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Impact evaluation of the project 'Sustainable Water and Sanitation Development Programme for Indigent Communities in eThekwini Municipality'

Final report

Rijksdienst voor Ondernemend Nederland

2017-0794/AK/bw/vd

6 October 2017

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Rijksdienst voor Ondernemend Nederland
Attn. Ms Sylvie Sprangers
Prinses Beatrixlaan 2
2595 AL DEN HAAG

6 October 2017

Reference: 2017-0794/AK/bw/vd

Subject: Impact evaluation of the project 'Sustainable Water and Sanitation Development Programme for Indigent Communities in eThekwini Municipality'

Dear Ms Sprangers,

In accordance with your instructions as agreed upon in our contract dated 5 April 2016, you receive this report on the Impact evaluation of the project 'Sustainable Water and Sanitation Development Programme for Indigent Communities in eThekwini Municipality'.

The goal of this engagement is to provide RVO.nl and other stakeholders with insight into the output, outcome and impact of the project and our recommendations. The method of the evaluation, as agreed with during the Steering Committee meetings, is described in paragraph 1.3 and the appendices to this report.

The scope of the engagement is limited to the evaluation of the matters described in this report. We do not provide assurance on the data provided to us by the project implementers.

For the record we would like to point out the following:

- This document is only intended primarily for you, but may be distributed as long as its contents are not modified.
- We will not accept any liability or duty of care to any party regarding the contents of this document.

If you have any questions, please do not hesitate to contact Bas Warmenhoven on +31 (0)88 792 32 66.

Yours sincerely,
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Abbreviations

CAB	-	Community ablution block
CSO	-	Civil Society Organization
DWA	-	Department of Water Affairs
EWS	-	eThekwini Water and Sanitation Department
FGD	-	Focus Groups Discussions
GA	-	Grant Arrangement between RVO (grantor), DWA (grantee) and eThekwini Municipality (competent authority)
MDG	-	Millennium development goals
NRW	-	Non-Revenue Water
O&M	-	Operation and Maintenance
ORIO	-	Grant Facility for Infrastructure Development
PTO	-	Permission to occupy
RVO	-	Netherlands Enterprise Agency
SAN 1, 2, 3	-	Sanitation phase 1, 2, 3 (the three programme phases)
SMEC	-	Contracted project manager
ToR	-	Terms of Reference
WHO	-	World Health Organization
WWNB		EWS' Wastewater Network Branch

Management summary

The consortium of PwC NL and the Amsterdam Institute for International Development (AIID) has conducted the evaluation of the ORIO project 'Sustainable Water & Sanitation Development Programme, for Indigent Communities in eThekwini, South Africa' at the request of the Netherlands Enterprise Agency (RVO.nl). The project was implemented by the eThekwini Water and Sanitation Department (EWS) with the support of an ORIO grant. During 2016 and 2017 we have carried out the evaluation, for which we present the findings in this final report. The evaluation has resulted in a **conclusion** of the findings, an initial **discussion** around these findings and a number of **recommendations** to be carried forward by RVO.nl and EWS for the improvement of the project and the sustainability of its results.

The EWS Sanitation programme is defined as the development, design, construction, commissioning, operation and maintenance of communal water and sanitation facilities which have the aim to:

- meet water and sanitary needs of the people in informal settlements;
- contribute to the improvement of living environment;
- contribute to epidemic avoidance and socio-economic development of informal settlements in the eThekwini municipality.

The programme has selected 173 informal settlements that will be upgraded with 1,676 so-called Community Ablution Blocks (CABs). The overall programme consists of a three-component approach:

- building of 1,676 CABs for the provision of water and sanitation to previously unserved population in informal areas (separate facilities for men and women);
- reduction of non-revenue water (NRW) from 37.5 percent to 25 percent through the installation of meters and valves, water pressure management and prompt repairs;
- operation and maintenance (O&M) programme to run the CABs: deployments of caretakers and mechanics and provision of equipment and consumables.

The implementation of the programme has been divided in three phases, known as SAN 1, 2 and 3. The target for SAN 3 was to deliver 750 CABs, of which 400 were to be constructed with the co-financing from the ORIO grant. The CABs are an interim measure aimed at upgrading the informal settlements with temporary facilities. Sustainable operation of the facilities has been a central consideration in the development of the project. This has led to the implementation of an O&M programme. For every location a paid caretaker is appointed to ensure cleanliness, safety and usability of the CAB. Plumbers and technical staff carry out maintenance activities. Community members are informed on facility use, hygiene and reporting of issues.

Conclusions

In the conclusion we provide an answer to each of the main evaluation questions on the level of output, outcome, impact, sustainability and cost-effectiveness of the project.

Output: 348 CABs delivered out of the 400 originally estimated; lower than expected number of users per CAB

The ORIO project financed the construction of 400 CABs in over 100 informal settlements in eThekwini. This is part of the third phase (SAN 3) of a larger programme implemented by EWS, which was started in 2009 and has constructed around 1,100 CABS in the preceding phases SAN 1 and SAN 2. SAN 3 started in January 2016 and has constructed 261 CABs up until the end of June 2017. With 87 CABs under construction, it is expected that a total of 348 CABs will be constructed with the ORIO funding. The original target of 400 CABs will eventually be reached, but with additional funding from the municipality.

The average number of users per CAB is estimated at around 225 (half of the targeted number of 450 users per CAB), which brings the total current number of end-users from the ORIO project to approximately 58,725. Even with the lower average number of users per day, queuing is normal during busier hours, although in most occasions the capacity of the CABs appears to be sufficient. Overall, it can be concluded that the location and design of the CABs are suitable. In SAN 3 most of the constructed communal facilities are modular CABs which have several design benefits over the containerized CABs that were mostly used prior to SAN 3, including flexibility in construction and maintenance.

Outcome: More than half of targeted beneficiaries use the CAB at least once a day; keeping the CABs clean and functional appears to be a challenge in older CABs

The first step towards creating an impact with the CABs is that the targeted beneficiaries use them regularly. This is indeed the case: more than half of the targeted beneficiaries use the CAB at least once a day and only 18 percent of them did not use the CAB at all in the past 3 months. Respondents mention toilets as the CAB facility that they use most. Targeted beneficiaries of the CABs still use alternatives for all purposes of the CAB. Particularly at night, people use alternative toilet facilities, mainly pit latrines or buckets, because CABs are generally closed or perceived as unsafe during the night. The older SAN 2 CABs, constructed in 2013 and 2014, are used more intensively than the SAN 3 CABs, most likely because some SAN 3 CABs have been placed in settlements that had already received one or more CABs in the SAN 1 or SAN 2 phase.

The next step is to make sure that users remain satisfied with the CABs, so that they continue using them. Overall, users are satisfied with the location, the design, safety and cleanliness. However, households using a SAN 2 CAB are significantly less satisfied compared to SAN 3 users, in particular with the cleanliness of the facilities. Our on-site observations also revealed that the SAN 2 CABs are dirtier and broken more often than SAN 3 CABs. The SAN 3 CABs are in a good state. Factors contributing to this difference include the lower number of households per CAB in some SAN 3 locations and the longer average opening hours of SAN 2 CABs. According to caretakers of the CABs, improper use is the main reason for broken parts and people confirm the improper use by members of the community.

Impact: Indications of more formal employment and better health in targeted areas, however, our data cannot link these observations unambiguously to the project

The intervention has led to several results that can be ascribed to the project, with different degrees of certainty. We note that it is in some cases less clear what the actual impact is, because the project consists of an intervention in a complex social situation with an existing landscape of water and sanitation facilities.

The fact that CAB facilities are used frequently is already a great result in itself, since this means that people appreciate the facilities and that more wastage is drained from settlements than before. EWS was successful in targeting persons in need for the job of CAB caretaker. This means that around 350 people that previously had little income, now have the certainty of a fixed job. Formal employment is significantly more common in CAB locations (more than 20 percentage points), but it is hard to think of a mechanism to explain this finding.

Regarding health impact, in the group with access to a CAB, the diarrhoea prevalence was half that of the comparison group, but this effect is not statistically significant. At least in the qualitative case studies, the CABs have made a great difference to health and hygiene. Users state washing their hands more often after toilet use, and surroundings are reported to be cleaner and more hygienic, since CABs allow them to dispose of waste water as well as flushing faeces. We do not observe significant gender differences in the impact variables.

Looking at negative effects of the intervention, the main issues that people encounter with CABs is that there is a lack of privacy and some people worry about compromised hygiene due to communal use of the facilities.

Sustainability: Limited organizational capacity and a maintenance challenge pose risks to long-term upkeep of results

While EWS is a capable organisation that has largely been able to manage this complex project, there are still several aspects of the project that form risks for the continued operation of the CAB facilities. These risks need to be addressed to ensure sustainability of the observed results.

Organizational capacity: EWS (as well as the eThekwini Health Department) lack staff capacity. This has contributed to backlogs and lack of internal coherence and coordination. There is a serious risk that capacity problems increase with the further roll-out in construction, which takes place at a high speed to reach targets.

Maintenance and continued operation: the project will pose an increasingly big challenge to maintain the results in the future and to cover the costs related with maintenance. Costs for maintenance are increasing with the expansion of the project and ageing of CABs. There is little overall monitoring of benefits and outcomes, although the maintenance unit is taking steps to improve CAB monitoring. Furthermore, although reliable up-to-date information on non-revenue water is not available, the last reliable information for 2016 shows a high NRW of 40 percent. Together with unfavourable water availability in the past years, this can have a severely negative effect on sustainability.

Cost-effectiveness: Costs per beneficiary and per CAB are higher than anticipated

Overall, the ORIO grant has made a valuable contribution in terms of number of beneficiaries. The number of end-users will be closer to 78,300 than the intended 180,000. This means that the costs per beneficiary and per CAB are higher than anticipated. While the project should aim to reach as many people as possible, at the same time a lower number of users per CAB could enhance the usability of the facilities for the end-users. The grant is at least partly additional: it is likely that part of the funding from ORIO could have been paid for by the Municipality, although this would also have reduced its resources for other activities, such as the construction of additional CABs in the future or continued maintenance.

Discussion

We provide some initial deliberations in order to clarify the interrelations and significance of our findings and to provide a start for RVO.nl and EWS to discuss the findings.

Implications of the changing housing policy

eThekwini municipality has fully committed to the strategy of community ablution facilities and to the expectation that this will be a temporary solution. According to the Human Settlement Unit the government will no longer provide formal housing to everyone. The policy change negates one of the underlying assumptions of the SAN 3 project and the larger CABs programme and requires EWS to reconsider the role it expects the CABs can fulfil in the provision of water and sanitation services in the long run.

One option is for the CABs to become a more permanent solution, meaning that a longer lifetime should be ensured and costs for O&M are continuous. Another option is for EWS to initiate a large-scale programme to provide private water connections. We expect that even with the abandonment of the formal housing transfer policy, CABs are still a suitable temporary solution, at least to serve part of the informal settlements. It does mean, however, that the design of the CABs must be more closely aligned with the chosen strategy.

Number of users per CAB

The fact that a significantly lower number of end-users is reached compared to the number of targeted end-users has implications for the size of the project's impact, and thus affects the assumptions and expectations on which the project agreements between RVO.nl and EWS are based. For RVO.nl it may be important to have a more realistic estimation of the number of beneficiaries reached with the project and also to understand the implications of the fact that less people are reached.

This can be viewed from two perspectives. Our evaluation has confirmed that there have been several important improvements to livelihoods and communities due to the CABs, and it is somewhat disappointing that there is still a large group of people in informal settlements that have not been provided with access to a CAB in their direct surrounding. On the other hand, we have found a strong indication that a lower number of users also results in less frequent queues, less uncleanliness and fewer defects. It is therefore important to set a lower and more realistic target for the number of users, based on a consideration of the optimum number of users. This also gives a more realistic insight in the number of people that are not yet, or only partly, being served.

Ensuring the sustainability of the intervention

RVO.nl has provided a grant for the water and sanitation project with the intention of making a contribution to sustainable service delivery. There are several indications that the CAB facilities that have been constructed over the years have deteriorated at a higher speed than had been anticipated. It will not be easy for EWS to ensure that the CABs, including those co-funded by RVO.nl, will be maintained and remain operational over the coming years. The ability of EWS to recognize the shortcomings and challenges and to implement effective measures will determine how well it can cope with the increasing maintenance needs. Based on our evaluation we foresee some important risks. It will be important for EWS to minimize the deterioration of CABs and to develop an efficient and smooth-running maintenance process.

Water availability and non-revenue water

Lastly, eThekwini has been facing low rainfall and water levels coupled with more demand on the water reservoir due to urbanization and migration. Lacking adequate measurements, we cannot be certain whether the CABs have also increased demand on the water supply, but this is certainly likely, for example as a result of water used in showers and for the flushing of toilets in settlements that previously were serviced only by public standpipes. Important concerns for the success of this water and sanitation project follow from these trends.

This problem also begs the question if it is feasible to provide more CABs to locations that previously did not use flushed toilet systems and running showers. An important part of the project rationale was the intention to significantly reduce the high level of water that was wasted or unaccounted for, the NRW.

There are two issues with NRW activities. First, the activities and outcomes of NRW have not been closely monitored. Second, the information that is available from mid-2016 seems to indicate that the level of NRW is even higher than it was at the start of the project. In our view, the relation between the NRW and the implementation of the CAB project should have been much more clear throughout the implementation of the project. For RVO.nl, who has funded part of the NRW activities, it is important to receive information on this aspect.

Recommendations

Based on the conclusions and discussion, we present the following recommendations to EWS and to RVO.nl to improve the implementation and sustainability of the ORIO project and EWS's overall Sanitation Programme.

Implementation & Output

Continue roll-out and maintenance. Based on the evident added value that the CABs have to the inhabitants of the informal settlements, we recommend to eThekwini municipality to continue the roll-out of CABs to unserved areas. However, it is crucial that the EWS structures for CAB maintenance and monitoring and reduction of NRW are simultaneously strengthened. This should be addressed in a strategic way, with a vision for the medium term, in alignment with the different EWS units as well as the contracted implementers.

Assess best design. In relation to the seemingly practically motivated change in design from a containerized facility to a modular facility in SAN 3, we recommend to assess what the most suitable type of facility would be and to make a cost-benefit analysis, taking into account the differences between various types of sites and the long-term annual costs of O&M.

Develop initiatives for participation and ownership. We recommend that the caretaker gets more authority and is supported in this role so that users will develop more discipline in using the facility. The fact that the caretaker is paid to clean the CAB takes responsibility away from the community. Next to compensating the caretaker, another mechanism could be sought to place more responsibility with the community.

Recalculate the optimal number of users. In the further roll-out of the programme reconsider if 450 end-users is realistic and desirable. We found that there are on average 225 users for each CAB site, and the capacity of the CABs mostly meets this number of users. Adjusting the users per CAB downwards would require a larger number of facilities to be provided to reach the same amount of beneficiaries.

Strengthen cooperation with partners (departments). We recommend a stronger involvement of eThekwini's Health Department. This could somewhat help to improve people's knowledge of how to use the CABs. It could also provide a feedback mechanism from the Health Department to EWS on further improvements to the project.

Incorporate health improvements. Consider providing soap for washing hands in the CAB, using a fixed dispenser that cannot easily be removed. Since this introduces another risk of theft, a design should be developed that makes it difficult or unattractive to remove the dispenser.

This evaluation has not been able to make an unambiguous assessment of the health effects of community ablution facilities. We recommend eThekwini municipality to incorporate an evaluation element in the next phase of the programme, in order to obtain more rigorous evidence on the health impact of the facilities.

Sustainability

Given the results of the project as they have been achieved in SAN 3 and the preceding phases, and may be achieved in SAN 4 and later phases, attention should be paid to their sustainability.

Revisit the long term strategy. For this reason, our primary recommendation regarding sustainability is to thoroughly revisit previous expectations of the lifespan of the CABs and the period they are in service, and

develop a revised strategy for their O&M. We advise that based on this assessment of the revised O&M strategy, RVO.nl will be informed and consulted by EWS through the preparation of a proposal for RVO.nl, allowing the RVO.nl project officer to comment on how RVO.nl's investment will be maintained and the project's results will be ensured.

Assess the project context. The eThekwini water system is currently operating under less than ideal conditions as a result of the ongoing drought. Combined with the finding that the NRW reduction component of the project has not met its target, this should lead EWS to consider to what extent delivering further CABs to the informal settlements will not reduce the service level to existing water users to new lows.

Work on innovations. The technical solutions that are currently being experimented with should be given the necessary attention to be implemented forthwith if they prove to contribute to saving water and making operational cost reductions. We would encourage the EWS' Wastewater Network Branch to keep experimenting with the application of solutions proven abroad.

1. Introduction

1.1. Introduction of assignment

The Facility for Infrastructure Development ORIO is funded by the Dutch Ministry of Foreign Affairs and implemented by the Netherlands Enterprise Agency (RVO). ORIO contributes to the development, construction, expansion, operation and maintenance of public infrastructure in developing countries. By realizing functional public infrastructure. ORIO aims to contribute to human development and private sector development. Until 2014, central governments of about fifty developing countries could apply for an ORIO grant for their infrastructure development projects in one of the following sectors: water, environment, energy, transport and logistics, ICT, social services and civil works. Sixty-seven projects have been, or are being, developed or implemented in Africa, Asia, Latin America and Eastern Europe. The Facility for Infrastructure Development ORIO is funded by the Dutch Ministry of Foreign Affairs and implemented by the Netherlands Enterprise Agency (RVO).

The third phase of the "Sustainable Water and Sanitation Development Programme for Indigent Communities", in eThekwini, South Africa is partly funded by the ORIO programme. The third phase (known as "SAN 3") develops better sanitation facilities by building Community Ablution Blocks (CABs) in informal settlements in the eThekwini Municipality. This project also aims to reduce the Non-Revenue Water (NRW) levels through active leak detection and repair, implementation of pressure zones and advanced pressure management. The project has a dual focus: it is intended to contribute to human development and to economic development. The provision of safe drinking water and adequate sanitation is expected to have a major impact on health.

RVO has contracted PwC and Amsterdam Institute for International Development (AIID) to evaluate this third phase of the programme. PwC and AIID have worked with Progressus Research and Development (Progressus), based in Johannesburg, to conduct the fieldwork in eThekwini. We are grateful for the cooperation and support provided to the evaluation by the staff of the eThekwini Municipality, in particular the eThekwini Water Services department (EWS), as well as by all others who generously gave their time and attention to make the evaluation possible.

1.2. Research questions

This study focuses on the (adjusted) ORIO transaction described in paragraph 2.1.2 of this report, while also drawing on existing and new data from phase 1 and 2 on the sustainability aspects of the programme, including operations and maintenance (O&M), NRW reduction and end-user experience. We have developed a comprehensive list of evaluation questions which are answered in this report. These research questions have been divided into five categories and main questions:

- *Output; What activities have been undertaken and how were these implemented?*
- *Outcome; How have the new facilities and related activities influenced the user-behaviour?*
- *Impact; What is the effect of the changed behaviour and of the project on socio-economic development?*
- *Sustainability; How likely is it that the results will be sustained after the project has been completed?*
- *Cost-effectiveness; Are the results and costs as anticipated and is this acceptable?*

The full list of research questions can be found in Appendix A.

1.3. Approach to the evaluation

The evaluation was conducted in four phases:

1. the ***inception phase***, in which:
    a. available documentation on the project was studied;
    b. a first visit was made to eThekwini, the EWS and other government services and several project sites; and

c. the methodology for the evaluation was finalised and agreed with the evaluation's Steering Committee, consisting of representatives of RVO.nl, EWS and the Dutch Ministry of Foreign Affairs' Evaluation Department (IOB);

2. the ***survey phase*** (September 2016-March 2017), in which:

   a. survey data were collected in 20 settlements where CABs have been placed and 10 in which CAB locations had been designated (see section 3.2 and appendices B, C and D for more details on the survey method and results);
   b. a limited number of interviews and on-site observations were conducted;
   c. the resulting data were analysed and a preliminary report was delivered to the Steering Committee;

3. the ***qualitative research phase*** (March-June 2017), in which:

   a. interviews were conducted with the project implementers and other government departments involved, as well as independent informants, including an NGO and a university researcher (see appendix E for a full list of the interviews conducted);
   b. qualitative research was conducted in three out of the 30 CAB sites surveyed in phase 2, using the following methods to develop rich qualitative case studies (see section 3.3 and appendices F and G for more information):

      i. interviews;
      ii. focus group discussions;
      iii. structured observation of people's behaviour in and around the CABs;

4. the ***reporting phase*** (July-October 2017), in which the draft final report was written and discussed with the Steering Committee, and this final report was written.

1.4. Outline of report

This final report for the evaluation of the ORIO project 'Sustainable Water and Sanitation Development Programme, eThekwini, is structured as follows. In chapter 2 we begin with outlining the background and context of the project to better understand the logic of the intervention and the implementation process. Then in chapter 3 we present the data collection methods that have been designed for this evaluation. In chapter 4 we present our findings by answering each of the detailed evaluation questions. Then in chapter 5 we come to the conclusions of the evaluation and, lastly, we provide recommendations for the continuation of the project.

The Appendices contain all the relevant documents referred to in the final report.

2. Background of intervention

To provide a better understanding of the project context and the intervention we will describe the project, the implementing organisation, the policy environment and key trends. The description of the evaluation findings in chapter 4 will build on this section.

2.1. Intervention

In this section we first provide the scope of the evaluation and describe both the eThekwini Water Services (EWS) sanitation programme and the ORIO Project.

2.1.1. The EWS Sanitation Programme

The EWS Sanitation programme is defined as the development, design, construction, commissioning, operation and maintenance of communal water and sanitation facilities which have the aim to:

- meet water and sanitary needs of the people in informal settlements;
- contribute to the improvement of living environment;
- contribute to epidemic avoidance and socio-economic development of informal settlements in the eThekwini municipality.

In a narrower sense, the programme has selected 173 informal settlements that will be upgraded with 1,676 CABs. Supplementary activities are undertaken to structurally improve the water and sanitation systems of the municipality. The overall programme consists of a three-component approach:

- building of 1,676 CABs for the provision of water and sanitation to previously unserved population in informal areas (separate facilities for men and women);
- reduction of NRW from 37.5 percent to 25 percent through the installation of meters and valves, water pressure management and prompt repairs;
- operations & management programme to run the CABs: deployments of caretakers and mechanics and provision of equipment and consumables.

The implementation of the programme has been divided in SAN 1, 2 and 3. In every phase a specified number of CABs are constructed. In SAN 1, started in 2011 and SAN 2, started in 2014, at least 1,173 CAB sites have been completed. A total of 302 facilities were completed in the first three-year period and 871 were completed in SAN 2. It is expected that a total of 150,000 to 210,000 inhabitants will benefit from the facilities constructed in SAN 3. At the moment there are concrete plans for a SAN 4.

The reduction of NRW consists of the installation of reservoir and district meters in the development phase. During implementation and the O&M phase leaks are detected and repaired and pressure is managed. The resulting reduction in water wastage is expected to free up sufficient water to supply the CABs.

The CABs are an interim measure aimed at upgrading the informal settlements with temporary facilities. Sustainable operation of the facilities has been a central consideration in the development of the project. This has led to the implementation of an O&M programme. For every location a paid caretaker is appointed to ensure cleanliness, safety and usability of the CAB. Plumbers and technical staff carry out maintenance activities. Community members are informed on facility use, hygiene and reporting of issues.

2.1.2. ORIO project description

More specifically, the ORIO transaction finances part of SAN 3 of the programme started in 2016. The following activities are part of the ORIO-financed transaction:

- building 400 CABs (out of the total of 750 to be constructed SAN 3);
- building pipelines for waste water from the ablution blocks to the sewer main;

- reducing NRW from 37.5 percent to 25 percent: through new pressure zones and pressure management and repairs.

