



TERMS OF REFERENCE FOR A DIRECTED WRC PROJECT

THEMATIC AREA	Water Use
TITLE	Optimising Water Services in Informal Settlements: Cost Analysis and Savings Potential of Decentralised Reuse and Shared Service Models
TOR	1010083

Background and Rationale

This project seeks to assess the potential water (and cost) savings achievable through the implementation of decentralised water recycling and water-efficient sanitation technologies in indigent communities and informal settlements. The costs associated with supplying water and sanitation services to these communities are sometimes administratively classified by municipalities as Free Basic Water or Non-Revenue Water (NRW). While this is a necessary and essential service, the associated costs can become unsustainable as informal settlements continue to grow. A number of decentralised water and sanitation technologies that recycle water have been demonstrated in various contexts. Within the Water Research Commission's (WRC) SASTEP portfolio, such systems have been implemented in rural schools and the cities of Durban and Cape Town. Earlier demonstrators in rural school environments have shown that one of the main benefits of these decentralised technologies is water cost savings, particularly from reduced flushing. There is an opportunity to extend these savings to other water uses, such as clothes washing. For example, eThekweni Municipality operates over 1,000 communal ablution blocks (CABs) that provide flushing toilets, showers, and clothes-washing facilities in informal settlements. Introducing decentralised water recycling systems in such facilities could significantly reduce this water supply cost. Research has also shown that municipalities operate all services to informal settlements as *ad hoc* with limited technical support and there is an opportunity to rethink integrated planning (water, sanitation, drainage, solid waste and community services) and resourcing to gain more savings and provide sustainable water services.

The study will quantify current water supply costs for these services in selected areas, evaluate the technical and financial viability of integrating decentralised water reuse systems, and model potential cost savings for municipalities. The objective is to provide evidence-based recommendations to reduce water supply costs and improve service delivery in under-resourced communities, while enhancing water security and resilience through innovative, inclusive water management strategies.

This project also presents an opportunity to explore broader shifts in how informal settlements are planned, serviced, and managed. Rather than treating water and sanitation interventions as isolated technical services or interim emergency measures, the study should investigate how decentralised reuse systems and shared service models can support more integrated, adaptive, and sustainable approaches to informal settlement upgrading and management. This includes consideration of how water, sanitation, drainage, solid waste management, energy use, community services, and local governance arrangements can be planned in a more coordinated manner to improve service efficiency, reduce long-term municipal costs, and enhance resilience in rapidly growing settlements.



Objectives

General:

To evaluate the potential for reducing water supply costs in informal and indigent settlements through the adoption of decentralised water recycling and water-efficient sanitation technologies in indigent communities and informal settlements.

To promote integrated, sustainable, inclusive, and cost-effective water and sanitation service delivery models that address the unique needs of underserved populations.

Specific Aims:

- Quantify current water consumption patterns and water supply costs in selected informal settlements and indigent communities, with a focus on water used in sanitation and communal services. Identify key water-use areas (e.g., toilet flushing, showering, clothes washing) where recycling technologies can achieve the greatest savings.
- Assess the technical feasibility and potential for implementing decentralised water reuse and water-efficient sanitation systems in these areas.
- Evaluate the financial viability and cost-saving potential of these technologies for municipalities, with specific attention to operating costs and reductions in water supply costs.
- Review and document lessons learned from existing pilot projects, including those under the WRC's SASTEP programme.
- Develop implementation scenarios and models for scaling up these technologies and delivery models, including projected savings and return on investment.
- Provide policy and planning recommendations to guide municipalities in incorporating these solutions into their broader water and sanitation strategies.
- Explore how decentralised reuse systems and shared service delivery approaches could support more integrated planning, management, and upgrading of informal settlements, including opportunities for coordination across water, sanitation, drainage, solid waste, energy, and community services

Scope of Work

The scope of work aligns with the objectives, including additional knowledge dissemination through workshops and peer-reviewed journals, as well as an edited Final Report (20% of the total project budget).

The study should not only assess technology feasibility and cost savings, but also examine the institutional, planning, and service delivery implications of decentralised and shared service approaches in informal settlements. This includes identifying opportunities for more integrated and sustainable settlement-level infrastructure planning and management.

It is the responsibility of the proposers to secure access to the necessary data from municipalities, including CAB data. While the WRC can facilitate these engagements, it is preferable that proposers obtain prior confirmation or assurance of data availability from the relevant municipal stakeholders. This should be included in the proposal submission. Similarly, metering and metering data may not be available at all sites; these challenges should be worked out beforehand.



4. Deliverables

Deliverables should align with the study's objectives.

Not more than three deliverables per financial year.

The first-year deliverables may NOT include an advance.

The final deliverable of the print-ready final report, valued at 20% of the budget is required.

Total Funds Available:

R1 million over 3 years.

Year 1: R400,000.00

Year 2: R400 000.00

Year 3: R200,000.00 (Final Report)

Key Background Sources:

Please read through background literature in designing your proposal

<https://www.ajol.info/index.php/wsa/article/view/90116/79559>

<https://ujcontent.uj.ac.za/esploro/outputs/doctoral/Communal-ablution-facilities-as-interim-measure/9912162807691>

<https://infrastructurenews.co.za/2023/11/20/cape-town-to-pilot-new-sanitation-technologies/>

<https://verixiv.org/articles/2-124>

https://www.wrc.org.za/wp-content/uploads/mdocs/2519_final.pdf

<https://pubmed.ncbi.nlm.nih.gov/19542639/>