resourced.

## CONCLUSION

**The sanitation sub-sector in Zambia is undergoing promising changes.** This brief highlighted the development of a regulatory framework that allocates clear responsibilities between sector actors

regarding sanitation services – both sewered and non-sewered. In the context of these reforms, a tool such as CWIS SAP can complement technical planning exercises and demonstrate the different trade-offs of potential technical options in terms of financial sustainability, equity as well as safety.

**For CWIS SAP to be able to influence decision-making, there is need for alignment between all actors concerned with the relevance of the tool and the three outcomes of equity, safety and sustainability.** These actors include the line ministry, the municipality and a range of development partners, who all play a critical role in shaping the nature of investments. Integrating the tool, or at least the three outcomes (financial, equity and safety), within existing processes requires communicating CWIS SAP with these actors and building consensus on its relevance.