The ORIO Project proposal dates from 15 May 2009. On 17 December 2010 a grant arrangement (GA) was signed for the Development phase, and in November 2013 a second GA was signed for the Implementation phase and O&M phase. RVO asked eThekwini Municipality to use the second grant only for the Implementation phase. Accordingly, no request for O&M financing was submitted.

The planning was that approximately 750 CABs would be constructed in SAN 3, which started in January 2016. In the original proposal from 2009 it was expected that ORIO could co-finance all 1,676 CABs for all three phases. Because of significantly higher actual costs, it was recognized in 2016 that the ORIO funding would be sufficient to co-finance only 400 of the 750 CABs to be constructed in SAN 3.

This round of implementation is expected to take three years. Construction in each phase has been managed by a different programme manager. In phase 3, the construction will be managed by SMEC. During SAN 3 the municipality invests in water intake and the existing network of water supply and sewer mains. While these activities are not part of the ORIO transaction, these investments are essential for the CABs to function properly, as CABs will be connected to the main infrastructure and thus a reliable water supply is essential to their operation.

For NRW reduction the activities that are included in the ORIO project are the following: Active leak detection, leak repair, implementation of new pressure zones and advanced pressure management.

In summary, the scope of the programme for EWS has not been changed, even with the costs being higher than anticipated. Because of the fixed ORIO grant, the scope of the project has been adjusted to include 400 CABs in SAN 3. The other activities to which it contributes (e.g. non-revenue water reduction) have not been changed.

2.2. Development context

To understand the significance of the project and the relevance of the project, this section describes the context of South Africa and eThekwini in terms of economic and human development, water and sanitation and housing.

2.2.1. Regional context

South Africa has a population of 55 million people of diverse origins, cultural backgrounds, languages, and religions. Similar to the demographics, the climate and natural conditions also differ greatly between regions. In 2016, South Africa's GDP amounted to about 3.84 trillion ZAR (253 billion EUR)[1]. The eThekwini Municipality is located on the east coast of South Africa in the Province of KwaZulu-Natal. The municipality has 3.5 million inhabitants and consists of a diverse society that faces various social, economic, environmental, and governance challenges. The largest city in the region and in the eThekwini municipality is Durban. Notably, Durban is the largest shipping terminal in Sub-Saharan Africa, providing economic opportunities.

2.2.2. Human development conditions (education, health and income)

2.2.2.1. Education

The quality of education is poor in South Africa[2]. Learning outcomes were low, not only by international standards but also compared to neighbouring economies. A recent OECD comparison of international assessment results shows that more than two-thirds of South African students lack basic skills, well below all other upper-middle income countries surveyed[3]. People aged 25-64 in South Africa have finished varying levels of education. According to the statistics of 2016 6 percent of this group did not have any schooling, while 13.6

[1] http://data.worldbank.org/country/south-africa
[2] http://www.oecd.org/southafrica/bytopic/education/
[3] http://www.oecd.org/southafrica/bytopic/education/

percent has finished primary school. The largest share has finished their secondary school (68 percent). Only 12 percent of these individuals have some post-secondary qualification[4].

In the province KwaZulu-Natal (where the eThekwini municipality is located) there are 4.5 million people between the age of 25 and 64. KwaZulu-Natal is a province with an education level that is close to that of South Africa as a whole. 7.5 percent of the people finished no schooling at all (compared to 6 percent nationwide) and 10.7 percent finished their post-secondary qualification (compared to 12 percent)[5]. The rest of the educational attainment is quite similar to that of South Africa. 13.4 percent vs. 13.6 percent looking at primary school and 68.2 percent vs. 68 percent as for secondary school.

eThekwini itself belongs to the top 10 with the highest educational attainment[6] in South Africa. eThekwini houses 1.8 million inhabitants which are between 25 and 64 years of age. The percentage of people who have finished post-secondary education is around the same as the rest of South Africa (12.1 percent vs. 12 percent). The largest difference is to be seen in the percentage of people who have finished secondary school. 74.3 percent finished secondary school in eThekwini compared to the 68 percent national average. These statistics also show the percentage of people who had no schooling (4 percent vs 6 percent), or only primary school (9.6 percent vs 13.6 percent)[7].

2.2.2.2. Health

Life expectancy at birth has increased in recent years in South Africa: the figure has gone up (between 2002 and 2016) from 55.2 to 62.4 years in 14 years (59.7 for males and 65.1 years for females). In the same period a decline in infant deaths is seen (48.2 to 33.7 deaths per 1,000 live births). The mortality rate has also dropped from 70.8 to 44.1 deaths per 1,000 live births. Around 33 percent of the people living in South Africa are under 15 while about 8 percent of the people are over 60 [8].

KwaZulu-Natal is the largest province in South Africa and houses 19.8 percent of the total population of South Africa (11.1 million inhabitants). Of the South African population younger than 15 years, approximately 23.0 percent (3.86 million) live in KwaZulu-Natal[9]. The average life expectancy is lower in KwaZulu-Natal in 2016 than in the rest of South Africa (59.7 vs 54 years for males and 65.1 vs 58.7 for females)[10].

Diarrhoea

Diarrhoea is one of the leading causes of morbidity and mortality in under-five children in South Africa, however, the true burden of childhood diarrhoea is not accurately known. Official data from Statistics South Africa estimate that diarrhoea accounts for approximately 20 percent of under-five deaths, but other sources estimate the burden between 8 percent and 13 percent. The 2010 General Household Survey (GHS) showed that there were over 60,000 cases of childhood diarrhoea per month and approximately 9,000 child diarrhoeal deaths in the same year.[11]

It is estimated that annually 280,000 diarrhoea deaths are caused by inadequate sanitation, and unsafe and insufficient drinking water causes 502,000 deaths annually worldwide.[12] In addition, improving sanitation also reduces the severity and impact of malnutrition by decreasing the incidence of diarrhoea and the spread of intestinal parasites, promotes dignity and boosts safety, particularly among women and girls, and promotes school attendance.

There are multiple studies demonstrating the health impact of switching to the use of clean drinking water and sanitary facilities. The current context is ill-suited to add another study to this existing body of literature.

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[4] http://www.statssa.gov.za/?page_id=1854&PPN=Report%2092-01-03&SCH=6977
[5] http://www.statssa.gov.za/?page_id=1854&PPN=Report%2092-01-03
[6] Idem.
[7] Idem.
[8] http://www.statssa.gov.za/?p=8176
[9] Idem.
[10] http://www.statssa.gov.za/?page_id=1854&PPN=P0302
[11] Chola, L., Michalow, J., Tugendhaft, A., & Hofman, K. (2015). Reducing diarrhoea deaths in South Africa: costs and effects of scaling up essential interventions to prevent and treat diarrhoea in under-five children. *BMC Public Health, 15*(1), 394.
[12] World Health Organization, (2014). *Preventing Diarrhoea Through Better Water, Sanitation and Hygiene*. World Health Organization

Nevertheless, we have included a few health related questions in the surveys to compare with expected improvements in health outcomes based on secondary sources in the literature on water and sanitation. It is worth mentioning that according to the District Health Plan 2015/2016 diarrhoea is the second main cause of Years of Life Lost (8.7 percent) in the eThikwini Health District, after TB (21 percent) and just before HIV/AIDS (8.6 percent).[13]

2.2.2.3. Income

Before the economic recession in 2008, South Africa's economy grew about 5 percent annually in real terms from 2004. After 2008 however, the average growth per year did not go higher than 2 percent due to the economic recession[14]. 27 percent of South Africa's population is unemployed compared to 30.2 percent of the population in eThekwini [15].

Wages in South Africa averaged 18687 ZAR/Month (1,280 EUR) in the first quarter of 2017. From 2004 until 2017, wages averaged 12,220 ZAR/Month (838 EUR). [16] Around 16 percent of the population lives with under 25 ZAR (1.70 EUR) a day (734 ZAR/Month (50 EUR) [17]. The country suffers from a very high level of inequality (GINI-coefficient is 63.38 in 2011[18]). KwaZulu-Natal solely makes up 16 percent of the total GDP of South-Africa[19].

2.2.3. Conditions of water and sanitation

South Africa is ranked the 39th driest country in the world in 2014 according to the World Bank[20]. It is a water scarce country where the demand for water is in excess of the natural water supply. Each region faces different rainfall patters and climatic regimes[21]. Climate change will have a deteriorating effect on these two parameters as temperatures will increase and rainfall will decrease. In the period 2010-2015, the average rainfall in South Africa has been 445 mm per year[22]. With the highest average rainfall per year in 2011 with 552 mm and the lowest in 2015, with 338 mm. Since documentation started, the average rainfall in KwaZulu-Natal has been 900mm per year. Since 2010 however, the average rainfall has not been above 600 mm[23]. Even though KwaZulu-Natal has an average rainfall that is significantly higher than in the rest of the country, the water still is a scarce and strategic resource. To deal with water scarcity, policies have been adapted by the government. Access to water infrastructure in South Africa has improved from 58 percent in 1994 to 91 percent in 2009 according to South African data, meaning that South Africa has met the MDG targets for water supply.

Although Durban is a developed city with a large port and a high level of tourism, it faces serious water shortage. eThekwini enjoys a larger natural water supply than many other South African municipalities. However, the pressure in the water system has been reduced in response to the on-going drought period. If the rainfall does not improve, further restrictive measures are required.

Sanitation

89.4 percent of South African households had access to piped water in 2015. During the same year, an estimated 45.8 percent of households had access to piped water in their dwellings. Nationally, 62 percent of households rated the quality of water-related services they received as 'good'. A further 27 percent accessed water onsite while 13.9 percent relied on communal taps and 2.7 percent relied on neighbours' taps.[24]

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[13] http://www.kznhealth.gov.za/Strategic/DHP/2015-16/eThekwini.pdf retrieved on November 30, 2015.
[14] http://www.statssa.gov.za/?page_id=735&id=1
[15] http://www.statssa.gov.za/?page_id=993&id=ethekwini-municipality
[16] https://tradingeconomics.com/south-africa/wages
[17] https://tradingeconomics.com/south-africa/wages
[18] http://data.worldbank.org/indicator/SI.POV.GINI?locations=ZA
[19] http://www.statssa.gov.za/?page_id=735&id=1
[20] Average precipitation in depth (mm per year), http://data.worldbank.org/indicator/AG.LND.PRCP.MM?order=wbapi_data_value_2014+wbapi_data_value+wbapi_data_value-last&sort=asc, retrieved on November 18, 2015
[21] United Nations Environmental Programme Finance Initiative, (2009). Water Sustainability of Agribusiness Activities in South Africa.
[22] http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisCCode=ZAF
[23] Information provided by the DWA, Ethekwini office, during the interview on 11 April 2017.
[24] http://www.gov.za/about-sa/water-affairs

Although households' access to water is improving, 4.4 percent of households still had to fetch water from rivers, streams, stagnant water pools and dams, wells and springs in 2015. This is a decrease of 5.1 percent compared to 2002. Nationally, the percentage of households with access to 'RDP-standard' (Reconstruction and Development Programme) sanitation increased from 62.3 percent in 2002 to 80 percent in 2015. The percentage of households that continued to live without proper sanitation facilities declined between 2002 and 2015, decreasing from 12.3 percent to 4.7 percent during this period. [25]

In 2010 the sanitation situation in the informal settlements in eThekwini municipality consisted of poor water quality [and basic sanitation facilities. Water is mainly supplied through standpipes and water tanks and sanitation facilities are either absent, resulting in open defecation, or consist of basic measures such as pit latrines (a toilet with a hole in the ground) or Ventilated Improved Pit latrines, a pit latrine with a vent pipe.

2.2.4. Conditions of housing

Urbanization started in 1994 when people from farms moved to the cities because of jobs and better living conditions. This was also caused by mining, people started to leave their mining hostels for bigger cities. An increase in urbanization is to be expected, as the number of jobs in cities is still larger than in rural areas. In order to keep up with these developments, the South African government tries to build enough houses. According to the general statistician at the statistics bureau of South Africa, the speed of building, despite serious corruption challenges, is only matched by China, but still it cannot keep up[26].

About 3.5 million housing units have been provided since 1996, the rate of growing houses has outpaced the rate of the growing number of people. That results in a decline in the average household size. That is more pronounced in the urban areas, that manifests itself in informal settlements which represent about 25 percent of housing stock of most of the urban areas [27]. At around 1 percent per year, eThekwini's population growth rate is much lower than other African cities. In 2011, the urbanisation rate in eThekwini was 92.0 percent [28]. In the last 10 years, the proportion of households in informal settlements has been steadily increasing. Since 2001, the proportion of households in informal settlements rose by 3 percent[29].

In 2011, 945,910 dwellings were counted in eThekwini. 28 percent of these were informal dwellings in informal settlements. eThekwini is seeing a rapid influx of people from rural areas of which only a few have the money to buy or build a formal house [30]. The eThekwini's Housing service policy officially is to upgrade informal settlements where they are currently located. Upgrading goes via the housing prioritization model. The municipality adds that *"Other important means of creating quality housing opportunities include construction of new integrated human settlements, facilitating rental opportunities through social housing institutions and private developers, and rehabilitation of houses built by the state."*[31]

2.2.5. Conclusion

When looking at the context of the intervention it becomes clear that South Africa faces serious issues when it comes to sanitation and housing. The government focuses on these issues and the ORIO Project supports these efforts. In the province KwaZulu-Natal the life expectancy is low although the education levels are high. Combined with the poor existing conditions of sanitation, this explains the logic to implement this Water and Sanitation project in eThekwini.

2.3. Policy environment

In this section, the policy environment of the eThekwini municipality is discussed. Relevant fields like water, sanitation and housing policies are analysed in order to get a better understanding of the intervention's policy environment.

[25] http://www.gov.za/about-sa/water-affairs
[26] http://www.enca.com/south-africa/urbanisation-challenges-in-the-spotlight
[27] http://www.enca.com/south-africa/urbanisation-challenges-in-the-spotlight
[28] Orio Project final plan 12 nov 2012
[29] http://www.worldbank.org/en/country/southafrica/publication/urbanization-climate-change-threaten-ethekwini-municipalitys-long-term-sustainability
[30] http://www.durban.gov.za/City_Services/housing/Pages/default.aspx
[31] http://www.durban.gov.za/City_Services/housing/Pages/default.aspx

2.3.1. *Water and Sanitation*

2.3.1.1. National policies

South Africa's water policy is enforced by the National Water Act of 1998. South Africa has established fifteen water provision authorities, including local and district municipalities. Their ambitious goal was to provide 100 percent of the population with access to water and sanitation by 2015[32]. Although significant improvements have been made over the years, this target has not been met. In 2015, 93 percent of the population had access to an improved water source and 66 percent had access to improved sanitation[33]. One of the authorities is the Department of Water and Sanitation that is responsible for policy formulation and development in the areas of water and sanitation services. It acknowledges the basic human right to have access to sufficient water and a safe and healthy environment, captured in the Constitution of South Africa and the National Water Policy. This policy focuses on the three fundamental principles for successful water management: equity, sustainability and efficiency.

In 2014 the Bucket Eradication Programme was adopted with the purpose to eradicate all bucket toilets across the country. This is an indirect grant for a period of two years. The budget for the programme was R899 million for the 2014/15 financial year and R975 million for the 2015/16 financial year[34].

2.3.1.2. Municipality policies

The eThekwini Water and Sanitation (EWS) Department, established in 1992, is responsible for the provision of water and sanitation. In the past 14 years, 1.3 million people have been connected to piped water and 700,000 people have been provided with access to toilets[35]. In line with the constitutional right to water, access to basic water supply and sanitation is provided at no cost to poor families. In the municipality's Integrated Development Plan from 2012/2013 to 2016/2017, the following improvements were stated for the period 2014/2015: access to basic water increased from 92.44 percent to 93.06 percent since 2013 and access to basic sanitation increased from 76.92 percent to 82.36 percent over the same period[36].

The approach of the municipality in the Integrated Development Plan consists of several water and sanitation improvements, such as roof and ground water tanks, and Urine Diversion Dehydration Toilets, a type of toilet that operates without a constant source of water and has a divider so that the user, with little effort, can divert the urine away from faeces.

The water system in Durban faces serious issues such as old pipes, bad fittings and illegal connections. These issues cause water losses that the local government wants to reduce[37]. Even though the municipality wants pipe replacement, their budget is limited to repairs only. In order to combat this, the municipality decided that the best option next to reducing leaks is to reduce usage. According to the Department of Water Affairs (DWA), the eThekwini Municipality has one of the highest levels of water usage in the world per capita. So in 2015, the Durban government started rationing water ("water shedding") to prevent a water shortage[38]. Several reduction rules have been made to reduce use and have proven effective. In December 2015, the government implemented restrictions of water use for business and users. Users actually started using more in the beginning, but in the end the government realised a 10 percent reduction over the year[39].

Even though the water reducing programme proves to be effective, it has not been effective enough. New dams are needed to provide more water. The problem is that new works are only expected in 10 years; until then low availability is foreseen. A new dam that will add 30 percent to the water availability[40] is expected to be finished in 2028.

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[32] http://www.gov.za/about-SA/water-affairs, retrieved on November 18, 2015
[33] https://washdata.org/data#!/zaf
[34] http://www.gov.za/bucket-eradication-programme
[35] http://www.siwi.org/prizes/stockholmindustrywateraward/winners/2014-2, retrieved on November 18, 2015
[36] Integrated Development Plan, (2015), eThekwini Municipality
[37] Interview DWA
[38] http://www.bloomberg.com/news/articles/2015-07-03/south-africa-s-no-3-city-starts-water-rations-to-curb-shortage, retrieved on November 19, 2015
[39] Interview DWA
[40] Interview DWA

2.3.2. Integrated housing policy (incremental services)

In 1994 housing was identified as one of the greatest challenges facing the South African government. The urban housing backlog stood at about 1.5 million houses at the time and it was growing at a rate of 178,000 units a year. In 1996 it was estimated that about 1.4 million informal dwellings still existed and this increased to an estimated 1.9 million informal dwellings in 2016[41]. Urbanisation further adds to the growing numbers of informal settlements (see section on trends). The South African constitution states that "everyone has the right to have access to adequate housing" and that the "state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of this right". The Housing Act (1997) provides for the facilitation of a sustainable housing development process and contains specific requirements with regards to access to water, sanitation, roads, storm water drains and street lighting. In eThekwini the Department of Human Settlement implements this policy as the Incrementental services.

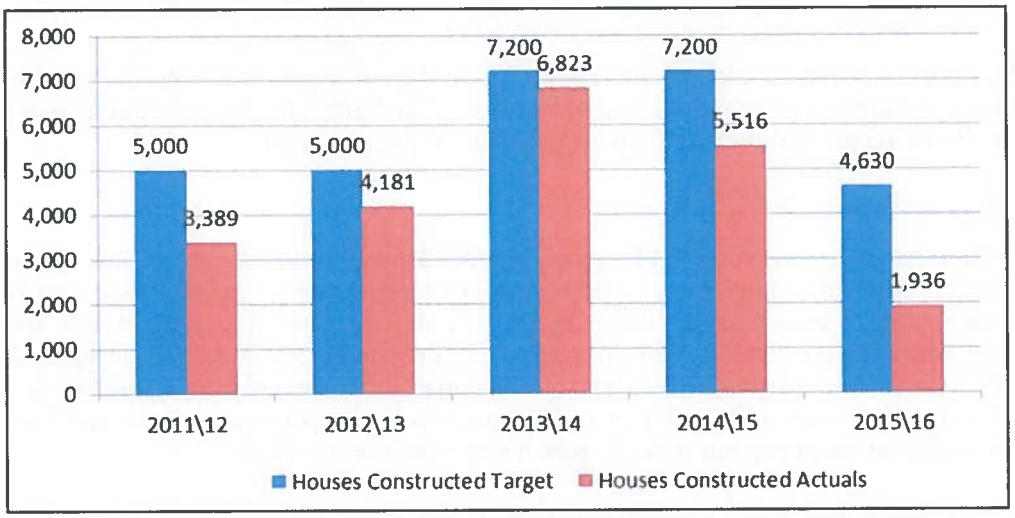


Figure 1 Housing delivery statistics

The housing policy is changing and the South African government will not provide formal housing to all citizens in the future. The backlog in delivering formal housing to informal settlements will therefore not be solved, and CABs will not be removed as result of formalization but are likely to stay for some time. EWS departments are still expecting that the CABs are an interim measure until formal housing is provided. The Human Settlement Unit has explained that they are developing the new policy and have not yet informed implementing branches such as EWS.

2.3.3. Conclusion

The CABs programme has been developed based on the assumption that these are temporary facilities that will be replaced once formal houses are provided. Because of the large backlog in supply of free formal housing there was always the likeliness that the CABs would not be a temporary solution. However, by abandoning the commitment to provide formal housing, part of the original logic of the CABs has been undermined. While this policy change has not been communicated more widely yet, it will have far reaching effects for the time horizon on which EWS will have to perform operations and maintenance of the CABs.

2.4. Implementing organisations

We will now turn to briefly describing the municipal organisation responsible for building and maintaining the CABs, which is EWS, and the main partner departments, which are Human Settlement and Health.

2.4.1. Implementer: EWS

The eThekwini Water and Sanitation Unit (EWS) is responsible for the provision of water and sanitation services to all customers in the municipal area. EWS has a total staff complement of 3,000 people which

[41] http://www.africacheck.org. Factsheet: The housing situation in South Africa

includes planning, design, project management and operational functions. According to the ORIO project plan, the area under the responsibility of the unit has grown 1,000 percent since 1996 through the incorporation of outlying informal and rural areas, and the unit now oversees services provision for an area of 2,297 km², with a population of approximately 3.5 million, currently just over 465,000 water connections and with 12,000 km of water mains[42].

The Water & Sanitation Unit manages an annual budget of approximately ZAR 4.1 billion (270 million EUR) in meeting the objectives of the Municipality's service delivery mandate. Operating revenues are received through water sales and sewerage charges, while capital budgets are primarily obtained through loans and National Government grants.[43]

The structure of the Water and Sanitation Unit that will oversee the implementation of the ORIO project has been presented in the following figure.

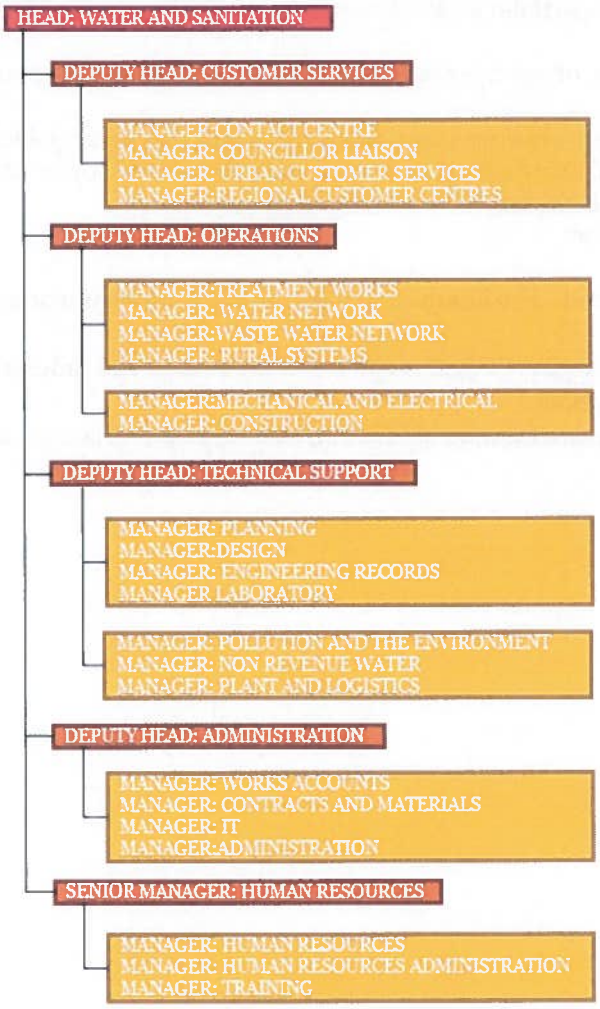


Figure 2 Detailed structure of the Water and Sanitation Unit[44]

2.4.2. *Other departments*

2.4.2.1. Human settlement Unit

At the local level, the Human Settlement Unit works to realize Plan Three of the eThekwini Municipality's Integrated Development Plan: creating a quality living environment. The key elements of the Unit's

[42] First submission ORIO Project plan 2012, p 17.
[43] First submission ORIO Project plan 2012.
[44] Draft Water Services Development Plan Volume 2, 2014

contribution are construction of new fully subsidized houses, management and sale of rental and pre-1994 stock, upgrade and refurbishment of housing units built by the state, and development and conversion of Community Residential Units [45]. In section 2.2.4 we referred to the backlog that exists in the implementation of the free housing policy strategy. This policy is now being revised on a national level, and is expected to be replaced with a different strategy aimed at allowing people to construct and upgrade their own houses.

2.4.2.2. Health department

The eThekwini Health Department has the following 4 departments: Communicable Disease, Social Development, Environmental Health Services and Clinical Support Services [46]. Of these four departments: the Environmental Health Service is relevant to the project. The Environmental Health Service has 11 diverse roles, for example pollution control, noise management or food safety management. Two of these 11 roles are relevant for the project. These roles are 'Water quality monitoring' and 'Waste management'.

The water quality monitoring's portfolio is also diverse, the most important roles are:

- monitoring and sampling of water intended for use for human consumption and for recreational and commercial use;
- ensuring the monitoring of effective waste water treatment and water pollution control, including the collection, treatment and safe disposal of sewage and other water-borne waste, and surveillance of the quality of surface water(including sea water) and ground water;
- sampling and testing water.

The Waste management's portfolio also has diverse roles, of which three functions are important:

- Ensuring proper management of liquid waste including sewage and industrial effluents;
- Advocating proper sanitation;
- Ensuring safe usage of treated sewage sludge and ensuring that reclaimed waste is safe for health.[47]

[45] http://www.durban.gov.za/City_Services/housing/Pages/default.aspx
[46] http://www.durban.gov.za/City_Services/health/Pages/default.aspx
[47] http://www.durban.gov.za/City_Services/health/Pages/default.aspx

3. Description of methods

In this section we describe the evaluation methods that were used to collect data. We first present the overall approach, which consists of different data collection methods and sources of information. We then describe the quantitative and qualitative methods in turn, and the way these have been integrated in the analysis and in the reporting of findings in chapter 4.

3.1. Framework of methods

We have developed a multi-method approach suitable for evaluation research in this particular context. This approach, described by amongst others J. Creswell (2011)[48], allows us to combine the strengths and overcome to some extent the shortcomings of individual methods. Also, a multi-method design allows for triangulation, as is shown in the figure below.

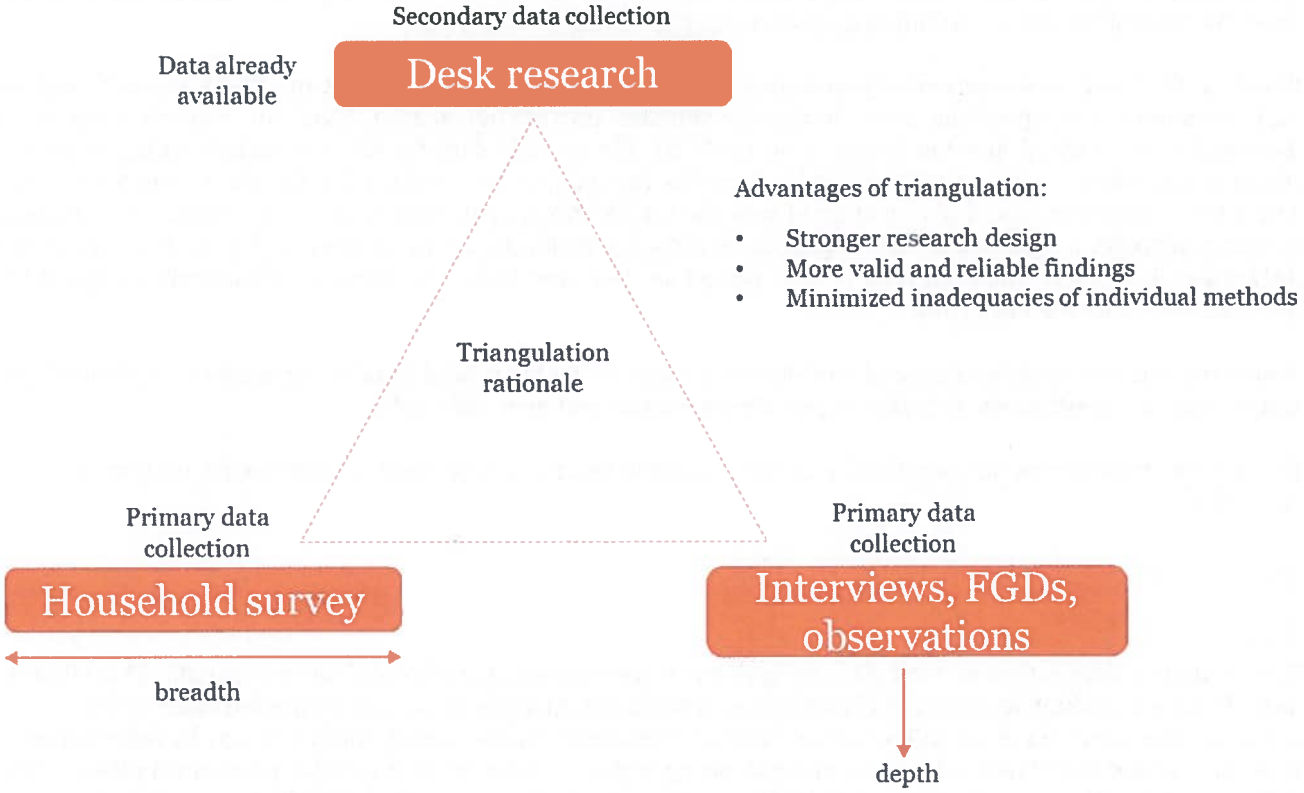


Figure 3 Triangulation rationale

As can be seen from the figure, the approach combines qualitative and quantitative primary data. We will now describe the quantitative and the qualitative methods separately. The intended approach is described as well as any changes that have occurred in the execution of the evaluation.

3.2. Quantitative methods

At the start of the evaluation, we faced a choice between two plausible quantitative evaluation designs to assess the impact of the programme: the often-used difference-in-difference design and a simpler cross-sectional approach. In the first case, we would have taken measurements at two points in time (baseline and end line) for both a treatment and a control group. In the second case, data are collected only once, for both groups. The characteristics of eThekwini and the programme roll-out made us opt for a cross-section approach in the

[48] "Designing and Conducting Mixed Methods Research" (John W. Creswell, SAGE Publications, 2nd edition, 2011)

evaluation proposal, as the CAB locations are likely to meet the assumption of comparability.[49] The design is based on comparing three groups instead of only looking at a treatment and comparison group: one group of locations without a CAB but designated to receive one in the near future (the comparison group), one of locations that recently received a CAB (SAN 3), and one of locations that have had access to a CAB for a longer period of time (SAN 2).[50]

The assumptions underlying this choice were verified during the inception visit. Most importantly, if the three groups differ systematically in a way that affects outcome variables of interest regardless of CAB presence, we need to find ways of measuring this, so that we can control for these confounding factors in our analysis. We identified a number of aspects where there could be systematic differences between the three groups. Notably, the SAN 3 locations were on average further away from Durban's city centre than the older SAN 2 sites, which could affect outcomes. Nevertheless, the people we interviewed in the inception phase were not aware of any systematic differences between these groups of locations, and there is much variation in distance within the subgroups. We did, however, control for both distance to the city centre and distance to work, the latter measured by how much time it takes to get there. Another hypothesis is that older sites, i.e. generally the ones closer to the centre, are more stable and cohesive because people have been living there for a longer period of time. We control for this by including measures of social cohesion and trust.

Based on the three cross sections, we present a picture of how and to what extent the CABs are used, and we make a number of comparisons. First, descriptive statistics provide information about the outcome variables in the short term (SAN 3) and the longer term (SAN 2). We provide data for the comparison group whenever relevant, e.g. when it comes to the sanitation facilities that people use. Contrasting the short term SAN 3 data with SAN 2 outcomes gives an indication of how the ORIO SAN 3 CABs could fare in the longer term. Second, we run a regression analysis for the impact-level variables including all three groups. The coefficients on the SAN 3 and SAN 2 variables can then be interpreted as short and long term impact, respectively, compared to the situation of not having a CAB.

Where relevant, we consider the gender of the respondent or the household head in our analyses. This provides insight into the question whether the project affects women and men differently.

For further discussion of the quantitative methods applied and the sampling strategy followed, we refer to Appendix B.

3.3. Qualitative methods

3.3.1. Sequential design

The qualitative data collection took place in April 2017, after the initial analysis of the survey data. This allowed us to develop a qualitative approach (described in detail in the Analysis plan) that addressed some of the questions that came out of the initial survey findings. Findings from the survey could that way be reflected on with the relevant stakeholders to get an understanding of the mechanisms that could explain our findings. Also in the selection of case studies the survey findings were central. The case study data collection tools were tailored to collect more information that could assist in recognizing such mechanisms.

[49] One feature of the informal settlements is that we expect people to move in and out frequently. Since a difference-in-difference design requires that the same people are re-interviewed, the people that moved out would fall out of the sample (giving a high attrition rate). This could introduce a selection effect in our estimates, as the people moving out may differ from those staying in a number of characteristics. Furthermore, an important assumption of the difference-in-difference approach is that groups exhibit a common trend. This is unlikely to hold since eThekwini's municipal development plan differentiates between areas, and the control group should not be in line for receiving a CAB during the entire measurement period. The sites that satisfy that criterion may well be on a different trend compared to sites that do receive a CAB. Moreover, the phased approach of the programme enables us to take a virtual look at the future of current sites by interviewing households at sites that have had a CAB for at least two years.

[50] Note that the locations in the comparison group should also be eligible for receiving a CAB, otherwise they would not be comparable enough to the locations in the other groups.

3.3.2. Qualitative sources

The qualitative data collection is grouped on two levels, the process evaluation (based on interviews with project implementers and at institutional level) and case studies around three selected CABs (consisting of interviews, Focus Group Discussions (FGDs) and observations).

Qualitative analyses and data sources		Informants
Project-level evaluation	Interviews	Implementers Independent experts
Case studies	Semi-structured interviews	Local stakeholders
	Focus Group Discussions (FGDs)	CAB users
	Observation of Operation and Maintenance of CABs	Evaluation team

Table 1 Primary data collection methods for qualitative study

The project-level data collection serves the assessment of the implementation of the overall project and is thus concerned with the process, the sustainability and the (changes to the) context. The case studies, on the other hand, are more suitable to gain a comprehensive understanding of the effects a CAB has on a community, on individuals and on social dynamics, and how different actors are engaged in and experience the project.

3.3.2.1. Interviews

During the inception visit most key stakeholders were interviewed. These interviews were intended to help determine whether the proposed quantitative method was feasible. At the same time, these interviews were followed up a year later by semi-structured interviews at the project level. During these interviews we also reflected on the changes that had occurred since the interview during the inception phase. A total of 11 interviews were conducted in Durban. In appendix C the list of interviews can be found. For each interview a list of questions had been prepared. A snowball-method was applied by which we received some referrals during interviews of other stakeholders to interview. Most interviews were followed up by documentation from the stakeholders on the information that had been discussed during the interviews.

3.3.2.2. Case studies

The survey findings as well as views of stakeholders were used to develop the case study tools. The purpose of the case studies was to get more in-depth information on the experience of communities with the CABs. Three case studies were selected, one for each survey sub-sample, which are SAN 2, SAN 3 and a prospective CAB site for SAN 3 without a CAB. The final case study selection included the cases presented in the table below.

Site number	Settlement	Sub-sample
R/0106/001	Dunpals	SAN 3 no CAB
R/0159/008	Canelands	SAN3 CAB
P/081/001	eManyaleni	SAN 2

Table 2 Primary data collection methods for qualitative study

We have selected these cases because several of the indicators measured in the survey showed that these sites were largely representative for the particular sub-sample. This way, perceived differences between the sub-samples could be assessed for these specific locations. Appendix F describes the process of the case study selection in more detail. Each case study consisted of around five interviews with local stakeholders, a Focus Group Discussion (FGDs) with beneficiaries and observations of users at the CAB site. The data collected through these methods have been analysed through triangulation and synthesized in the three Case Study Reports in appendix O.

3.4. Combining quantitative and qualitative findings

In the subsequent section we will present the findings from the described data collection methods. In presenting the findings we combine the qualitative and the quantitative data sources that we have collected by triangulating findings where possible. The answer to the questions will be primarily given from the source with the most relevant findings and with the largest reliability. For many questions we first present the survey findings and consequently present findings from the interviews. Because the case study findings cannot be

considered representative for the entire project, these are generally presented in distinctive text boxes for each question to which they apply. However, for questions that are largely answered with case study findings the findings are presented in the main text.

In some cases the interviews and case studies support the findings from the survey and provide some more context or examples. In other cases the qualitative findings indicate something different from what the survey findings show. We will then discuss the possible cause for this discrepancy and the conclusions that can be drawn. Whenever no reliable or definitive answer can be provided on the evaluation questions based on the collected data this will also be indicated.

4. Presentation of findings

In this section we present the findings from the different data that we have collected. We present the information for each of the main evaluation criteria (output, outcome, impact, sustainability, efficiency, attribution) by answering the specific evaluation questions. For each question we first present the findings and then provide a conclusion.

As discussed in section 3.2, the SAN 2 results give an indication of the outcomes for the ORIO SAN 3 CABs in the longer term. We ask the reader to bear in mind that the circumstances for both phases are reasonably comparable, but not equal. Therefore, the SAN 2 results should not be interpreted as a long term prediction for SAN 3.

4.1. Implementation and output

In this section we will report on the findings regarding the suitability of the intervention of constructing CABs. We have considered the quantity and the quality of CABs, the selected location and the influence end-users had on this. Non-revenue water reduction activities were also intended as part of the intervention and are therefore also assessed.

4.1.1. Does the number of facilities sufficiently meet the number of end-users?

As the project is still ongoing, we collected data on the progress in the construction of CABs in SAN 3 and on the estimated number of users. It is important to distinguish between actual users of the CAB and beneficiaries in a broader sense. Also if someone is not using the CAB, e.g. because they prefer their own pit latrine, they may still benefit because there is less faeces in the environment.

4.1.1.1. Number of facilities

At the time of qualitative data collection in April 2017, the project manager estimated that around 1,400 CABs had been built in the entire SAN programme. In SAN 3, 170 CABs had been completed and 150 were under construction, bringing the total to 320 once completed. EWS expected this number to be reached by July 2017, the end of the municipal financial year. However, by July 2017, only 261 CABs had been finished and 87 were under construction. Due to a slow start, interim performance targets were not met. EWS has now applied internally for additional funding and thereby the programme would be able to finish the planned 400 CABs co-financed by ORIO by 2018[51]. SMEC has noted that they have spent more than planned, and EWS has now confirmed that the ORIO funding will be sufficient to complete 348 CABs, which equals 85.75 percent of the target.

Based on the total number of CABs constructed and operational (around 1,400) and the estimation by EWS of the average number of users per CAB (450[52]) it appears that 630,000[53] people have access to a CAB. In eThekwini, at least 800,000[54] people are living in informal settlements and according to these numbers at least 170,000 people therefore still would not have access to CABs. On a municipality level the current number of CABs is not sufficient to meet the needs of all people in informal settlements. The EWS does aim to reach as many people as possible and noted their plans for a SAN 4. Looking at the CABs funded by ORIO, 261 have so far been constructed, amounting to 117,450 beneficiaries. If the target of 400 CABs would have been reached, a total of 180,000 beneficiaries would have been expected.

[51] As detailed in the Addendum to the grant agreement, dated 5 April 2016, ORIO funds a subset (400) of the CABs for SAN 3. 1173 sites had been delivered in SAN 1 and 2. The total project goal was 1676 and for SAN 3 the target thus stands at 503 (although the City Planning report 2016 notes a target of 602).
[52] Assuming 75 households with 6 members, which is assumed in the ORIO Project Plan 2012 and successive project documents.
[53] For the end of the project a target of 754.200 has been set in the Final Project Plan 2012.
[54] Project Plan ORIO 2012, p.33. Other sources state up to 1 million people with informal land tenure.

4.1.1.2. User numbers based on survey and observation data

We have made a calculation based on our own data to assess the actual number of end-users. Since we do not know the total number of households in the sampled CAB sites, we cannot give a precise estimate on (potential) users based on the household survey. Making a rough estimate, based on the average of 3.68 members per household we observed in the survey, and on 50 to 75 households per site, we would get to between 184 and 276 potential user per site, on average. Given that EWS counted with six members per household, our figure is much below the expected 450 beneficiaries per CAB.

However, we do have estimates on use by the caretakers and our own observations on the CABs included in the case studies. The difficulty here is that these numbers do not align. On the one hand, the average number of users per day based on estimations of caretakers, is 125. Note however, that there is a significant difference between SAN 2 and SAN 3 CABs, with 172 users on average in the former, and 78 in the latter (see also section 0). If we look at the observations on the other hand, based on counts, we calculated 270 users at the SAN 3 CAB and 385 at the SAN 2 CAB (see the box).[55] In both cases, the caretaker estimates are lower than the observed numbers of users. The discrepancy for SAN 3 may partially be explained by the fact that the SAN 3 CAB has been in the community for half a year longer: people may have changed routines and started to use it more. Another explanation could be that the caretaker is not constantly present and therefore underestimates the number of users. Since the observation includes people who used the CAB twice (in the morning and evening) the number of unique users is probably lower. Taking all this into account, we would estimate 200-250 users on an average day. This is still far below the intended target of 450 users per CAB. The number of potential users per site would then be between 300-400 people.[56]

Based on 225 users, a total of 315,000 beneficiaries are using the current 1,400 CABs. This would mean that in reality 60 percent (485,000) of the total number of informal settlement dwellers do not have access to CABs. The 261 CABs of the ORIO project have an estimate total of 58,725 beneficiaries using them and the final 400 CABs would have 90,000 end-users (compared to the target of 180,000). The survey was not set up to give insight in the number of households in eThekwini that are not served by a CAB because their settlement does not have one. In SAN 3 at least some of the CABs were constructed as additional CABs in SAN 2 or SAN 1 locations, indicating that also in served areas the number of facilities may be perceived as insufficient, by people and ward councillors as well as by EWS.

Case studies: The SAN 2 site had been selected for its high number of users. The people in the case study confirmed that the SAN 2 settlement had a very high number of users (300 per day according to estimation by caretaker in the survey) of a single CAB site. In this location there was no place to erect additional CAB facilities. In the SAN 3 settlement there were many CABs, also from previous phases, and the construction of new CABs in SAN 3 had further reduced the number of users per CAB (which was estimated by the caretaker in the survey to be 100).

It is difficult to compare the number of users observed for the SAN 2 site with those for the SAN 3 site, because although the observations were taken for three hours at the same three moments of the day, the last hour of observation for the SAN 2 site included 30 minutes of the inside CAB being closed due to cleaning. The observations shows that both the SAN 3 and the SAN 2 site CABs were used by around 100 people in total, 60 people inside and 40 outside. If observations had been done before the cleaning for the SAN 2 site, the number would likely have been closer to 130 (90 inside and 40 outside)[57]. Using these numbers to make an estimation for the entire day, for the SAN 3 site, 3 peak hours of around 40 users and 10 non-peak hours of around 15 users indicates around 270 users per day. This is far higher than the estimation given by the caretaker. For the SAN 2 site 3 peak hours of 45 users and 10 non-peak hours of around 25 users, brings the number of users to around 385 per day. This is also higher than the 300 estimated by the caretaker.

In sum, in the positioning of CAB sites in settlements, household counts are used to place a CAB for every 50 to 75 households or 300 to 450 beneficiaries. Based on the information we have collected the number of users is most likely lower than 450 and roughly estimated to be between 200 and 250. In the continuation of the

[55] The SAN 2 site was selected for the case study partly because it had so many users.
[56] Based on 65 percent of respondents in the household survey answering that they use the CAB daily or multiple times per day.
[57] Based on the same number of users during the peak hour observed in the morning being counted for the peak hour in the evening.

evaluation we will use an average of 225 users per CAB. The total number of end-users of the currently constructed 261 CABs is then 58,725. There can be different reasons why people do not use the CABs (frequently), but it appears that the 400 CABs will not be sufficient to provide all intended 180,000 end-users with facilities. In a number of settlements already additional CABs had to be constructed to better meet the number of end-users.

4.1.1.3. Queuing

Especially during peak hours queuing is normal. We collected information about waiting times, which gives an indication of the sufficiency of the number of facilities around these sites.

Household results	SAN 3	SAN 2	p-value
Average waiting time in the queue for fetching water (minutes)	3.96 (9.47) [48]	5.80 (7.31) [56]	0.223
Average waiting time in the queue for the showers (minutes)	4.91 (7.52) [68]	6.62 (8.70) [69]	0.315
Average waiting time in the queue for doing laundry (minutes)	9.87 (17.96) [68]	24.15 (49.49) [68]	0.049**

Table 3 Waiting times at the CAB

In the case studies long waiting times were confirmed to be an issue at specific times. Particularly at the SAN 2 location this was common, but even at the SAN 3 location that had fewer users. People mentioned using other facilities when they were in a hurry. However, during the observations, done at the expected peak hours in the morning and evening, (almost) no queues were witnessed.

The waiting times show that especially during peak times people often have to wait. The case studies confirm this. Even though people often find this acceptable because the advantages over alternatives, the case studies show that it can lead people to revert to alternatives. The capacity of the CAB can in those instances be considered insufficient.

In conclusion, the findings on queueing show that even with the lower found number of actual end-users long waiting times are common. If the number of intensive users would be closer to the target of 450 that would further exacerbate the waiting times and likely lead to more people reverting to alternatives. The facilities appear to be sufficient to carry the capacity of the 200 estimated actual end-users, most of the time.

4.1.2. Are the locations of the CABs and their design well-chosen?

4.1.2.1. Location

In choosing the location for a CAB design consultants have considered technical as well as social aspects. They make the decision for the location on a case-by-case basis. In the ORIO project plan and during interviews some guiding technical principles have been described to select the location of a CAB. These include positioning the CAB at the edge of a settlement and at the lowest point, to allow draining from individual households in the future on the sewerage that is placed as part of the project. However, there are also other considerations, such as safety, that sometimes conflict with the technical preferences. From a safety perspective choosing a central location within a settlement is more sensible.

Case studies: In all three case studies the location was selected by the design consultants. In most cases there were few different options and the technical criteria and proximity to all shacks was most important. In two of the three cases the CABs were surrounded by shacks and therefore somewhat more secure.

Satisfaction with the location and design is presented in Table 4. The households scored the location of the CABs on a scale from one (very unsatisfied) to five (very satisfied), which was recoded to a scale from minus two to plus two for convenience in interpretation. In general, the households are satisfied with the location of the CAB (the score is above 0). However, in SAN 2 sites, 19 percent of the households experience disturbance from

the CAB or its users at least once a week. The percentage is significantly higher for male respondents in SAN 2 areas (p<0.01): the percentage was 8 percent for female respondents, versus 39 percent for male respondents.

It is clear that the location of each CAB is carefully considered. We conclude that most of the time this leads to well-chosen CAB locations, settlement restrictions permitting. There are many factors that are taken into account and the need to consultation with the community, discussed below, is important in this regard.

4.1.2.2. Design

On average, end-users are also satisfied with the design of the CAB, but SAN 2 households are significantly less satisfied. The main reasons they give are not enough space, poor drainage and non-working facilities.

Household results	SAN 3	SAN 2	p-value
On a scale from -2 to 2, how satisfied are you with the location of the CAB?	1.23	1.08	0.266
	(0.71)	(0.88)	
	[100]	[100]	
Fraction of households that experience disturbance at least once a week from the CAB or the users	0.06	0.19	0.007***
	(0.24)	(0.39)	
	[100]	[100]	
On a scale from -2 to 2, how satisfied are you with the design of the CAB?[1]	1.20	0.89	0.023**
	(0.77)	(0.90)	
	[84]	[92]	

[1]Only asked to households that have used the CAB in the past 3 months
Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 4 Satisfaction with location and design

According to EWS the design of the CABs has changed several times from the start of the project in 2009. Prior to management by EWS the health department managed the project. According to EWS the design of the CABs by EWS is in many ways an improvement to the facilities that were previously constructed. The structure provides more privacy and is more hygienic (e.g. closed sewage diversion instead of open sewage). At the same time, part of the regular defects appears to also relate to the weaker quality of the loose parts. This has been done to prevent theft but has also led to more damage.

Case studies: While people were mostly content with the design of the CABs, there were several aspects to the design which they found could be improved. These included geysers for hot water; hangers for clothes in the showers; soap/sanitizer dispensers; and a trashcan for sanitary pads for women. On the other hand, people realized that these additions would be prone to vandalism. End-users and stakeholders also recognized that the poorer quality of the plastic parts led to more defects, although these were mainly considered the result of improper use by the community.

In the facilities in SAN 3 a major change has occurred in terms of the design. The CABs were previously made out of containers. In SAN 3 almost all facilities are modular facilities, which are purpose built structures that are erected in the informal settlements. According to project staff the reason for this shift was that EWS no longer had a contract to procure sea containers. However, the modular CABs also have several benefits over container CABs. They are easier to maintain and to refurbish, they are less prone to degradation as container CABs are vulnerable to rusting due to the sea climate in eThekwini, and they can be constructed at sites that are difficult to reach by truck. From a sustainability perspective the container CABs were thus less fitting for the context than assumed. On the other hand, the original proposal listed the benefits of the container CAB vis-à-vis a brick and mortar structure.[58] It notes a rapid deployment and the fact that the container had no loose parts, which would prevent vandalism such as theft of roofs. The modular facility has a loose roof, but according to EWS this has not led to vandalism. So, the design of the modular facilities appears to be effective[59]. However, it is too early to draw conclusions on the sustainability.

[58] ORIO project proposal 2012, p.77.
[59] It is difficult to ascertain this because they have not been tested for longer periods. One instance was noted where the roof was blown off.

In conclusion, the design appears to be effective and is appreciated by users. The CABs are however sensitive to defects. The decision to choose containers or modular CABs appears to result mainly from ease of procurement instead of a quality assessment, strategy and clear policy.

4.1.3. Have end-users been involved?

From interviews with EWS and with independent experts it appears the consultation with end-users is limited. The design and location are in the first place proposed by the design consultant and the contractor. They do consult with the local representative and ward councillor.

The survey enumerators asked the households about their opinion on the location of the CAB and their involvement in any decisions on the location. On average, 19.5 percent of the households feel that they had had any say in the location of the CAB.

Table 5 shows that this does not differ significantly between the groups.

This percentage seems rather low given that households were supposed to be involved in selecting the location. However, the programme manager argues that there are often very few options for placing the CAB due to the dense nature of the settlements and terrain features such as slopes and streams.

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Fraction that feels like they had any say in the location of the CAB	0.14	0.23	0.16	0.295	0.790	0.341
	(0.35)	(0.42)	(0.37)			
	[56][1]	[100]	[100]			

[1]Only asked of households that were aware of the location of the future CAB in sites without CAB
Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 5 Involvement of households in location of the CAB

Case studies: For all of the three case studies a meeting was held to inform the community of the CAB construction. During this session people could ask questions. For all three case studies the community was informed of the location but not involved in choosing it. While in SAN 3 more people confirmed being informed, in SAN 2 it was particularly a committee member who had joined the design consultant when the location was selected. It was also confirmed in the case studies that there were not many options for the CAB location and end-users understood why these specific locations were selected and mostly agreed with them.

According to the EWS, the decision to leave the CAB open or closed at night is left to the community. However, in the two case studies with operating CABs the community leadership and the ward councillors mentioned that the municipality told them that the CABs should be closed at night to prevent vandalism. The community was only left to decide at what time it would be closed and opened.

It can be concluded that in general EWS does make efforts to engage communities in the CAB construction and operation process, although this is not very extensive in terms of participation. It appears that in SAN 3 communities have been slightly better informed. However, this could also be a result of a bias of recollection, SAN 2 being longer ago.

4.1.4. To what extent are Non-Revenue Water objectives achieved?

Several activities were planned to reduce non-revenue water, mainly in leak detection and the installation of reservoir and district meters in the development phase of the project. According to the project design, during implementation and the O&M phase leaks are detected and repaired and pressure is managed. The target for NRW reduction was to reduce NRW from 37.5 percent to 25 percent of total water input into the system, which

would in turn ensure that sufficient water would be available to supply all CABs. In June 2016 the NRW was still 40 percent.

During our data collection visit to Durban in April 2017 we were informed that no reliable information on non-revenue water was available for 2016 because a new billing system had been introduced. The new system makes a different distinction between types of users (paid/non-paid/industrial et cetera), leading to numbers that could not be compared to the numbers for previous years. The EWS manager for non-revenue water noted that reliable information could likely be shared by July 2017. The evaluation team requested this information at the start of July but was informed that the manager was no longer working in this team and that the issue with the data had finally started stabilizing. The last reliable numbers for NRW were until July 2016 and showed 40 percent NRW. Due to the lack of reliable information, this activity cannot be evaluated. Interview findings and the number presented for July 2016 seem to indicate that the NRW has not been reduced, but rather has increased.

4.2. Outcomes

In this section we present the findings on how the CABs are being used by end-users and whether they are still using alternative facilities for water use and sanitation purposes. Aspects related to (and influencing) the use of facilities such as time spent, cleanliness and vandalism, and experienced safety are also discussed.

4.2.1. Do intended end-users, differentiated by demographics, use the CAB facilities?

We have several sources of information to answer this question, including an estimate by the caretaker, self-reported use for households and CAB observation as part of the case studies. The average number of users as estimated by the caretakers is presented in Table 6.

In total, we find a clear difference between numbers for SAN 2 and SAN 3: the estimate by caretakers is 78.2 daily users for SAN 3 sites, and 172 for SAN 2 sites. Remarkably, the number of estimated SAN 2 users is more than twice the number of SAN 3 users. Several explanations can be given. A logical explanation would be a difference in opening hours. SAN 3 CABs are open for 13.9 hours a day on average, while SAN 2 CABs are open for 17.2 hours a day (p=0.12). However, the number of users is not significantly correlated with opening hours, so our data does not support this explanation. Another possible explanation is a difference in user/CAB ratio. While the number of CABs that are constructed in a settlement is calculated based on the number of households, because of densification since a CAB is placed, it is likely that the number of users per CAB is higher in SAN 2 sites.

Interestingly, the caretakers estimate that more women use the CAB. A potential explanation is that tasks like doing the laundry, fetching water and doing the dishes are often done by women. However, the survey and observation results do not back this up.

Case studies: This explanation of increased density of the settlement is supported by the SAN 2 case study. On the other hand, some settlements that received a SAN 3 CAB had already been served in SAN 2 or SAN 1, such that an additional SAN 3 CAB also reduces the number of users per CAB. This is what we witnessed in the SAN 3 case study.

Interestingly, the observations show that for the cases, there were more male users of the inside facilities (38 male against 23 female users for the SAN 3 site and 36 against 25 for the SAN 2 site). For the outside CABs this is also the case with 40 male users against 16 females for the SAN 3 site and 31 male users against 24 females for the SAN 2 site. Also, the observations do not show a difference in the division of tasks between women and men (men are also fetching water, washing clothes and draining waste water).[60]

Caretaker results	SAN 3	SAN 2	p-value
Number of male users per day[1]	38.50	79.00	0.078*

[60] Note that the numbers in this section are higher than those presented in section 4.1.1.2, because in 4.1.1.2. we have reduced the outside users by around 1/3 to adjust for counting people using both the inside and outside of a CAB twice.

	(10.29)	(67.73)	
	[10]	[10]	
Number of female users per day[1]	40.20	93.00	0.085*
	(24.05)	(88.45)	
	[10]	[10]	
Fraction of CABs used by small businesses for their water needs	0.40	0.20	0.355
	(0.52)	(0.42)	
	[10]	[10]	

[1]These numbers are estimated by the caretaker
Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 6 Number of users per day

Six of the twenty caretakers reported that small businesses use the CAB for their water needs. They mention the CAB being used by taxi owners for washing and maintenance, by meat sellers and by tuck shops.[61] The possible impact of this business use is discussed in section 4.3.5.

While we asked the caretakers about the *total number* of users per day, we have asked the households about their *frequency* of use. Almost all the households from SAN 2 sites have used the CAB at some point in time, and 87 percent of households from SAN 3 sites have ever used it. Figure 4 illustrates the frequency of CAB use. The respondent was asked to indicate the frequency of use of the other household members as well, so that the figure shows the results for 338 SAN 2 individuals and 335 SAN 3 individuals. Like the caretakers, the households indicate a more intense use of SAN 2 CABs. 60 percent of people living in SAN 2 sites use the CAB at least once a day, compared to 49 percent of SAN 3 individuals.[62]

Still, 18 percent of the individuals did not use the CAB at all in the past 3 months. The main reason for not using the CAB to fetch water is that other facilities are closer, just like the main reason for using the CAB is that it is the closest water point. SAN 3 households also mention that the CAB was recently constructed and they had not used it yet, while SAN 2 households not using the CAB say that it is dirty.

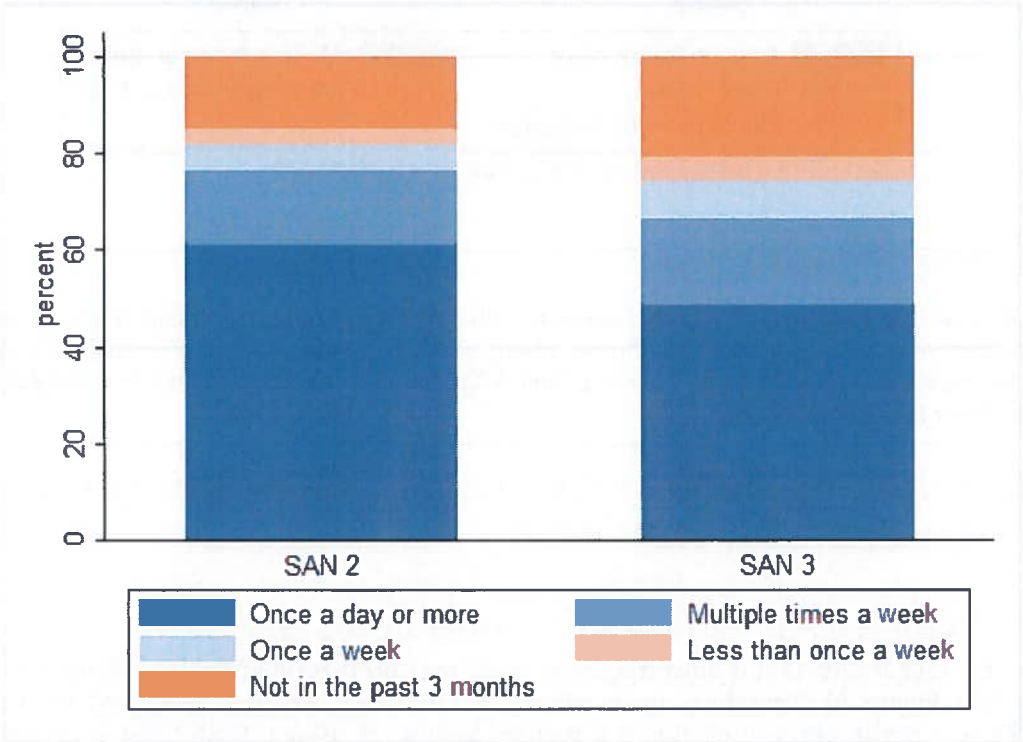


Figure 4 Frequency of use

[61] Tuck shops are small (roadside) shops.
[62] However, the p-value is 0.279, so we cannot exclude the possibility that across the whole population there is no difference between the averages for SAN 2 and SAN 3 sites. There is much variation from site to site.

Case studies: In the case study for SAN 2 and for SAN 3 end-users reported that all people use the CABs, at least for fetching water, with only very few exceptions. Almost all participants used it at least once a day which corresponds to the survey findings. The main reason for not using the CAB for fetching water was the proximity of stand pipes. Some did not use the toilet because of queues and very few people also for hygiene or privacy reasons. The showers several people did not use because they find the water too cold, and multiple people suggested geysers on the CABs as a good addition. Particularly in winter the cold water prevents people from using the showers. Also queues were a reason to bathe at home, particularly in the morning when people need to go to work and find it is busy at the CAB.

When splitting the use by age and gender in Figure 5, we see that slightly more adults (compared to minors) make use of the CAB multiple times a day, and adult women make most use of the CABs. This is in accordance with the caretaker findings.

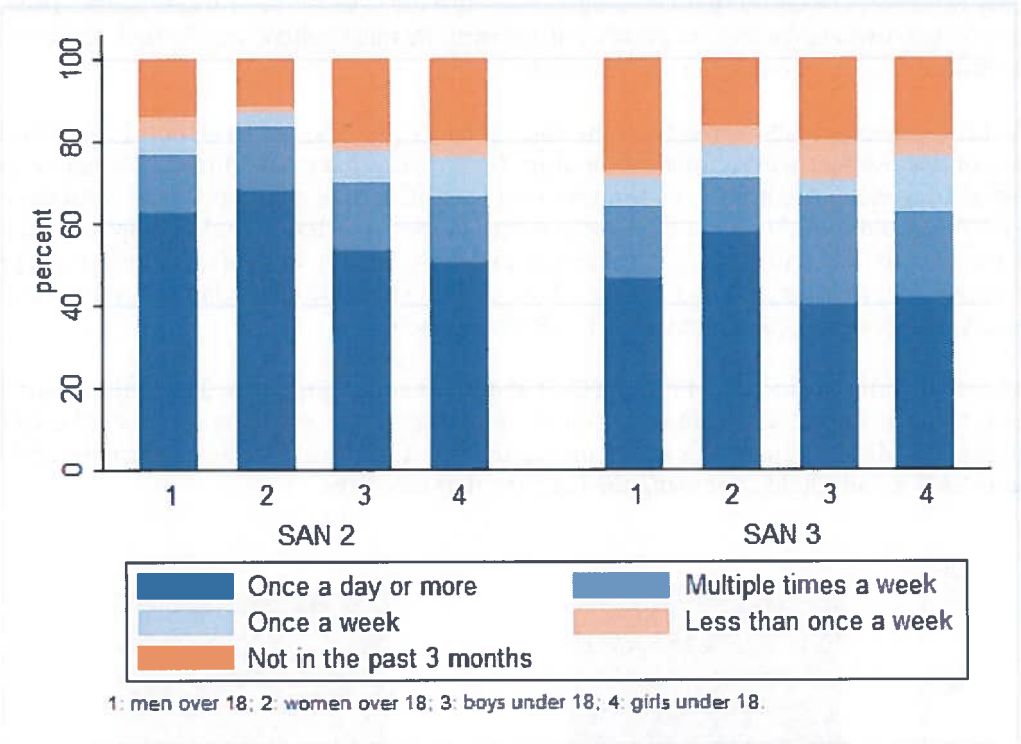


Figure 5 Frequency of use by age and gender

In sum, we can conclude that the CAB facilities are generally much used by the intended end users and that there are overall more users in SAN 2. Nevertheless, about a fifth of the intended beneficiaries does not use the CABs. The main reason for deciding to use/not use the CAB to fetch water is which facility (the CAB or the alternative) is closer to the user's home.

4.2.2. *How are CAB facilities being used and/or are end-users still using alternative locations?*

4.2.2.1. Which CAB facilities do households use?

The toilets are the CAB facility that is most frequently used: over 80 percent of the households use the CAB for this purpose (see Figure 6). Therefore, we conclude that the CAB meets a real need of the settlement inhabitants. From a health perspective, this is a positive finding, as using a flush toilet is preferable to open defecation or using an open pit latrine.

Only 13 percent of the respondents uses the CAB specifically to wash their hands. When asked separately about when they wash hands, 63 percent of the respondents say they wash their hands after defecation, 80 percent before cooking and 84 percent before eating. This means that they often wash their hands with water from

other sources, or water that was fetched at the CAB beforehand. 43 percent of households report usually or always using soap when washing their hands. Bear in mind that this is self-reported information.

Other important uses of the CAB are bathing and laundry (69 percent of households). Comparing the use between SAN 2 and SAN 3 households, only the difference in bathing is significant ($p<0.05$). SAN 3 households are more frequent users of the showers: 77 percent make use of them. Again, this is a good indication that they fulfil a need.

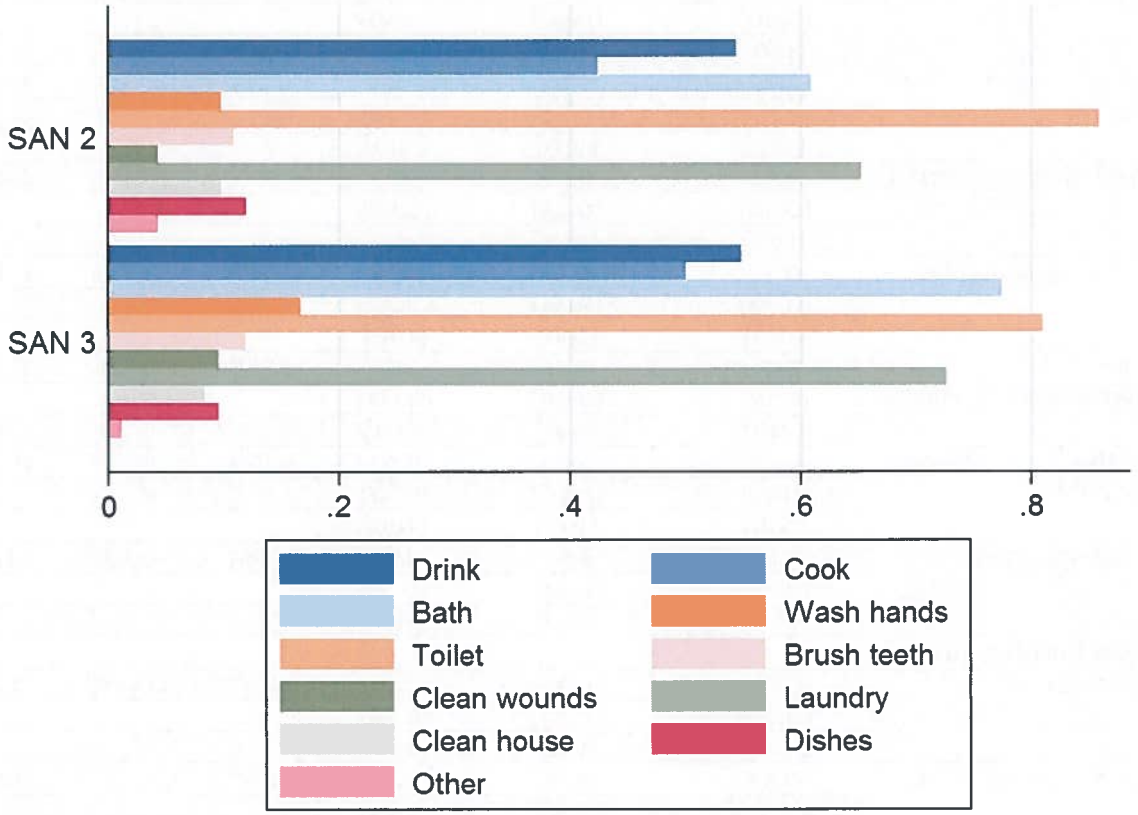


Figure 6 Purposes that CAB is used for (fraction of households)

A bit more than half of the users (55 percent) also use the CAB for drinking water, and a similar figure we find in Table 7, which gives the household's main water source for drinking, bathing and doing laundry, respectively. Piped water into the yard and public stand pipes are the main water source for households that do not use a CAB, both in the comparison and treatment groups, because these are the closest sources to their houses.

We have looked at differences in use between men and women by comparing answers given by male and female respondents. Notably, women make less use of the shower facilities: 60 percent compared to 84 percent of male respondents ($p<0.01$). The difference is more pronounced in SAN 2 areas. In addition, we observe that on average, as many women as men use the CAB for doing laundry.

Almost 70 percent of the households use the CAB as their main source for bathing, for about 8 times a week on average.[63] These numbers are 68 percent and 2.3 times a week for laundry. Piped water into the yard and public standpipes are also the main other sources for bathing and laundry.

[63] This can also mean that they fetch water at the CAB in a large plastic tub and bathe at home.

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Main drinking water source						
Sampled CAB	0.00	0.48	0.56	0.000***	0.000***	0.503
	(0.00)	(0.50)	(0.50)			
	[100]	[100]	[100]			
Piped water into dwelling	0.04	0.05	0.01	0.715	0.125	0.111
	(0.20)	(0.22)	(0.10)			
	[100]	[100]	[100]			
Piped water into yard	0.52	0.28	0.17	0.078*	0.021**	0.405
	(0.50)	(0.45)	(0.38)			
	[100]	[100]	[100]			
Public tap/standpipe	0.34	0.13	0.22	0.067*	0.292	0.148
	(0.48)	(0.34)	(0.42)			
	[100]	[100]	[100]			
Water supplier/carrier/tanker	0.01	0.00	0.00	0.318	0.318	
	(0.10)	(0.00)	(0.00)			
	[100]	[100]	[100]			
Another Ablution block/CAB	0.03	0.04	0.02	0.813	0.758	0.546
	(0.17)	(0.20)	(0.14)			
	[100]	[100]	[100]			
Neighbour's tap	0.06	0.02	0.02	0.185	0.185	1.000
	(0.24)	(0.14)	(0.14)			
	[100]	[100]	[100]			
Main bathing source						
Sampled CAB	0.00	0.66	0.70	0.000***	0.000***	0.713
	(0.00)	(0.48)	(0.46)			
	[100]	[100]	[100]			
Piped water into yard	0.53	0.19	0.12	0.008***	0.004***	0.478
	(0.50)	(0.39)	(0.33)			
	[100]	[100]	[100]			
Public tap/standpipe	0.34	0.07	0.14	0.020**	0.073*	0.130
	(0.48)	(0.26)	(0.35)			
	[100]	[100]	[100]			
Main laundry source						
Sampled CAB	0.00	0.67	0.68	0.000***	0.000***	0.927
	(0.00)	(0.47)	(0.47)			
	[100]	[100]	[100]			
Piped water into yard	0.52	0.18	0.13	0.008***	0.004***	0.583
	(0.50)	(0.39)	(0.34)			
	[100]	[100]	[100]			
Public tap/standpipe	0.32	0.08	0.12	0.022**	0.058*	0.360
	(0.47)	(0.27)	(0.33)			
	[100]	[100]	[100]			

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 7 Main water sources

Similar to the use for bathing and laundry, 70 percent uses the CAB as their main toilet during the day. Facilities that are used besides the CAB are other flush toilets and pit latrines with slabs. Figure 7 (on the next page) presents these results. The table in Appendix D shows detailed results, which we summarize in the text below.

The situation at night is different from the situation during the day. Most CABs (16 out of 20) close between 17.30 and 21.00 in the evening and hence are not in use at night. Only four SAN 2 CABs are always open. Still, 29 percent of SAN 3 and 47 percent of SAN 2 households indicate to use the CAB toilet at night as well. One explanation from the interviews, is that in some locations people can collect the key from the caretaker after the CAB is closed. As an alternative, households use pit latrines and buckets at night.

Case studies: the case studies confirm that people use alternatives during the night including pit toilets and buckets. Almost all women and children use a bucket during the night. For young children the bucket is also used during the day. While most people report thoroughly rinsing their bucket in the CAB during the day, some people empty them outside. Open defecation was still practiced in the SAN 2 location in the evening when people would find the CAB closed and go behind it. While the CAB in the SAN 3 settlement would according to the caretaker be closed in the evening (around 21:00) people still reported using the CAB at night and when random people were asked, they confirmed CABs are not closed at night.

Only few respondents in the comparison group report practising open defecation (bush or field), during the day or at night. We found similar results when we asked about the facilities used before the CAB was placed.[64] However, 15 percent of the comparison respondents use open pits and 18 percent of the treatment households used an open pit before the CAB. The World Health Organization (WHO) categorizes open pits as 'unimproved sanitation', while pit latrines with slab and other flush toilets are 'improved'.[65] Although it is difficult to quantify the health benefits, this shift in use is an important outcome that we can attribute to the programme.

We also compared the toilet use between men and women, but there are no noteworthy differences.

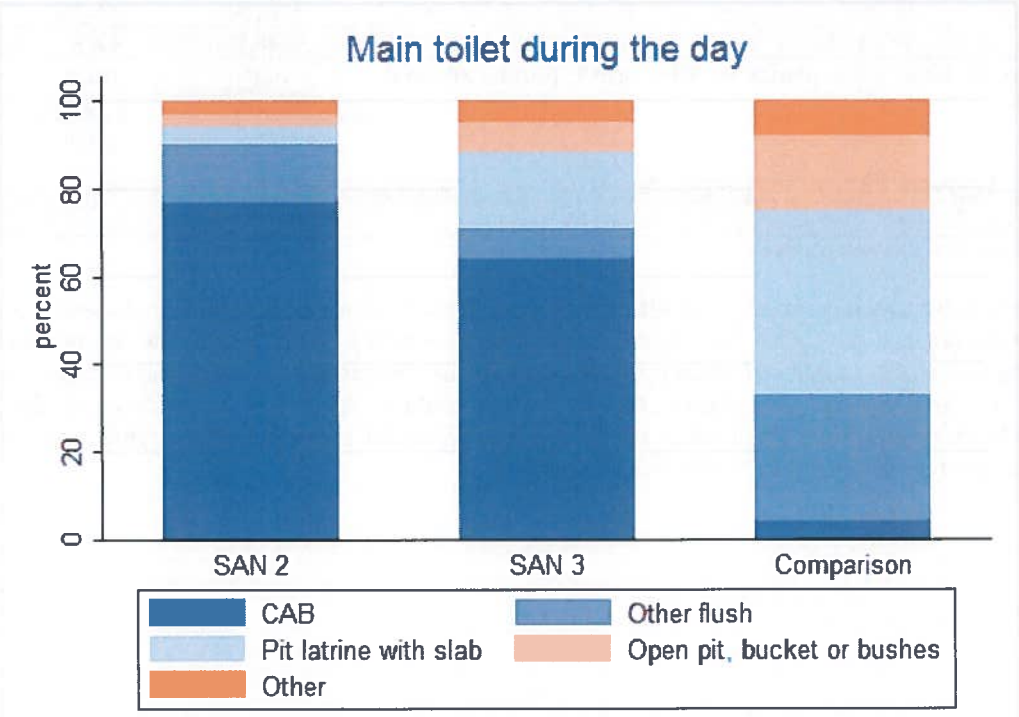


Figure 7 Main toilet during the day

Case studies: For the location without a CAB the facilities that were most used were private pit latrines (likely only a share with slap), buckets, the bush (open defecation), and more distant CAB facilities. It was unanimously noted that the area was dirty with human faeces spread around. The situation before CABs described in the SAN 2 and SAN 3 case studies was very similar. People also used illegal communal taps, allegedly because the pressure from the municipality taps was too low. People bathe using a dish and fetched water and laundry is done at the tap (or at home) and spilled around communal taps, causing puddles.

[64] 5 percent of households in SAN 2 sites and 3 percent of households in SAN 3 sites.
[65] WHO-UNICEF Joint Monitoring Programme for Water Supply and Sanitation, available at https://www.wssinfo.org/definitions-methods/watsan-categories.

In conclusion we find that most of the facilities of the CABs are used as primary source by households. While for drinking water people often also use alternatives, for showering, laundry and particularly toilet-use end-users mostly use the CAB. At night alternatives are still used, including pit latrines and buckets. Compared to the comparison group, the use of pit latrines during the day is far lower in CAB sites.

4.2.2.2. Are end-users still using alternative locations?

The previous section discussed which alternative locations the households use, and this section zooms in on the extent to which those alternative locations are used.

The main water source is not the only source. For drinking water, 28.9 percent of CAB users use a secondary drinking water source and 11.5 percent of users of other sources use the CAB as a secondary drinking water source. The table below shows the fraction of caretakers who indicate that alternative sources and facilities are available to the households in the site. While 85 percent of the households have access to alternative public drinking water source, only 25 percent have access to other public toilets and shower facilities.

Caretaker results	SAN 3	SAN 2	p-value
Fraction of sites with available alternative public drinking water sources	0.90	0.80	0.556
	(0.32)	(0.42)	
	[10]	[10]	
Fraction of sites with available alternative public toilets	0.30	0.20	0.628
	(0.48)	(0.42)	
	[10]	[10]	
Fraction of sites with available alternative public shower facilities	0.30	0.20	0.628
	(0.48)	(0.42)	
	[10]	[10]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 8 Availability of alternatives

Figure 8 summarizes to what extent these alternatives are used.[66] All households are included in the figure, also the ones that do not use the CAB.[67] The figure shows two interesting points. First, the figure corroborates our earlier finding that SAN 2 CABs are used more intensively, as the sampled SAN 3 households use alternatives relatively more often. Second, the figure reflects that inhabitants have few alternatives to the CAB toilets, showers and laundry facilities. The CAB is used relatively more for those purposes, while households use the CAB and other sources about as much for drinking water.

[66] Respondents were asked to indicate their use of the CAB relative to other sources on a scale from one to five for several purposes, where one means 'only uses other sources', three means 'uses other sources and the CAB just as much' and five means 'only uses the CAB'.

[67] Recall from Figure 5 that 15 percent of SAN 3 and 20 percent of SAN 2 respondents did not use the CAB in the past 3 months.

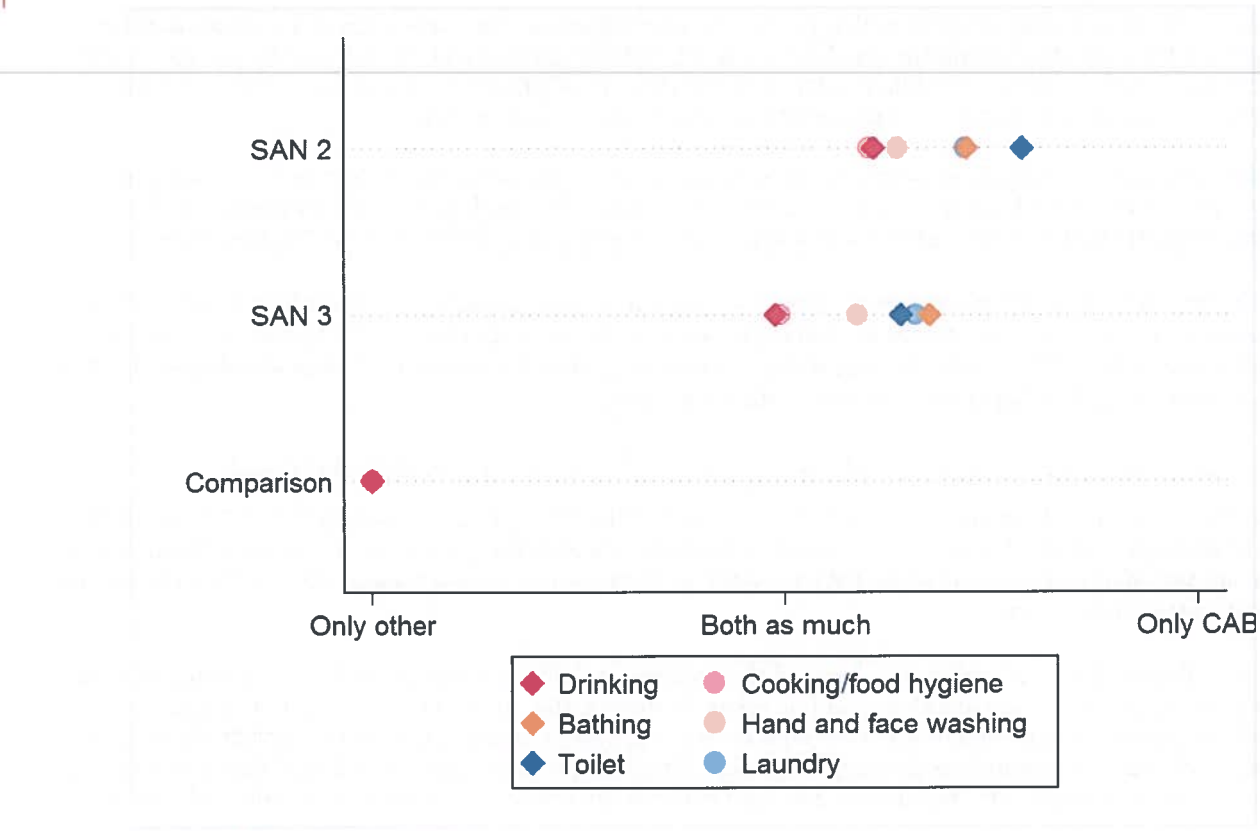


Figure 8 Relative use of alternatives

In sum, people still use alternatives to some extent for all facilities that the CAB offers. However, especially in SAN 2 areas, the CAB toilet is preferred to alternative options. Besides, although most people have other sources for fetching water, laundry is more often done at the CAB.

4.2.2.3. How long does it take to go to the water point, get water, and come back?

Table 9 presents the time it takes to fetch water at the CAB and at other water sources. It takes CAB users 10.4 minutes on average to fetch water and come back. This is a minute longer than the comparison group, for whom it takes 9.4 minutes. Section 4.3.4 looks further into a possible timesaving effect from the CAB.

An interesting finding concerns the duration of fetching water for treatment households that use other sources than the CAB. The short duration of 4.2 minutes corresponds with the reason they give for using this source, which is that it is the closest source to the house. Water quality is not an issue, since it should be the same if the household is using for instance a standpipe.

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Duration of fetching water at the CAB in minutes		8.83	11.77			0.122
		(9.67)	(10.03)			
	[0]	[48]	[56]			
Duration of fetching water at other sources in minutes	9.37	3.44	5.11	0.021**	0.111	0.225
	(15.51)	(4.18)	(5.52)			
	[100]	[52]	[44]			
Number of times that households fetch water per week	11.66	8.75	10.89	0.002***	0.268	0.012**
	(7.78)	(6.24)	(6.11)			
	[73]	[77]	[85]			
Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01						

Table 9 Duration of fetching water at the CAB

Case studies: The case studies confirmed that people use standpipes or other taps if these are closer to their shack. In the SAN 2 site the community and leadership wished for additional stand pipes to be placed around the settlement, to reduce distance to fetch water. In the SAN 3 site, CABs were spread around the settlement and nearby for most people, hence no standpipes appeared to be used or needed.

During the interviews with EWS, we were informed of the policy of the municipality to remove standpipes within 250 meters of the CAB, with consent from the community. The continued use of standpipes by the community suggests that in many cases from their perspective it might be better to leave the standpipes.

In sum, the time it takes to fetch water is an important determinant for people to decide where to get it. People want enough access to water, and prefer not having to walk too far to get it. While EWS's policy is to remove standpipes close to the CAB, in some instances the community prefers to receive additional standpipes. Lack of drainage at remaining standpipes could however still be an issue.

4.2.3. What is the metered quantity of water consumption?

On the CAB level we have been informed by EWS that most of the SAN 3 CABs do not have a meter installed yet. One of the explanations that were given was having problems with the procurement contract. Water use is therefore not yet effectively monitored by EWS for SAN 3. We therefore cannot answer the question on metered quantity of water consumption.

Case studies: During the case studies we observed that neither at the SAN 3 nor at the SAN 2 site meters were installed at the CABs. Hence no quantity could be taken. However, the caretaker for SAN 2 noted that the meter and the pipe were damaged by a person who burned rubbish on top of it (not knowing that the meter was there), indicating that there was previously a meter. People in all case studies confirmed that at times (not often) there is no water, but they accept this, also because the whole area is then turned off and not only them.

4.2.4. To what extent are the CABs used properly and kept clean?

The cleanliness of CABs is an important aspect of use. In addition, improper use can cause defects and is therefore also an important aspect of usability. The survey results and the case studies help to understand how the people in eThekwini use the CABs.

4.2.4.1. Proper use

It is the caretakers' job to keep the CAB in a good state and all interviewed caretakers agree on this (as presented in Table 10). However, the caretakers indicate that improper use of the facilities is an issue. Of the ten SAN 2 caretakers, seven say that less than half of the users use the CAB properly. Four of the SAN 3 caretakers give the same estimate for the CAB they are responsible for. In addition, the SAN 2 caretakers seem to have less authority than the SAN 3 caretakers, as only three of the SAN 2 caretakers indicate that people listen to them when they say something about their behaviour compared to 70 percent of SAN 3 caretakers. The household characteristics (see Appendix C) show that caretakers of SAN 2 CABs are 8.7 years younger on average than caretakers of SAN 3 CABs, which may help explain their lack of authority.

Caretaker results	SAN 3	SAN 2	p-value
Fraction of caretakers who consider her/himself responsible for keeping the facilities working	1.00	1.00	
	(0.00)	(0.00)	
	[10]	[10]	
Part of users using the CAB properly according to the caretaker			
Only a few (0-25%)	0.20	0.30	0.628
	(0.42)	(0.48)	
	[10]	[10]	
Slightly less than half (25-50%)	0.20	0.40	0.355
	(0.42)	(0.52)	
	[10]	[10]	
Half or a bit more (50-75%)	0.30	0.10	0.288
	(0.48)	(0.32)	
	[10]	[10]	
Almost everyone (75-100%)	0.20	0.10	0.556
	(0.42)	(0.32)	
	[10]	[10]	
Everyone (100%)	0.10	0.10	1.000
	(0.32)	(0.32)	
	[10]	[10]	
Do people usually listen to you when you talk to them about their bad behaviour?	0.70	0.30	0.081*
	(0.48)	(0.48)	
	[10]	[10]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

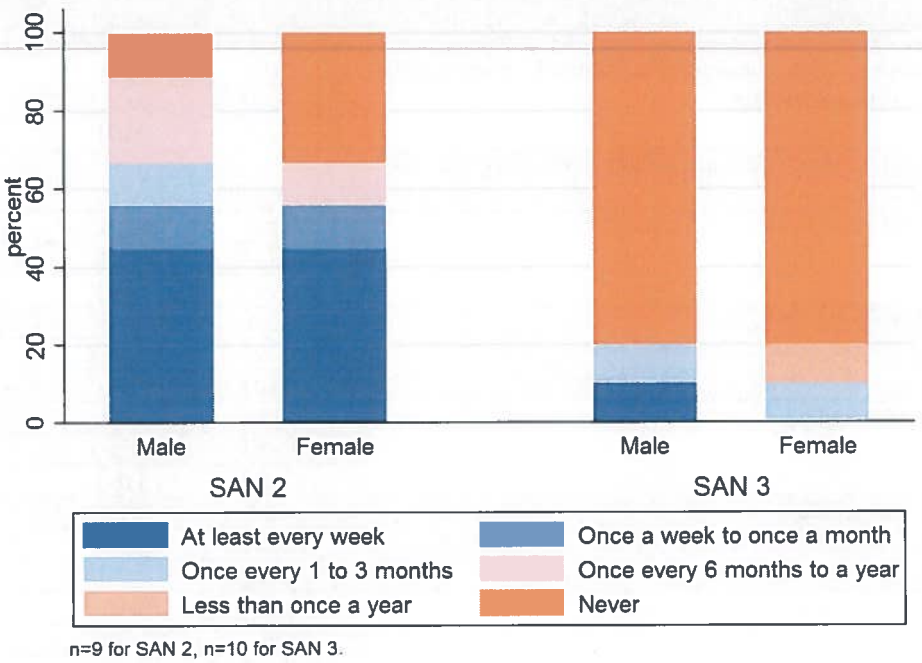
Table 10 Proper use according to caretaker

Case studies: The Focus Group Discussions confirm the statements by the caretakers. End-users agreed that the community does not use the facilities properly. They also confirmed that the caretakers are responsible for cleaning the CABs and are doing their work well, but that they are not able to keep them clean because of how people use them. It was even noted that some people are intentionally careless, because they know the caretaker is paid and feel like they should clean up after them.

Figure 9 shows how often the improper use results in broken facilities, as estimated by the caretakers. The difference between SAN 2 and SAN 3 is also apparent in the figure, but keep in mind that the SAN 3 CABs had only been open for three to six months at the time of the survey. At four male and female CABs, facilities break every week because of improper use. Even at one of the male SAN 3 CABs facilities are broken every week.[68]

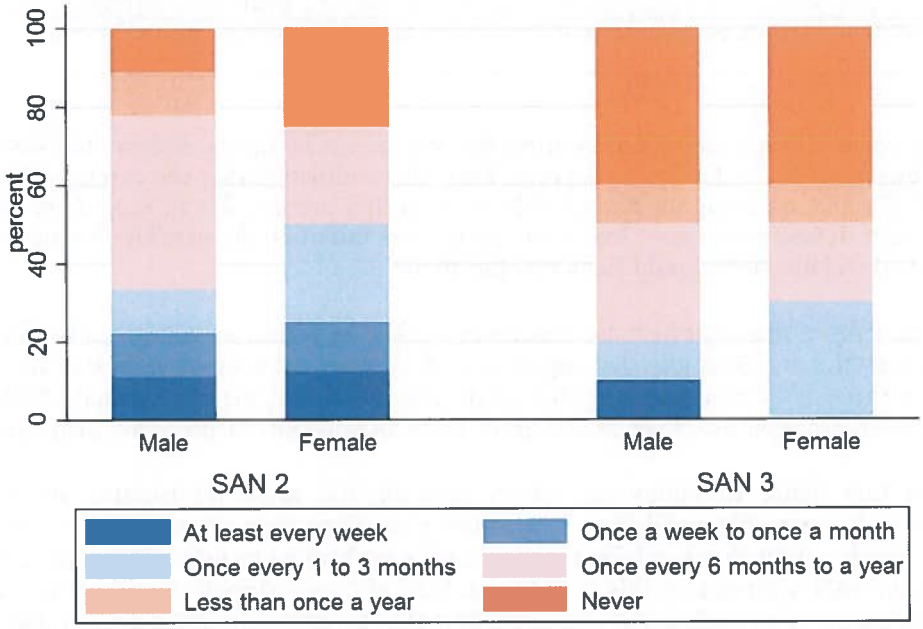
When comparing this figure to Figure 10, which presents the same information for vandalism-related breakages, it becomes clear that vandalism is a smaller problem than improper use according to SAN 2 caretakers. They mostly report that vandalism is responsible for broken facilities only once every six months to a year. However, for SAN 3 caretakers this is different. Half of them estimate that facilities are broken due to vandalism at least once a year, while eight of them report that facilities are never broken due to improper use. Because the SAN 3 CABs had been open between three to six months at the time of the survey, caretakers who answered once every six months or less often based that on expectations. Therefore, we hesitate to draw firm conclusions based on these responses.

[68] Note that the CAB consists of two containers or modules, with separate facilities for women and men. We asked the caretaker about each of the two units.



n=9 for SAN 2, n=10 for SAN 3.

Figure 9 Frequency of broken facilities due to improper use



n=8 for SAN 2 female, n=9 for SAN 2 male, n=10 for SAN 3.

Figure 10 Frequency of broken facilities due to vandalism

Case studies: The case studies show that it can be difficult to discern between breakage due to improper use and vandalism. In SAN 3 all agreed that breakage of the facilities is problematic and is caused by carelessness. The (shooter) locks on some doors are mostly broken, as well as taps. The toilet flush levers are broken but the toilet can still flush. According to the caretaker in the SAN 3 case these were reported but the levers could not be replaced without replacing the whole toilet tank. In the SAN 2 location end-users note vandalism and improper use as cause for defects and dirtiness. On the other hand there are also indications that poor quality of materials results in more breakage and dirtiness, including leaking pipes.

At the time of the survey, enumerators observed the state of the CABs. Table 11 shows the fraction of male and female CABs with at least one unit of that type of facility broken. Confirming the findings discussed above,

broken facilities are a bigger issue for SAN 2 CABs than for SAN 3 CABs. At the SAN 3 CABs, more recently built, only some urinals and a sink outside of a female CAB are out of use. In contrast, at the SAN 2 CABs, which are older, each type of facility is out of use at two or more CABs, except for the sinks outside the female CABs, which are all in use. Remarkably, most SAN 2 CABs had defect toilets. The caretakers mention lack of toilet paper as a reason for defect toilets. When there is no toilet paper, people use other materials that cause blockages.

Maintenance staff within EWS as well as other stakeholders confirmed clogging due to flushing of other materials than toilet paper to be one of the main forms of misuse. While initially EWS supplied the CABs with toilet paper, the provision has been reduced and during some periods in 2016 no paper was supplied at all. The following reasons were given by EWS: Some caretakers were believed to abuse supplies by hoarding and selling and there were issues with the procurement contract extension. The stance of EWS project staff is to ensure toilet paper is provided again, since the costs do not weigh against those of continuous need for maintenance to toilets.

Case studies: In both the SAN 2 and SAN 3 site, respondents confirmed that besides toilet paper, also newspaper or very occasionally even other materials including cardboard, clothing and leaves were used as alternatives. They all noted that this will at some point cause blockage and dirty toilets. In Manyaleni (SAN 2) the supply has fluctuated: the caretaker did not receive toilet paper in the month before the interview and two packets in the current month. She distributes it amongst users because it would be taken or wasted when it was left in the CAB. In Canelands (SAN 3) the caretaker notes receiving it monthly and places a roll in the CAB in the morning and afternoon but it is insufficient for the whole day and for the whole month, mainly because of misuse (such as using it to dry hands). End-users in Canelands noted buying toilet paper, although mainly those who cannot afford that use newspaper.

Household results	SAN 3	SAN 2	p-value
Fraction of male CABs			
Toilets out of use	0.00	0.67	0.001***
	(0.00)	(0.50)	
	[10]	[9]	
Showers out of use	0.00	0.22	0.128
	(0.00)	(0.44)	
	[10]	[9]	
Sinks inside out of use	0.00	0.22	0.128
	(0.00)	(0.44)	
	[10]	[9]	
Sinks outside out of use	0.00	0.22	0.128
	(0.00)	(0.44)	
	[10]	[9]	
Urinals out of use	0.40	0.33	0.779
	(0.52)	(0.50)	
	[10]	[9]	
Fraction of female CABs			
Toilets out of use	0.00	0.56	0.004***
	(0.00)	(0.53)	
	[10]	[9]	
Showers out of use	0.00	0.22	0.128
	(0.00)	(0.44)	
	[10]	[9]	
Sinks inside out of use	0.00	0.33	0.049**
	(0.00)	(0.50)	
	[10]	[9]	
Sinks outside out of use	0.10	0.00	0.357
	(0.32)	(0.00)	
	[10]	[9]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01; the figures indicate the fraction of CABs that have at least one unit of this type of facility broken.

Table 11 Observed facilities out of use

In conclusion, improper usage of the facilities is a general issue, at least partly resulting from a lacking sense of responsibility of users. This is of course a common issue with shared facilities. Defects appear to be often caused by improper use, although breakages and clogging are also influenced by lower quality of used spare parts and toilet paper often not being available.

4.2.4.2. Cleanliness

Table 12 and Table 13 show data on self-reported cleaning behaviour of the caretakers and households and the perceived cleanliness by the enumerators and households.[69]

As the caretaker's main task is to keep the CAB clean, all caretakers feel responsible for this and almost all of them respond that they clean the CAB multiple times a day[70]. Households, on the other hand, are not involved. Only in 2.7 percent of the households, someone helps with maintaining, cleaning or repairing the CAB. This is confirmed in the case studies with people indicating that they hold the caretaker responsible because she is paid; people do not help to keep it clean.

The perception of cleanliness of the CABs differs between the enumerator and the households, with more positive household results. On average, the households think that the CABs are relatively clean (a score above zero), while the enumerator thinks that the SAN 2 CABs are dirty (a score of minus 1 or below).[71] Nevertheless, the difference between SAN 3 and SAN 2 CABs is clear in both scores. SAN 2 CABs are significantly less clean than SAN 3 CABs with a difference of one point for the households and two points for the enumerator. In fact, the enumerator did not consider any of the SAN 2 male CABs to be clean.

One possible explanation for this difference is the more intense use of the SAN 2 CABs, making it more difficult for the caretakers to keep it clean. Additionally, we do find a correlation between the hours that a CAB is opened and the level of uncleanliness. These two explanations reinforce each other, since longer opening times will allow for more intensive use.

Case studies: A comparison of the case studies for SAN 2 and SAN 3 supports the explanation that the higher number of users for SAN 2 leads to facilities that are less clean most of the time. Recall from section 3.2.1 that this particular SAN 2 location has only one CAB site, while the SAN 3 location has multiple. The problem is nicely stated by the caretaker for SAN 2: 'I am content but the problem is that we are having too many people using the CABs especially male CAB, even if I have cleaned them it doesn't take an hour for them to be dirty again.' In the case studies children were often identified as cause of uncleanliness, which was seen as a neglect of responsibility by the parents.

Observation and caretaker results	SAN 3	SAN 2	p-value
Fraction of caretakers who consider her/himself responsible for keeping the CAB clean	1.00	1.00	
	(0.00)	(0.00)	
	[10]	[10]	
Fraction of caretakers who clean multiple times per day	1.00	0.80	0.151
	(0.00)	(0.42)	
	[10]	[10]	
On a scale from -2 to 2, how clean do you think that the male facilities are? (Enumerator answer)	0.78	-1.33	0.001***
	(1.30)	(0.87)	
	[9]	[9]	
On a scale from -2 to 2, how clean do you think that the female facilities are? (Enumerator answer)	0.80	-1.11	0.003***
	(1.23)	(1.17)	
	[10]	[9]	
Fraction of male CABs that the enumerator considered clean (i.e. for which a score of 1 or higher was given)	0.67	0.00	0.001***
	(0.50)	(0.00)	
	[9]	[9]	
Fraction of female CABs that the enumerator considered	0.70	0.11	0.007***

[69] Besides the households, an enumerator also scored the cleanliness of the CABs on a scale from one (very dirty) to five (very clean), which was recoded to a scale from minus two to two for convenience in interpreting the results.
[70] The other two caretakers clean the CAB once a day or between 2 and 6 times a week.
[71] For SAN 3 sites, there is a significant difference ($p<0.01$) between male and female respondents in the household survey. The average score is 1.03 for the former, against 1.47 for the latter.

clean (i.e. for which a score of 1 or higher was given)	(0.48)	(0.33)	
	[10]	[9]	

Notes: two CABs could not be observed because they were closed at the moment of the interview
Standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 12 Cleanliness of CABs based on caretaker interviews and observations

Household results	SAN 3	SAN 2	p-value
Fraction of households with someone in the household helping with maintaining, cleaning or repairing the CAB	0.01	0.05	0.048**
	(0.10)	(0.22)	
	[100]	[100]	
On a scale from -2 to 2, how clean do you think that the facilities are?	1.32	0.34	0.003***
	(0.75)	(1.34)	
	[84]	[92]	

Notes: opinion about cleanliness only asked to households that have used the CAB in the past 3 months.
Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 13 Cleanliness of CABs according to households

In sum, the uncleanliness of CABs is a serious concern. Even if caretakers clean well, it is difficult to maintain this. There appears to be a relation to the number of users and longer opening hours. This negatively influences user-experience as well as hygiene.

4.2.5. *How is consumer education and communication effectuated and what are the results?*

4.2.5.1. EWS

We have collected information on the training process (through desk research and interviews) and on the experience of end-users (through the survey).

EWS is responsible for communication prior to and during the construction of the CAB to maintain good relations with people in the settlements. In theory, around the opening of the CAB, EWS holds a session to provide some more information to users on the use of the CAB, which should be attended by a person from every household.

Consumer education and communication about the CAB was planned to take place in the form of trainings. Table 14 and Table 15 show the realisation of these trainings. Both for SAN 3 and SAN 2, three of the ten caretakers say that there has ever been a training about the CAB and hygiene.

Caretaker results	SAN 3	SAN 2	p-value
Fraction of sites where caretaker indicated that any training about the CAB and hygiene has taken place since the construction	0.30	0.30	1.000
	(0.48)	(0.48)	
	[10]	[10]	

Standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 14 Trainings according to caretaker

However, less than ten percent of households indicate that they actually participated in a training about either sanitation or use of the CAB. Although it is possible that households might not recall participating in a training, these numbers suggest that education and communication about the use of the CAB was limited.

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Fraction of households that ever participated in a sanitation training	0.10	0.07	0.08	0.500	0.647	0.730
	(0.30)	(0.26)	(0.27)			
	[70][1]	[100]	[100]			
Fraction of households that ever participated in a CAB training	0.07	0.10	0.07	0.507	0.972	0.370
	(0.26)	(0.30)	(0.26)			
	[70][1]	[100]	[100]			

[1] Households that were unaware of the planned CAB are excluded.
Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 15 Trainings according to households

The households that did participate said the focus of the training was on how to properly use and clean the CAB. Nevertheless, due to a limited number of participants, we do not have any indication whether the training affected participants' behaviour.

Case studies: For the SAN 2 site, the health staff notes that EWS only came once after the CABs had opened and according to her, the leadership of the community have taken it upon themselves to continue informing the community on how to properly use it. Also in the SAN 2 site, one of the end-users recalls that a meeting was called on how to use the toilets and work together with the caretaker. It is however not clear how many people took part in the training. Observation: In none of the three CABs there were user-instructions hanging in the CAB.

In conclusion, there have been informative sessions by EWS in settlements on how to use the CABs but many households did not participate in this and reach appears to be limited.

4.2.5.2. Health department

According to the education unit (E&CS) of EWS, after the initial stage, EWS becomes less involved with the communication with users. Maintaining contact and influencing behaviour regarding hygiene and proper use of water and sanitation then falls within the responsibility of the Health Department. This was confirmed by the health department. There is, however, no coordination between the two about the opening of a new CAB, so no formal "handover" of new CAB sites from EWS to the Health Department takes place.

According to the health department local health staff visit each community every three months, they meet with the caretaker and call a community meeting with 60 to 100 participants to discuss issues that the community is facing with regard to water, sanitation and other basic services related to health and hygiene. The health staff also noted that people are aware of health and hygiene, but a (small) share of them just does not act accordingly.

In conclusion, the sensitization of people to use the CABs properly and look after them is very limited. It is doubtful, however, if additional awareness creation would change the impact on the behaviour of users. In addition, the term 'training' might not be most appropriate to describe EWS activities to make people aware of how to use the CABs. Based on interviews and FGDs, most people appear to be aware of best practice in hygiene and proper use. People do not seem to experience any incentive to look after the CAB, because it is the caretakers' responsibility to look after them and because uncleanliness caused by other users also makes it more difficult and less motivating to do so. This also shows that social control and peer pressure are not manifest in the CAB sites we studied.

4.2.6. In terms of personal safety, what is the perception of the end–users on the location and design?

Feeling unsafe is a potential barrier to use of the CAB. We asked the households and caretakers how safe they feel around the CAB.[72] The results are shown in Table 16 and Table 17. The household results indicate that users feel safe around the CAB during the day, but somewhat unsafe at night. We find a similar result in the caretaker

[72] We asked to rate this on a scale from one to five, with one meaning 'Very unsafe', three 'Not safe, not unsafe' and five 'Very safe'. We recoded this to a scale from minus two to plus two.

data, although SAN 3 caretakers also feel relatively safe at night. Generally speaking, and at least during the day, the CAB and its surroundings are perceived as safe, indicating that this is not an obstacle to using it. Lack of safety is a concern during the night. Project staff mentioned this as one reason why many CABs are closed during those hours.

In general, the difference in safety perception between men and women is small. Only at night, women from SAN 2 sites report feeling less safe than men. They score safety at night -0.38, while men score it 0.1.

Several municipality officers reported that insecure surroundings of the CABs are a serious issue. There are at least two ways in which the implementers have aimed to address this: (1) Safety is taken into account in the selection of a location, (2) Lighting has been placed at the CAB site. Solution 1 has been discussed in section 4.1.2.1 The outside lighting is considered by project staff to enhance the sense of safety. However, 13 out of the 20 locations did not have a functional flood light. This is a strong indication that at least half of the CABs are not secured through light.

Household results	SAN 3	SAN 2	p-value
On a scale from -2 to 2, how safe do you feel around the ablution block/CAB during the day?	1.08	1.18	0.384
	(0.81)	(0.73)	
	[100]	[100]	
On a scale from -2 to 2, how safe do you feel around the ablution block/CAB at night?	-0.32	-0.21	0.559
	(1.05)	(1.18)	
	[100]	[100]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 16 Personal safety of respondent

An interesting observation from the survey, however, is that SAN 2 caretakers feel less safe than SAN 3 caretakers during the day. The SAN 2 caretakers that feel unsafe during the day take care of CABs that are situated in the settlements KwaMashu A Hostels and KwaMashu K&J Buffer. Project staff told us that KwaMashu Hostels is perceived as one of the most dangerous settlements in Durban. In our regression analysis, we control for differences in crime levels with a crime index, as reported in section 4.3.3.

Caretaker results	SAN 3	SAN 2	p-value
On a scale from -2 to 2, how safe do you feel around the CAB during the day?	1.70	0.40	0.018**
	(0.48)	(1.51)	
	[10]	[10]	
On a scale from -2 to 2, how safe do you feel around the CAB at night?	0.90	-0.10	0.130
	(1.10)	(1.66)	
	[10]	[10]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 17 Personal safety of caretaker

Case studies: The case studies strongly confirm that it is not considered safe for people to go outside during the night to use sanitary facilities. This was the main argument given by local stakeholders who believed the CABs should be closed at night. Particularly in the SAN 2 site, the location of the CAB was considered to contribute to safety because there are houses around it and there is light at night. For both case studies at night there are men around (or even inside) the CABs smoking Whoonga (street drug). This creates a sense of insecurity. At Canelands (SAN 3) the observers noted there was no light. The caretaker also noted that she is scared during the night to close the CAB (at around 21:00).
Interestingly, also the distance towards the facilities is important for the experienced security during the evening. For SAN 3 one end user noted that the CAB is 150 meters from his house which is a bit far, so he accompanies his wife during the night to protect her. One woman noted that she used to use the bucket in the evening but now her boyfriend accompanies here to the facilities. In Dunpals (No CAB) the risk of going to a public facility was also related to the political intolerance, which could result in being assaulted there.

In conclusion, the safety situation during the day does not seem to be an obstacle to using the CAB, since users report feeling safe. However, safety is a main concern during the night for both users and caretakers. While activities have been undertaken to address this, e.g. by installing flood lights, this is not effective, since a large number of CABs do not have (functioning) lights outside. Many users would like to have the CABs opened at night, but safety is an overriding restriction and thus leads to people using alternatives.

4.3. Impact

We assess the impact-level effects of the project in different areas. For the health evaluation question, we research diarrhoea prevalence. Time used for fetching water is analysed for the time saving evaluation question and for the economic evaluation question we look at the type of work of the household head (formal/informal/ grants) and a wealth index. We consider the impact on migration, development planning and the environment.

4.3.1. What is the effect of CABs on migration and settlement?

A number of interviewees argued that the CABs attract people to the informal settlements. [73] The reason for this would be that the services provided by the municipality are an indication to people that the government is developing an area. This is an incentive to others (often relatives from rural areas) to move to the area. In addition, the construction of a CAB is seen as a reliable indicator that the settlement will not be removed any time soon, as the municipality is investing in it. This would decrease uncertainty for the settlers. However, the household survey does not provide evidence for the influence of the project on migration streams.

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Number of years that household lived in the settlement	12.32	11.11	11.51	0.663	0.803	0.878
	(13.11)	(10.06)	(10.97)			
	[100]	[100]	[100]			
Moved to this settlement because of the CAB	0.00	0.00	0.00			
	(0.00)	(0.00)	(0.00)			
	[100]	[100]	[100]			

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 18 CAB and migration

On average, households report having lived in the current settlement for about 12 years. This does not exclude the possibility that they have moved within the settlement in that period. They mainly moved there because it is close to work and work opportunities, while none of the households moved because of the CAB. Hence, it seems unlikely that the CABs have a strong effect on migration.

Case studies: In the SAN 2 settlement end-users noted that the number of CABs was based on the original number of community members, but since new people came to the settlement they were now insufficient. Also people from adjacent settlements come to use the facilities. For the SAN 3 site, the community leadership claimed that the number had not changed since the CABs were erected. In Dunpals (No CAB) different stakeholders mentioned that many new people came to live in the settlement, the main reason being (temporary) jobs but possibly also the promise of formal housing. The ward councillor noted 2,000 registered people but 5,000 actual dwellers. The community leadership explained that in Dunpals (and the whole of Mumbhayi) people can easily come, pay someone and build a shack while in other areas it is more difficult to get employed if you are not from around and you are not allowed to build a shack. This could explain why there is differentiation in the growth rate between areas. One possible explanation for their tolerance toward newcomers might be the lower level of development of the settlement and the unwillingness of settlements with more opportunities for work and better services to be shared with others.

In sum, while densification of settlements cannot be denied, the direct impact on the use of CAB facilities appears to be moderate. It is likely that in some settlements the number of people increases much faster than in others. There appear to be incentives for people to move to settlements that have services, while on the other hand these communities might be more closed to newcomers. We cannot draw a definitive conclusion on the significance of the CABs on migration and vice versa.

[73] Human Settlement Department, EWS maintenance, EWS asset management

4.3.2. What is the effect of CABs on official development planning?

From the interviews with the EWS and Housing Department it appears that the CABs have an effect on official development planning in at least two distinct ways.

The municipality has made a distinction between the area where water and sanitation services can be provided and the area where this is not possible, which is divided by the 'waterborne edge'[74]. This is also roughly the divide between rural and urban areas. While it is costly to develop the pipe infrastructure, EWS is succeeding in expanding the boundaries of the area where services are provided. However, with a large part of the people in informal settlements in eThekwini living outside the waterborne edge, the current policy of providing CABs is not capable of serving these people. Professor Chris Buckley and the University of KwaZulu-Natal are cooperating with the municipality on different projects, but appeared to be separately working on a CAB prototype that can operate off the sewerage and water grid. However, currently the project is only implemented inside the waterborne edge.

The Human Settlement Unit noted that water and sanitation are part of a package of incremental services, which also includes electricity, waste collection and pathway construction. It is the intention of the municipality to provide these services as much as possible in concurrence. EWS runs their selection of sites and order of roll-out by the Human Settlement Unit. In theory this enables them to align this with the activities of the units for the other incremental services. To some degree the project can thereby have an influence on wider development planning although there is no hard evidence to support this. In practice the coordination between the different departments is sub-optimal. All departments use the same GIS information system but create their own layer of information. These different layers are not integrated to provide a single overview of each settlement and they are not used by other departments, although they can access the other layers too. It is therefore often not clear for departments what infrastructure is already in place to use this in their own development planning. Specifically for EWS and housing this has meant that when Housing starts developing an area, the sewerage pipes and water pipe extension placed by EWS are sometimes not used but replaced with new ones, resulting in wasted investments.

Secondly, the CAB project was envisioned as a temporary solution, and is closely aligned with the housing policy strategy for formal housing. The project was intended to help bridge the waiting period until people in informal settlements were transferred to formal housing. Housing staff made clear that this housing policy is being abandoned. Although this was not the original intention of the project, the CAB project might provide the Human Settlement Unit with more space to realize this shift. It does mean that formal housing will most likely not be provided to most of the informal settlements currently served by the CAB project.

Case studies: The experiences of the case study communities with regard to service provision are very different. In the SAN 3 site, incremental services are being provided: besides the CAB facilities there is also electricity and waste collection and road construction is currently ongoing. In the SAN 2 site, this is also the case, at least to some extent. In the SAN 3 site that does not have a CAB yet, the wide consensus is that the community has been provided with close to no services at all. There is no electricity, there is no communal waste disposal and collection and there are only a few legal taps (with poor water pressure). According to the leadership, they have requested these services for many years but they are told by the municipality that the area is earmarked for development of formal housing.

Also the expectations of the end-users of whether the CABs are permanent or temporary is very different. In Manyaleni (SAN 2) end-users argued that the CAB should be seen as a temporary solution because they were informed that it would be, because they were promised houses and because the CAB will not last long. In Caneland (SAN 3) end-users in the FGD argue that they consider the CAB to be permanent because they have not been informed of what the next step will be and also the leadership states they see the CAB as long term. In Dunpals (No CAB) the construction of a CAB has steered up sentiments amongst community members which has been fueled by political parties. People are confused and upset because for 20 years they have been told that development of housing was eminent and recently they were told this again but the construction of CABs indicates that there will not be formal housing. This has led to protests. Both in Caneland and Dunpals, the fact that there is no clarity is given as reason for people not improving their housing structure.

[74] Interview with Professor Chris Buckley from the University of KwaZulu-Natal.

In sum, the influence of construction of CAB facilities on the wider development planning is significant. The programme touches on the dividing line between settlements within the waterborne edge and outside and between informal settlements and development of fully-serviced settlements. Policy integration with other departments is lacking. From a community perspective, the CABs therefore create a dual feeling of recognition and uncertainty about the future.

4.3.3. What is the impact of the project on health?

We have collected information on health from end-users and cross-checked findings during interviews.

By providing clean water and improved sanitation facilities to the settlements, the CABs are expected to improve the health of the inhabitants. Theoretically, using shared facilities like a CAB could also facilitate the transfer of pathogens if facilities are unclean and people do not use them properly. To investigate this, the survey asked about the prevalence of diarrhoea among the respondents in the last two weeks before the survey, and about the health costs related to diarrhoea for the whole households in the past 6 months.[75] We chose to ask about diarrhoea because safe drinking water and adequate sanitation and hygiene reduce the chance of suffering from diarrhoea significantly.[76] Moreover, respondents can recognize the symptom rather easily. Note, however, that it is also a sensitive topic to some people, which could lead to underreporting of prevalence. However, the field work team did not expect people to be apprehensive about answering diarrhoea-related questions and did not note such apprehension in interviews and FGDs. Furthermore, low prevalence would make it difficult to find a significant effect.

Table 19 shows the descriptive findings of the health related outcomes, while Table 20 shows the regression results. The prevalence of diarrhoea in the past two weeks among the respondents is 5.5 percent in the sites with CAB compared to 10 percent in sites without CAB; on average, they were affected for three to four days. Even though we find in our sample that in sites with a CAB half as many respondents suffered from diarrhoea as in sites without a CAB, the result could be due to chance fluctuation or other factors. Also the regression results do not show a statistically significant effect from the CAB. We do not find that the CAB has a statistically significant effect on the number of days that respondents were affected either.[77]

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Fraction of respondents that suffered from diarrhoea in the past 2 weeks	0.10	0.06	0.05	0.283	0.112	0.748
	(0.30)	(0.24)	(0.22)			
	[100]	[100]	[100]			
Number of days that he or she was affected in the past 2 weeks	3.40	3.00	3.60	0.641	0.908	0.738
	(2.17)	(1.26)	(3.65)			
	[10]	[6]	[5]			

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 19 Descriptive health results

	(1)	(2)	(3)	(4)
	Respondent had diarrhoea in past 2 weeks		Total number of days that the respondent was affected	
SAN3C	-0.040	0.002	-0.160	-0.030
	(0.037)	(0.030)	(0.121)	(0.099)
SAN2	-0.050	-0.017	-0.160	-0.094
	(0.031)	(0.028)	(0.132)	(0.128)

[75] Following the WHO, diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual). Frequent passing of formed stools is not diarrhoea, nor is the passing of loose, "pasty" stools.

[76] http://www.who.int/mediacentre/factsheets/fs330/en/

[77] We also asked about costs related to diarrhoea (medication, treatment and transport) in the past six months, but average reported expenses were very low for all groups.

Constant	0.100***	-0.100	0.340***	-0.615
	(0.026)	(0.101)	(0.088)	(0.524)
Controls	No	Yes	No	Yes
Observations	300	300	300	300
r2	0.007	0.079	0.005	0.092
ymean	0.070	0.070	0.233	0.233

Notes: Standard errors in parentheses
Controlled for drinking water treatment, water storage duration, health facility within 30 minutes, number of household members, trust in community leader, age, number of friends, distance to Durban, average distance to work per site, education of the household head, wealth, crime, years living in the settlement and region dummies.
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 20 Health regression results

During the interviews these findings were discussed. The health department assured that the improved water and sanitation facilities are contributing to a reduction in diseases. However, they have no data available that can support this. According to health staff the CABs have resulted in less pollution and excrements in public spaces and more people washing their hands, although rarely with hand soap.

Our own observations during the case studies are the most objective source of data collected on hand washing behaviour, which confirms the statements that washing of hands is practiced, but soap is not used: of the 85 people who used the toilet, 35 people were observed washing their hands (some others washed them outside because taps were broken inside) and only 1 person used soap. Therefore, while 43 percent of respondents in the survey claimed to use soap, it is very likely that they gave socially acceptable answers. Nevertheless, also if no soap is used, washing hands may still decrease transmission of pathogens causing diarrhoea.

Case studies: The case studies indicate that health improvements are closely related to improved services, and particularly in water and sanitation. The health situation in Dunpals (No CAB) is, according to most stakeholders, poor, with many diseases including diarrhoea, cholera, typhoid and tuberculosis being common. Important causes given are that the area is filthy, with trash, dirty water and human faeces lying around and that people generally do not wash their hands (directly) after relieving themselves. One of the dwellers expected that more people will wash their hands with the CAB because (even if the toilet might not be clean) it will be possible to wash them with water after using the toilet. In the FGD in the SAN 3 site end-users stated using only water after toilet use. Also in the SAN 2 site all participants stated only using water to wash their hands after toilet use. All stakeholders argued that this was a great improvement, and that after using a pit toilet people would not have water at their immediate disposal and thus washed their hands less regularly. Moreover, the amount of human faeces in the bush and flowing into the water has largely decreased and the fact that the toilets flush excrements further improve hygiene and reduces risk of contamination.

One possible negative effect of the CABs on health is the fact that the CABs are used by many people and are often unclean. This means that infections and bacteria can easier be transmitted. In the case studies this was noted by several people and local stakeholders to be a concern about the CABs.

We have analysed potential differences in health impact between men and women, by taking into account the gender of the respondent or the household head. We do not find significant differences for any of the impact variables considered.

In sum, we have some evidence that there are positive health effects from the project, although the precise effects cannot be determined based on the data we have. We do find lower levels of diarrhoea in areas with a CAB although this could also have other explanations. More people seem to wash their hands after toilet use although not with soap. The settlements with a CAB have likely become less polluted with excrements as a result of the CABs.

4.3.4. *Does the increased availability and in many cases proximity of facilities generates a time saving component?*

We answer this evaluation question by looking at the time it takes households to fetch water, i.e. to go the source, get the water, and return home. Recall from Table 9 that the descriptive results do not show a

statistically significant time-saving effect. Columns 1 and 3 in Table 21 display the same finding in a different way. Yet, when controlling for confounding factors, we find an effect of five minutes saved for SAN 3 CABs, of which we can be reasonably confident.[78] Nevertheless, in practice we do not expect that saving five minutes will have a notable impact on the lives of the users, considering that they fetch water nine times a week on average.

	(1)	(2)	(3)	(4)
	Duration of fetching water		Walking distance in minutes to main laundry source	
SAN3C	-3.340	-5.002*	-1.120	-1.673*
	(2.491)	(2.714)	(0.738)	(0.930)
SAN2	-0.530	-2.459	-0.460	-0.623
	(2.570)	(2.178)	(0.778)	(0.629)
Constant	9.370***	20.289**	3.170***	3.089
	(2.308)	(7.987)	(0.724)	(2.546)
Controls	No	Yes	No	Yes
Observations	300	300	300	300
r2	0.017	0.082	0.018	0.081
ymean	8.080	8.080	2.643	2.643

Notes: Standard errors in parentheses
Controlled for number of household members, trust in community leader, age, number of friends, distance to Durban, average distance to work per site, education of the household head, wealth, crime, years living in the settlement and region dummies.
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 21 Timesaving regression results

4.3.5. What is the impact of the project on economic benefits?

The CABs may have economic benefits in several ways. We have considered different possible pathways. Most importantly, a CAB creates direct employment for construction workers and caretakers. Additionally, the CAB could improve the chances of CAB users on the job market, through improved health and personal hygiene.

4.3.5.1. Construction work

The construction of a CAB requires, on average, 1.26 FTE of labour, which is equal to approximately three months of work for five construction workers.[79] In total for 348 CABs this adds up to an estimated 1,740 temporary construction jobs. [80] Taking these five temporary jobs per CAB, and assuming 75 households in the catchment area of each CAB with one qualified household member in each of those, we would expect to find a CAB construction worker in seven percent of the households. Table 22 shows that six percent of the respondents said that someone in the household worked on the construction of the CAB, which is in accordance with expectations.

However, 31 percent of the respondents in the comparison group give the same response. This could be due to expectations of the household members; this number might not reflect the number of actual construction workers in those sites. This inconsistency comes back in the number of working days, for which only one comparison group respondent could provide an indication. In the sites with a CAB, the construction workers worked on the CAB for 63 hours on average. We also asked what part of household income the construction earnings made up. This varies among households; four of the twelve respondents do not remember this.

[78] The effect is statistically significant at the ten percent level, meaning that if there were no difference between SAN 3 and comparison sites, the chance of observing the values we find in the survey is less than ten percent. According to our analysis, the factors that are actually confounding the effect of the CAB are wealth (richer households take less time to fetch water, perhaps because they have their own source) and crime (residents of areas with more crime take longer, possibly because they make a detour to avoid certain areas).
[79] Calculations based on SMEC Status report to City Manager, December 2016.
[80] The number of CABs currently finished or being constructed.

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Fraction of households with someone in the household who (will) work(ed) for the construction of any CAB	0.31	0.08	0.04	0.005***	0.001***	0.234
	(0.46)	(0.27)	(0.20)			
	[100]	[100]	[100]			
Number of working days in total	14.00	55.60	70.67	0.024**	0.364	0.721
		(42.35)	(61.33)			
	[1]	[5]	[3]			
Income earned with construction work is [...] for the household						
All income (100%)	0.00	0.25	0.00	0.172		0.146
		(0.46)	(0.00)			
	[1]	[8]	[4]			
Most of the income (75-100%)	0.00	0.25	0.00	0.238		0.211
		(0.46)	(0.00)			
	[1]	[8]	[4]			
Half or a bit more (50-75%)	0.00	0.00	0.50		0.124	0.035**
		(0.00)	(0.58)			
	[1]	[8]	[4]			
Slightly less than half (25-50%)	1.00	0.13	0.00	0.001***		0.380
		(0.35)	(0.00)			
	[1]	[8]	[4]			
Only a little bit (0-25%)	0.00	0.00	0.25		0.481	0.365
		(0.00)	(0.50)			
	[1]	[8]	[4]			
Don't Know	0.00	0.38	0.25	0.129	0.308	0.652
		(0.52)	(0.50)			
	[1]	[8]	[4]			

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 22 Economic benefits – construction worker

4.3.5.2. Caretakers

Caretakers report taking care of the CAB for 23 hours a week on average, but there is much variation: the minimum reported is four hours, the maximum 56 hours. They earn about 2,450 ZAR (170 EUR) per month for this work, which makes up a large part or all of their total household income. Hence, targeting vulnerable households for caretaker jobs seems to be carried out well.

Caretaker results	SAN 3	SAN 2	p-value
Fraction of caretakers who get paid for taking care of the CAB	1.00	1.00	
	(0.00)	(0.00)	
	[10]	[10]	
Number of hours taking care of the CAB per week	20.50	26.10	0.398
	(12.89)	(15.88)	
	[10]	[10]	
Earnings per month (ZAR)	2,440.90	2,468.10	0.661
	(164.45)	(101.43)	
	[10]	[10]	
Income earned as the caretaker is [...] for the household			
All income (100%)	0.40	0.50	0.673
	(0.52)	(0.53)	
	[10]	[10]	
Most of the income (75-100%)	0.50	0.50	1.000
	(0.53)	(0.53)	
	[10]	[10]	
Half or a bit more (50-75%)	0.10	0.00	0.331
	(0.32)	(0.00)	
	[10]	[10]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 23 Economic benefits - caretaker

4.3.5.3. Other direct jobs

EWS informed us that gradually they expect to internalize the construction and maintenance work force instead of outsourcing this to the private sector. This is not expected to increase net employment, since it will go at the expense of hours spent by private contractors that currently conduct maintenance work. During the interviews in April 2017, the EWS customer officer and maintenance officer informed us of their proposals to contract additional personnel that would create around 120 additional jobs within EWS. In the case of the customer and education unit, there is a perceived need for 'caretaker supervisors' who would be responsible for liaising with and checking on the caretakers. This should help caretakers handle issues and conflicts and ensure their work is up to standard. One supervisor would be assigned per ward (totalling around 100). For the maintenance unit, with the increasing number of CABs and amount of maintenance required more staff is required. Particularly since the maintenance unit is trying to improve the monitoring of all the CABs. Initially, around 17 people need to be hired to collect information on the conditions of all the CABs using a data collection device ('juno device'), which will be mapped in the GIS data system. Because these jobs have not been created yet they cannot be counted. It does show that with the increasing number of CABs from SAN 3 new challenges arise that will create additional jobs.

For both the SAN 2 and SAN 3 case study the community leadership voiced worries about the proposal to hire a supervisor. They argued that this could lead to conflict between the caretaker and the supervisor if the latter is contracted locally also because of the dynamics of local politics. If the supervisor would be from EWS it would be better. The other community leader voiced concerns that the supervisor would wrongfully think that the caretaker did not clean well while the CAB could have just been cleaned but then again dirtied by users.

4.3.5.4. Economic outcomes for inhabitants of settlements

Table 24 presents an overview of our regression analysis on the association between a number of economic outcomes and the presence of a CAB. The main finding is that significantly more households from sites with a CAB have formal employment as main source of income. Households from SAN 3 sites are less dependent on social grants, remittances or pensions and households from SAN 2 sites are less dependent on informal work. However, we cannot exclude that this result is due to a selection effect. For example, economically more successful people could be more likely to live in these areas, or the inhabitants could have more leverage with the municipality, succeeding in obtaining a CAB earlier. These are rival explanations to the hypothesis that the CAB was the cause of this. Anecdotal support for the latter explanation is that the CABs improve the personal hygiene of the users, so that employers cannot directly identify them as settlement inhabitants, hence improving their chances of finding a formal job. We do not find an effect on wealth, however.

Since people were also able to wash themselves before they received a CAB, and the FGDs also show that people easily revert back to the old way of washing to avoid cold water or waiting times, it is unlikely that this explanation can account for the large difference we have found. Based on interviews with implementers, we can also exclude the explanation that communities were able to influence the municipality to receive a CAB sooner. The municipality confirmed that the selection and order of construction is mainly decided based on technical aspects including the technical feasibility, level of existing bulk infrastructure, the decision to do the easiest locations first, and whether the settlement has been earmarked for formal housing. This could, of course, be correlated to socioeconomic circumstances (see also the next paragraph). One interviewee mentioned that only in a few rare instances the community made public protests that resulted in EWS prioritising the settlement to prevent negative publicity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	PCA index of assets and dwelling		Dummy. Main source of income is formal work		Dummy. Main source of income is informal work		Dummy. Main sources of income are social grants, remittances or pension	
SAN3C	-0.310	-0.021	0.230***	0.236***	0.020	-0.028	-0.190***	-0.130***
	(0.285)	(0.206)	(0.059)	(0.057)	(0.047)	(0.047)	(0.053)	(0.043)
SAN2	-0.268	-0.025	0.110**	0.120**	-0.080*	-0.063*	-0.020	0.005
	(0.297)	(0.177)	(0.050)	(0.053)	(0.039)	(0.035)	(0.059)	(0.046)
Constant	0.193	-1.153*	0.110***	0.109	0.120***	-0.266**	0.300***	0.076
	(0.224)	(0.637)	(0.038)	(0.248)	(0.033)	(0.118)	(0.042)	(0.167)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	300	300	300	300	300	300	300	300
r2	0.019	0.300	0.051	0.078	0.021	0.067	0.041	0.099
Ymean	-0.000	-0.000	0.223	0.223	0.100	0.100	0.230	0.230

Notes: Standard errors in parentheses
Controlled for number of household members, trust in community leader, age, number of friends, distance to Durban, average distance to work per site, education of the household head, wealth, crime, years living in the settlement and region dummies.
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 24 Economic benefits regressions results

It is likely, however, that there is a relation between the difficulty of reaching a settlement and the overall lower level of development of such settlements, including fewer opportunities for formal employment. Looking at the map of sites for each sub-sample in Appendix B, it is clear that some sites without a CAB are located in more isolated areas.

Interviews with programme manager SMEC and the case studies show that factors at the site level, such as a large employer in the vicinity, explain levels of formal or informal employment found. However, the characteristics of an individual site are unlikely to explain the significant aggregate differences between the sub-samples of SAN 2, SAN 3 with a CAB and the comparison group of SAN 3 sites that are soon to obtain a CAB. Moreover, since the latter two groups were not far apart in the project pipeline, we do not expect significant systematic differences between these two of the type mentioned in the previous paragraph. In addition, we control for a number of factors affecting employment opportunities at both household and site level. In short, we find a correlation between CABs and formal work that is not easily explained by other factors. On the other hand, there is also no clear mechanism that explains how CABs would improve opportunities for formal work.

We have analysed possible differences in economic impact between men and women, by taking into account the gender of the respondent or the household head. We do not find significant differences for any of the impact variables analysed.

Case studies: The case studies do show that for Canelands (SAN 3) the high number of households having formal work (50 percent of households with formal work as main income source) is likely caused by the settlement being close to firms and to the international airport. This settlement has also received many public services (electricity, pathways, waste collection). For Dunpals (No CAB) the lower share of formal work (13 percent) is explained by the leadership as a result of the high availability of temporary work in the area, which also attracts many outsiders that are willing to do 'piece work' for a couple of months. At the same time the location has received very little prior services from the municipality accept for stand-pipes that do not have sufficient pressure.

In conclusion, both fixed and temporary jobs have been created as a result of the project. The CABs are labor intensive assets that require efforts to monitor, manage, clean and maintain, for the future as well. We found a correlation between having a CAB and the degree of formal work in a site. There could be different reasons for this, but we have insufficient information to make a definitive conclusion on causality and mechanisms at work. We have some indications that factors that can contribute to this are distance to formal employers and the overall level of development of informal settlements. The latter explanation indicates that provision of CABs, as well as other public services, could have a positive (indirect) effect on the ability of people to find formal work.

4.3.6. What is the impact of the project on private sector development?

We have also considered the possibility that the CAB is used by small enterprises. Apart from some exceptions, this is not the case. There is a tendency for CABs to be used as or integrated in a social meeting space. Examples have been given of a community centre being opened next to CABs, vendors selling goods there or a pool table being placed by a local entrepreneur. These examples do not show a structural contribution of the facilities to business development but do indicate that they can contribute to economic and social interactions within informal settlements. Use of the actual water from the CABs by businesses is also uncommon and the community officer at EWS gave one example of taxi drivers washing their car. Especially given the water shortage this behaviour was seen as undesirable. End-users in the FGDs in the case studies all agreed that they were not aware of private businesses using the CABs. The direct effect on private sector development from the project thus mainly lies in the jobs created in the implementation and maintenance of the project.

The project works with a few design consultants and with 12 construction companies that have been contracted by EWS, while there were only 5 contractors under the previous phase. According to SMEC this has had benefits and downsides in terms of implementation, which were flexibility and more dispersion/inefficiency respectively. In terms of private sector development, supporting a larger number of smaller enterprises is likely to have more impact. For the maintenance a total of 20 contractors are estimated by the executive department to be needed. However, as described in section 4.4.1, this capacity might be built within the EWS instead.

4.3.7. Which other effects can be attributed to the project, including environment effects?

Other effects that have been mentioned during interviews and in the case studies are environmental, safety, dignity and privacy and hygiene related, the last two being predominantly a negative effect. Since these findings are mainly based on the case studies, we do not know if these effects occur on a project-wide scale. However, they were often noted in the case studies and by informants independently, suggesting these are more common mechanisms.

4.3.7.1. Positive effects

In the interviews, project officers and other stakeholders generally considered the CABs to contribute to reducing pollution in informal settlements. This mainly results from better and centralized drainage which makes a huge difference in the capacity of disposing of black and grey water, water from sanitation and washing/cooking respectively. The case studies also show that in the selected locations there has been a very noticeable difference before and after the CAB was placed in terms of cleanliness of the area. People note that before the CABs was constructed, the area was dirty of human faeces and smelled badly. Now that the CABs are in use this has greatly decreased and the area smells better. Other results that were noted by the ward councillor for Canelands (SAN 3) are less pollution in water streams and beach water.

All case studies described the same safety issues of using alternatives for relieving oneself, which were the risk of children falling in pit latrines, getting bitten by a snake when relieving in the bush and the risk for women and children of being assaulted in the bush. The case studies also show the effect the CABs (amongst other public services) are having on the sense of dignity of the community. Health staff in the SAN 2 site and the local CSO noted the positive effect on people's dignity to have a proper (flush) facility to use and to feel like to municipality recognizes you, respectively. End-users confirmed they were content with the facilities.

4.3.7.2. Negative effects

According to a social activist, one negative impact of communal services is the perceived lack of privacy and the sense of shame and discomfort associated with having to publicly stand in line for the toilet, compared to the previous, and often still existing, situation of a pit latrine near one's house. It was claimed that particularly in the Zulu culture and for people with a higher communal status this is degrading. Several stakeholders in the case studies confirmed that lack of privacy is a main concern for people to use the CAB. Using the facilities when others can hear what you are doing was by some even experienced as a shortcoming over private pit latrines. Another concern for people is the fact that many people use the facilities and diseases and infections are therefore more easily transferred.

4.4. Sustainability

In this section we will cover the factors that influence the likeliness that the outcomes and impact will be sustained. We present our findings on the capacity of the implementers, transfer plan, activities to sustain results, working conditions and displacement.

4.4.1. Is the financial situation and organisational capacity of eThekwini Municipality viable?

4.4.1.1. Financial situation

We have received information on the organizational capacity and the financial situation during our interviews and based on updates provided by EWS in July 2017.

Executive management: In April 2017 EWS was behind on the number of CABs that had been completed. However, a large number of CABs were under construction and it was expected that all 400 CABs would be constructed before 2018. The current status (July 2017) is that 261 facilities have been completed, 87 sites are on hold and EWS is internally procuring funds for an additional 200 CABs. The ORIO funding will only be sufficient to cover the 348 CABs completed and under construction. The original prospect was 503 CABs to be completed in SAN 3 (of which 400 funded by ORIO), which will be reached with the 200 additional CABs. This will then however not be accomplished with the original budget. Besides, EWS noted that they intended for another phase of CAB construction (SAN 4), which indicates that there is funding within the EWS for the project continuation.

Besides the costs related to construction of the CABs, the project has now entered into a phase in which EWS has a large pool of assets to manage and maintain. This is already creating high costs for the organization and these are expected to further increase. Although EWS has been granted significant funds for the different aspects of the project, there are also indications that it will be difficult for EWS to guarantee sufficient funds in the future.

Wastewater Network Branch: We were informed by SMEC and EWS that from July 2016 there has been a maintenance programme to overcome the backlog of outstanding maintenance needs of all CABs. The programme was expected to be finished by June 2017. The programme would be financed with separate funding and the costs of the entire programme were estimated at R180 million (12 million EUR) of which R135 million had been spent by April 2017. EWS confirmed that part of the programme was aimed at refurbishing CABs while at the same time updating the status of reported defects in the system. According to SMEC the backlog in maintenance had now led to an unnecessarily expensive programme and executing maintenance in this form, as opposed to directly making repairs, was inefficient. The asset manager raised concerns about the sustainability of these costs and wondered where additional funds for increasing maintenance costs should come from, when all departments are competing for municipality income.

Non-Revenue Water: Regarding the reduction of Non-Revenue Water (NRW) the NRW manager explained that the new NRW reduction strategy will be a 10 year plan consisting of around 32 separate investments to bring down non-revenue water. The costs of the programme will be 3.6 billion ZAR (240 million EUR). This programme should lead to a reduction of non-revenue water to 30 percent in 5 years and 20 percent in 10 years. The manager NRW noted that there is no specific activities designed for the ORIO project, but this is allocated to some of the activities for which contracts were signed in the project period. This gives the impression that there is sufficient funding available within the municipality for the continuation of the project and that NRW reduction is prioritized. It also puts into question the additionality of the ORIO funding for this project component.

Moreover, the drought is leading to additional issues and costs related to NRW and asset management. Because of the drought the municipality has decided to turn off water supply to different areas at specific times. The EWS has now found out that the fluctuation in water pressure inside the pipelines is causing pipes and pipe connections to break. It is then not possible to repair a single leakage because pressure would then be increased on another weak point and lead to breakage. Instead whole blocks need to be replaced, which is a costly investment.

Currently provisioning of toilet paper by EWS has for example been greatly reduced, also because of the high fixed costs that it entailed. The cut on toilet paper has been identified as a problem within EWS because this is leading to more blockages and, in turn, to higher costs for maintenance.

4.4.1.2. Organisational capacity

The EWS is a capable organization with skilled staff. To manage the project in the near future EWS has several proposals of employing maintenance staff and supervisors. This is expected to further strengthen the organization. The assessment of each unit within EWS is based on our interviews with EWS staff and other stakeholders.

It was generally acknowledged that since recently the administrative burden for officials had greatly increased as a result of anti-corruption measures. In addition, the EWS staff experienced misalignment with the finance department resulting in lengthy procedures to ensure that resources needed for the project can be procured. Also contract periods with contractors are not aligned and due to the lack of flexibility in procedures this leads to delays in the project implementation, for example because bulk infrastructure contracts need to be extended before the CAB works can continue.

Wastewater Network Branch: A small team of only 4 staff members has managed the maintenance of the CAB project. They direct the contracted private maintenance companies. The team is highly knowledgeable about the different locations and the conditions of the CABs. However, with the further expansion, information management is becoming a challenge. The Project plan[81] describes changes to the responsibilities by which the operations team would take over responsibilities from Customer service of manage, monitor and maintain assets, because of the lack of resources with Customer service. However, also within WWNB there has been insufficient capacity to stay on track with maintenance and to solve issues before they exacerbated. Maintenance companies did not update information on their activities in the system. As a result, a large-scale maintenance programme (of roughly 182 million ZAR (12 million EUR)) has been rolled out in 2016 to sweep the backlog. Not only were information systems updated, but a large number of CABs have received more extensive refurbishment or smaller maintenance. According to the project manager (SMEC), this was both an expensive and inefficient way of handling maintenance. Different initiatives, including an innovative and efficient data collection system and expansion of the team, are planned in order to solve the problems with maintenance.

Customer Service & Education (CS&E) Unit: CS&E is primarily responsible for the service to communities and includes contact with communities, handling complaints, training and managing caretakers. The CS&E previously worked with officials but now works with a team of 5 graduates, who liaise with the community. The CS&E is not able to control the work of caretakers effectively. According to the CS&E head officer Health department does random visits but CS&E has to little capacity. CS&E recognizes that underperformance of caretakers and conflicts with communities are a big problem for the operation of CABs. They are therefore working on a proposal for full time caretaker supervisors for each ward (or 2 to 3 for bigger wards).

Non-Revenue Water: The unit for Non-Revenue Water Reduction is responsible for the prevention and reduction of loss of water and of income from water and for the collection of information on water use and loss. According to the DWA in recent years NRW has realized several important improvements and has become better organized. The unit has recently developed a 5-10 year Water Reduction Strategy which includes several ongoing and new activities to reduce non-revenue water and to increase income. The ORIO project plan[82] describes the previous programme which was initiated in 2007. Based on numbers for the current NRW (40 percent), activities were not as effective as anticipated. The large number of activities as well as the lack of earmarking for the ORIO funding for specific activities give the impression that the funding was not strictly managed and that the efforts were less well coordinated. Furthermore, the fact that a new information system had been implemented and led to a long period during which no reliable information was available, indicates that they lack capacity.

[81] ORIO Project Plan 2012, P. 85.
[82] Idem, p.41-45.

Within the EWS and the different departments there appears to be a lack of project overview and coordination between the different units and activities. It was clear that especially the maintenance department and the asset manager are closely cooperating. Between the other units this alignment is less strong.

4.4.2. How well is the availability and quality of a transfer plan?

This question can be answered on the level of the project and on the level of individual CABs.

On a project level the municipality and EWS are not working on transferring the management of the project and facilities. Instead, we were informed that as the project matures and expands EWS is likely to internalize more of the expertise and capacity instead of outsourcing parts to contractors. This is already visible from the efforts of the Wastewater Network Branch to strengthen their unit and from the challenges faced by Asset Management. Within the EWS organization, after construction and commissioning has been managed by the project executive management of the CABs is internally transferred to the operations department who manage maintenance of the assets. For Asset Management CABs are unlike any other asset, such as underground pipes, which have a 30 year lifetime. CABs require continues management and are continuously prone to damage.

On the level of individual CABs after construction there are several aspects. For the transfer of responsibilities regarding education on use of the facilities no formal transfer takes place between EWS and Health. Moreover, it was intended for CABs to be removed once the informal settlement could be moved to formal housing. The pipelines from the main system to the CABs was however intended to be used by housing as the foundational infrastructure for formalized accommodations. According to the Asset Management officer, there have been several instances where housing has removed all pipelines and placed their own. This results from lack of communication (e.g. information in GIS) and lack of integration of activities between departments. This transfer of assets is thus also not well organized.

4.4.3. What activities are undertaken to sustain results?

The most important activity to maintain the results is the maintenance and repair. This is a large component of the project. When the facilities become defective, EWS strives to send an engineer to fix the problem within a couple of days. There is a service desk with a contact number that users or caretakers can call to report a problem with the CAB. From there, complaints and problems are placed in a system used by WWNB and maintenance contractors to monitor and handle maintenance issues with the CABs. During the interviews it was confirmed that there was a very large backlog in maintenance works and outstanding tickets in the system (part of which had been repaired by contractors but not yet closed in the system). Part of the issues regarding defects and lack of cleanliness described in section 3.3.4. also relate to shortcoming in the maintenance.

Case studies: In the case studies people confirmed that defects are normally repaired within 3 days after they have been reported. End users did not report defects themselves but the caretakers and leadership did do so. The communities are used to contractors coming in by car, checking out the defects and making repairs if it can be done instantly, or otherwise returning after a few days to repair it.

The second important aspect to sustain results are the paid caretakers assigned to keep the facilities clean. The cleanliness and functioning are important aspect determining satisfaction. Satisfaction in turn influences likeliness of proper use of the facilities. It is clear from our findings that the caretakers are often not able to maintain the cleanliness of the CABs.

Moreover, EWS initiates improvements to the CABs to accommodate users. One example is the outside lighting that were placed to enhance safety, although we have found that around half of the CABs do not have functioning lights. The EWS as well as the University of Kwa-Zulu Natal are working on innovations to make the CABs more efficient in terms of water use. One example of improvements that are sought to maintain and improve results are filters piloted by WWNB which are intended to help bring water use down. EWS is also working on better integration and management of information on CABs in GIS, to allow for continuous monitoring.

4.4.4. How is society affected in terms of factors such as workers' rights?

During the inception phase it was already agreed on that this aspect would receive less emphasis. The option to collect data on construction workers was not included in the final methodology. Hence no conclusions can be drawn on this topic.

Case studies: One specific problem was raised by the caretaker of the SAN 2 site, who noted that they are not provided with safety boots while they are using chemicals to clean the floor. This affects their skin. Apart from that, caretakers in the case study locations are very content with their work.

4.4.5. How is society affected in terms of displacement and land acquisition?

We gathered information on experiences of settlement members and on views of staff and stakeholders.

A CAB needs to be placed on a flat concrete surface that requires space. Sometimes it is necessary to move some houses in order to create this space. To get an indication of the magnitude of this issue, we asked the households if they had had to move in the past or would have to move in the future in order to make space for the CAB. We find that very few households responded in the affirmative, which indicates that displacement does not often occur.[83]

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Fraction of households that had to move or have to move in the future in order to make space for the CAB	0.02	0.02	0.00	0.920	0.295	0.141
	(0.13)	(0.14)	(0.00)			
	[56]	[100]	[100]			

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table 25 House hold results comparison

According to the project staff and programme manager SMEC there have been instances in which people's houses had to be moved in order to construct the CAB or the pipeline connections. They also indicate that these instances are rare.

Case studies: In one out of the three case studies (SAN 3) replacement of households took place to make room for the CABs. According to the community leadership people where discontent at first but after explaining to them they realized it was for the benefit of the whole community. In Dunpals (No-CAB) the municipality had allegedly suggested to move some households closer to the CABs. It is not clear whether this has actually occurred.

Displacement in relation to maintenance will likely become increasingly prevalent according to the manager of assets at EWS. It often happens that (new) inhabitants build houses closer to the CABs and often on the access road which had been used by the truck to place the container. When a CAB has to be removed from a settlement for refurbishment, it then becomes impossible to do so without moving houses. According to the assets officer, this has already occurred and is likely to happen more often as the project expands. Taking into account the changing housing policy strategy, unlike previously envisioned, a large share of the CABs might need to be removed due to deterioration without the community itself first being moved.

The fact that almost only modular CABs have been constructed in SAN 3 does suggest that this might be less of a problem here, because the modular facilities are constructed and refurbished on site.

[83] Obviously, this identification strategy will only work if displaced households moved within the settlement. We find a similar percentage in the comparison group, for those 56 households that are already aware of the future location of the CAB. Since this is comparable, we are quite confident it has not been different for the SAN 2 and SAN 3 groups.

4.5. Efficiency and Cost-effectiveness

We will build on the findings we have presented so far on the effectiveness of the project and relate these to the project costs to answer the questions related to efficiency, cost-effectiveness and additionality.

4.5.1. To what degree do the outputs offset the cost of the chosen inputs taking into account quality?

In determining the cost-effectiveness of this intervention, we will first assess the costs per CAB. The CABs have been constructed at a higher cost than anticipated. The expected costs for the construction of 400 CABs totalled € 32,947,557.35, of which the ORIO grant is €11,531,645.07. Using the 348 CABs that are anticipated to be completed with the total ORIO project budget, the price per CAB is € 94,676 (€ 32,947,557.35/348). The anticipated cost per CAB according to the addendum to the grant agreement was € 62,832. This is a difference of € 31,844 (or 50 percent).

There are several factors that influence the price. Focusing specifically on the quality of the facilities it must be noted that in SAN 3 mostly modular CABs were constructed, which according to SMEC are slightly more expensive in terms of construction costs compared to the container CABs. There are several reasons that have led to the higher costs. One of these are the delays, that are partly caused by bulk infrastructure that needs to be constructed. Moreover, in the ORIO project plan it was made clear that construction of the modular CABs would likely take longer, which might also have contributed to the delay. At the same time, modular CABs do have several quality benefits over the containers and this might offset some of the higher costs. Project manager SMEC also noted that most contractors were new in SAN 3 and this led to knowledge and capacity that existed with the contractors of SAN 2 to also be obtained by the new contractors, which led to a slower and more costly implementation.

Moreover, the price of the CABs is higher than in SAN 2 and the number of CABs constructed is lower. Costs in SAN 1 were € 78,900 (23,900,000/302) per CAB. In SAN 2 costs were € 80,367 (70,000,000/871)[84]. One of the explanations is that more difficult locations have been provided with a CAB in SAN 3, which also influences the price.

In sum, while there are some factors that cannot be changed and have led to higher project costs, there are also activities that can be undertaken to reduce the costs per CAB.

4.5.2. Do the (socio-economic) benefits of the project outweigh the costs?

4.5.2.1. Beneficiaries

As we have indicated in section 4.1.1, the number of end-users is likely lower than the 450 that was anticipated and closer to 225 end-users per CAB, half of the target. EWS expects that the ORIO funding will be sufficient to complete the remaining 87 CABs that are currently under construction to bring the total at 348 CABs. Based on 225 end-users per CAB a total number of beneficiaries of 78,300 (348x225) would be reached (instead of the anticipated 180,000).

Based on 180,000 beneficiaries, the expected cost per beneficiary was € 183 (€ 32,947,557.35/180,000). Assuming the 348 CABs will be finished and the total budget of the ORIO project will be used, the costs per user according to our calculations are € 420 (€ 32,947,557.35/78,300). This shows a large difference in the costs per beneficiary of € 237 (or 56 percent). It should be noted that these costs do not include the maintenance costs, which are not part of the project. While this appears to indicate that the project has not been so cost-effective, this lower number of beneficiaries might actually be more favourable to the effectiveness of the project. Our findings indicate that on average, the CABs have sufficient capacity to meet the current number of users, but that higher number of users lead to less well maintained facilities and more queues and can lead people to divert to alternatives. While the target has thus not been reached, the facilities still reach a very large group of end-users and the costs per end-user are not excessive, given how big an improvement it is. Importantly,

[84] Based on numbers from the addendum to the Grant Agreement, p.3, dated April 2016.

considering the impact of the project, at least part of the health effects can convincingly be attributed to the project.

Moreover, it is likely that the benefits from the project reach further than only the direct users. The potential reduction of water stream contamination for example, will also have an effect on other people living in eThekwini. The actual number of (indirect) beneficiaries is therefore higher. In consideration of the large number of beneficiaries and the local circumstances, we do not see any alternative type of intervention to which the cost-effectiveness of this intervention can be meaningfully compared.

In conclusion, the number of beneficiaries is high and the costs per beneficiary are not excessive. Certainly given the effects that the intervention has resulted in for end-users. Emphasis should be on providing more value for money and trying to minimize costs per CAB, not on maximizing the number of people in informal settlements using the CAB.

4.5.2.2. Jobs created

We will now relate the number of jobs that are created within the project to the total ORIO project budget. As we have indicated in section 4.3.5, the direct jobs that have been created with the project are 348 permanent caretaker jobs and approximately 1,740 temporary construction workers.

The direct jobs created only consist of the temporary jobs in the construction of the CABs. We will therefore first calculate the costs per temporary job created. These cost per direct job created is € 18,950.40 (€ 32,947,557.35/1740). The costs in terms of fixed jobs of caretakers that have been enabled by constructing the CABs but are not directly paid for from the project budget, are € 94,680 (32,947,557.35/348). As noted the salary of the caretaker is paid by EWS and total costs per job created for the caretakers are thus higher.

These calculations do not include the staff at the municipality and the staff for the design consultants and construction contractors that have benefited from the project. Also indirect jobs created such as for suppliers of consumables are not included. If these jobs are also taken into account, the costs per created job will be lower.

In sum, in terms of jobs created, the construction process has been quite labour intensive and has resulted in many workers that have received temporary work. However, the calculations of the costs per job created do indicate that the costs per job created are not so meaningful in assessing the cost-effectiveness of the project, since the main impact was made in relation to end-users.

4.5.3. Additionality: Was the ORIO grant required to realise these results?

Given the additional budget that the municipality is providing for the maintenance programme (close to 12 million EUR), the NRW reduction strategy (close to 24 million EUR per year) and the procurement of an additional 200 CABs, it appears that the municipality would have been able to finance SAN 3 with its own resources.

At the same time, the additional budget provided by ORIO has meant that funds from the Municipality and EWS could be used for other purposes, including the large scale maintenance programme to refurbish the CABs, which has been very important in guaranteeing the sustainability of the project. Furthermore, it is clear from the calculated number of end-users that not all people living in informal settlements in eThekwini have been reached with the CABs that have been constructed so far. The Municipality therefore aims to continue with the programme in a next phase (SAN 4) and a large number of additional CABs might need to be constructed. It is not clear if sufficient budget will be made available by the Municipality to provide all settlements with sufficient CABs to meet their needs. The budget that ORIO has provided has taken some of the financial burden off of the project funding and thereby allows the costs to be more manageable. The possibility that not all people will be provided with access to a CAB in the medium term due to insufficient budget, means that the ORIO budget has made a real contribution the number of people that will in the end be served with this intervention.

In addition, the guarantee of the funding from the ORIO project as well as requirements from the grant provider (RVO) and their input on the proposals from EWS, are likely to have had an additional positive effect

on the organization of EWS in the project, the monitoring of results and the additional motivation to realize the project according to the agreements and within the specified term. The ORIO grant can thus be said to have had a positive effect on the realization of results in this regard as well. The funding by ORIO for the construction of the CABs has also freed up funds for this project from EWS to invest in other aspects of the project in the same project period. Additional activities could thereby be undertaken simultaneously during the implementation, for example, without additional delays in procurement.

It is apparent that the funding for non-revenue water reduction cannot be qualified as additional. Primarily because there was no predetermined purpose for the budget provided from the ORIO project, and the NRW manager allocated ORIO costs to any of the NRW-projects in the portfolio that had not been paid yet. Particularly with the large municipality budget that is expected to be made available for the NRW reduction strategy there is little additionality in the funding for this activity from the ORIO project.

In sum, although the Municipality is investing large sums in improvements in water and sanitation, the ORIO grant has still has an important role in allowing EWS to realize the further implementation of the Sustainable Water & Sanitation Development Programme. It is likely that additional people have been reached as a result of the grant.

5. Conclusions & Recommendations

This section contains the main conclusions from this evaluation, including a discussion of the findings, and describes our recommendations. In section 5.1 we present the conclusions in the form of an answer to the main evaluation questions that were listed in section 1.2. In section 5.2 we provide a brief discussion on some of the topics that are important for EWS as project implementer and for RVO as funder to consider and discuss. Lastly and based on the findings and discussion, we provide our recommendations to EWS and RVO.nl on elements of the programme that require attention in order for the project to become more effective, efficient and sustainable in section 5.3.

5.1. Conclusions

We will now provide an answer to each of the main evaluation questions on output, outcome, impact, sustainability and cost-effectiveness.

5.1.1. Output: What activities have been undertaken and how were these implemented?

After a slow start of CAB construction in SAN 3, the pace of construction has picked up. 261 CABs have so far been completed and 87 are under construction. The average number of users per CAB is around 225 (half of the targeted 450), which brings the total current number of end-users from the ORIO project to 58,725. This is lower than the number of people intended to be reached with the CABs in SAN 3. Even with the lower average number of users per day, queuing is normal during busier hours, although in most occasions the capacity of the CABs appears to be sufficient to serve around 225 daily users (some of whom might use the CAB multiple times a day).

Overall, it can be concluded that the location and design of the CABs are suitable. In choosing the locations, EWS and contractors take different aspects into account, including distance, drainage and security. The spatial organization of the CABs generally appears to be effective in terms of optimal use of space, privacy and drainage. Less favourably, the low quality of loose parts likely contributes to the high occurrence of defects. In SAN 3 most of the constructed communal facilities are modular ablution blocks which have several design benefits over the container ablution blocks that were mostly used prior to SAN 3. The most important advantage is their flexibility in terms of construction and maintenance.

5.1.2. Outcome: How have the new facilities and related activities influenced the user-behaviour?

We answer this question by considering the extent to which CABs are used by the inhabitants of eThekwini's informal settlements, as well as their experience in doing so.

5.1.2.1. Outcome: Use

The first step towards creating an impact with the CABs is that the targeted beneficiaries use them regularly. The survey results show that this is indeed the case, as more than half of the targeted beneficiaries use the CAB at least once a day and only 18 percent of them did not use the CAB at all in the past 3 months. Adult women use the CAB most often. Primarily due to intensive use and facilities often not being used properly, facilities are regularly not clean or have defects that limit usability.

Respondents mention toilets as the CAB facility that they use most, while 23 percent practiced open defecation, used a bucket or an open pit latrine before the CAB. The shift from pit latrines without a slab to a flush toilet linked to the sewage system is a clear improvement of the sanitary situation. The showers and laundry facilities are also popular, although we observe a gender difference in that women use the showers somewhat less than men. At the same time, households use the CABs less for drinking water as there are alternatives available, such as standpipes.

Targeted beneficiaries of the CABs still use alternatives for all purposes of the CAB. Particularly at night, people use alternative toilet facilities, mainly pit latrines or buckets, because CABs are generally closed or perceived as unsafe during the night. Furthermore, the older SAN 2 CABs, constructed in 2013 and 2014, are much used, and interestingly, even more intensely than the SAN 3 CABs. If EWS is able to keep up CAB maintenance, this bodes well for the sustainability of the ORIO-financed SAN 3 CABs.

5.1.2.2. Outcome: User experience

The next step is to make sure that users remain satisfied with the CAB, so that they continue using them. Overall, users are satisfied with the location, the design, safety and cleanliness. In addition, few people have had to move due to construction of the CAB. However, households using a SAN 2 CAB are significantly less satisfied, mainly about the cleanliness of the facilities. Observation by enumerators also revealed that the SAN 2 CABs are dirtier and broken more often than SAN 3 CABs. The SAN 3 CABs are in a good state. Nevertheless, the SAN 2 CABs are used more intensively. A possible explanation is that inhabitants of SAN 3 sites still have to get used to the CAB. Other factors contributing to this difference are the lower number of households per CABs in some SAN 3 locations (they already had CABs from the previous phases of the programme) and the longer average opening hours of SAN 2 CABs.

The caretakers of the CABs indicate that improper use of the facilities is the main reason for broken parts, even more so than vandalism. People recognize that the users themselves are mainly responsible for the uncleanliness and it is therefore unlikely that this could be prevented by creating more awareness about the benefits of using the CAB correctly.

5.1.3. Impact: What is the effect of the changed behaviour on socio-economic development?

The intervention has led to several results that can be ascribed to the project, with different degrees of certainty. At the same time we note that it is in some cases less clear what the actual impact is because the project consists of an intervention in a complex social situation with an existing landscape of water and sanitation facilities.

The fact that CAB facilities are used frequently is already a great result in itself, since this means that people appreciate the facilities and that more wastage is drained from settlements than before. In terms of economic benefits, there are several effects that result from the project. We found that EWS was successful in targeting persons in need for the job of CAB caretaker. Through contracting of local construction workers and caretakers, a fair number of jobs are created. This means that around 350 people that previously had little income, now have the certainty of a fixed job. Formal employment is significantly more common in CAB locations (more than 20 percentage points), but it is hard to think of a mechanism to explain this finding.

Looking at the impact on health, in the group with access to a CAB, the diarrhoea prevalence was half that of the comparison group, but this effect is not statistically significant. The case studies show that, at least in these specific locations, the CABs have made a great difference to health and hygiene, with users stating that now they wash their hands more often after toilet use because the sinks are near. Furthermore, cleaner and more hygienic surroundings are an important reported outcome from the facilities, since these allow them to dispose of waste water as well as flushing faeces. In addition, improved safety and an enhanced sense of dignity are reported as positive effects. We do not observe significant gender differences in the impact variables.

Looking at negative effects of the intervention, the main issues that people encounter with CABs is that there is a lack of privacy. This is the case for fully functioning facilities, when standing in line or when using the toilets and others might hear you. This is more of a problem still when locks are not working or doors are completely missing. Moreover, people worry about compromised hygiene due to communal use of the facilities. Particularly when facilities are defect and flooded, or when they are dirty, this may lead to the spread of pathogens.

More broadly, from the case studies it becomes clear that people experience uncertainty about the future of their settlement and the housing that they have been promised. They worry that the construction of CABs means that they will not receive formal housing. The intervention interacts with the wider context of the housing situation in South Africa and the expectations that people have of government. However, changing this

does not lie in the power of EWS. In conclusion, by itself and as temporary solution, the intervention can be regarded as important enough to justify it.

5.1.4. *Sustainability: How likely is it that the results will be sustained after the project is completed?*

This water and sanitation project is comprehensive and in many respects unconventional and inventive. EWS has demonstrated a lot of organizing capacity and has been able to come up with new solutions to challenges throughout the different phases. There are still several aspects of the project that form risks for the continued operation of the CAB facilities and that are not fully and effectively overcome. These need to be addressed to ensure EWS can manage the project during future phases while simultaneously guaranteeing proper maintenance.

5.1.4.1. Organizational capacity

- EWS lacks central overview over the entire service delivery. The different project units could be better integrated to overcome issues in implementation and increase effectiveness and efficiency.
- EWS (as well as the Health Department) are experiencing serious shortage of staff, and to hire and train them to good standard will need time. Since it is currently already a problem, there is a serious risk that this increases with the further roll-out in construction, which takes place at a high speed to reach targets.
- Contracting and procurement create delays and misalignments in work streams. The timelines of contracts (different design, construction, maintenance and supply companies) are not well aligned. The Finance Department is not flexible and proposals for project activities take long to be approved.
- The administrative burden is high and increasing across government. This puts extra strain on the current organisation which is already having difficulty to keep up with project and asset management.

5.1.4.2. Maintenance and continued operation

- There is no overall monitoring of benefits and outcomes. Maintenance is taking steps to integrate CAB monitoring.
- Costs for maintenance are increasing with the expansion of the project and aging of CABs: for staff, resources and utilities, refurbishment and rotation of CABs, and repair of bulk infrastructure. This raises questions about the financial sustainability of this intervention.
- Between departments cooperation can be better, especially with the Health Department. The Health Department is now not informed when a CAB is finished in a community. If this would be done, they could take this into consideration in their community outreach and also provide feedback on the use of the CAB in communities to EWS. This could be beneficial for the proper use of CABs.
- Although reliable up-to-date non-revenue water information is not available, the last reliable information for 2016 shows a high loss of 40 percent. Together with unfavourable water availability in the past years, this can have a negative effect on sustainability, both of bulk infrastructure and of CABs. Low water pressure at some CABs has been reported.

5.1.5. *Cost-effectiveness: Are the results and costs as anticipated and is this acceptable?*

The number of CABs constructed with the ORIO funding so far and those expected to be completed within the budget are lower than anticipated. The total number of CABs that will be realised with ORIO funding is close to 348. The number of end-users will be closer to 78,300 than the intended 180,000. This means that the costs per beneficiary and per CAB are higher than anticipated. While the project should aim to reach as many people as possible, at the same time a lower number of users per CAB could enhance the usability of the facilities for the end-users. Given the large number of beneficiaries reached, their overall satisfaction, and the noticeable improvements to their lives due to the facilities, the investment has been worthwhile. The grant is at least partly additional: although the municipality could likely have financed SAN 3 by itself, the grant allows funding by the municipality to be used for the extension of the project and to finance additional maintenance activities to enhance the project's sustainability.

5.2. Discussion on findings

While some of the findings contain clear-cut lessons for the project implementers, a number of key findings may require more reflection and discussion. The intention of this discussion is twofold: it clarifies the interrelations and significance of our findings and provides a start for RVO.nl and EWS to discuss the findings in order to make decisions in the project. This discussion could also be relevant and future phases of the programme, as well as the operation and maintenance of the infrastructure delivered until and including SAN 3. The following overarching topics will be discussed in more detail:

- implications of the changing housing policy;
- the number of users per CAB;
- ensuring the sustainability of the intervention; and
- water availability.

5.2.1. Housing policy

The municipality has fully committed to the strategy of community ablution facilities and to the expectation that this will be a temporary solution. The reality of the growing backlog in construction of formal housing and the changing policy strategy will have an effect on the requirements for the CABs. According to the Human Settlement Unit, after the new policy has been formally ratified, the government will no longer provide formal housing to everyone. This policy change should give people the incentive to start formalizing and investing in their current informal houses. However, the policy change also negates one of the underlying assumptions of the SAN 3 project and the larger CABs programme.

The change in housing policy requires EWS to reconsider the role of the CABs and the question of a realistic exit strategy. If it is no longer expected that CABs can be removed once people in a settlement are transferred to formal housing, EWS would do well reconsider the long-term strategy for the operation and maintenance of the CABs. One option is for the CAB to become a more permanent solution, meaning that a longer lifetime should be ensured and costs for operation and maintenance (including a permanent and sustainable role of the caretaker) are continuous. Another option is for EWS to initiate a large-scale programme to provide private water connections, especially in informal settlements where people take the initiative to invest in building more permanent settlements. However, it is unlikely that private water connections can be provided to informal settlements at the speed at which the construction of CABs has been taking place.

We therefore expect that even with the abandonment of the formal housing transfer policy, CABs are still a suitable temporary solution, at least to serve part of the informal settlements. It does mean, however, that the design of the CABs must be more closely aligned with the chosen strategy. The lifespan, location and operation and maintenance needs must be taken into consideration. In addition to the benefits of the modular CAB facilities that have been reported, they also appear more appropriate in the light of the changed needs due to the changed housing strategy (e.g. it is no longer required that it can be picked up and dropped off at a new location, but it should be possible to replace separate parts on-the-spot).

5.2.2. Number of CAB users

The fact that a significantly lower number of end-users is reached compared to the number of targeted end-users has implications for the size of the project's impact. It affects the assumptions and expectations on which the project agreements between RVO.nl and EWS are based. For RVO.nl it may be important to have a more realistic estimation of the number of beneficiaries reached with the project and also to understand the implications of the fact that less people are reached.

This can be viewed from two perspectives. On the one hand the project appears to have been less effective due to the lower number of people positively affected. Especially because our evaluation has confirmed that there have been several important improvements to livelihoods and communities due to the CABs, it is somewhat disappointing that there is still a large group of people in informal settlements that have not been provided with access to a CAB in their direct surrounding. This means that these people still need to use the limited existing facilities (standpipes, pit latrines et cetera) and it is important that they are also served with improved and drained sanitary facilities. On the other hand, we have found a strong indication that a lower number of users also results in less frequent queues, less uncleanliness and fewer defects. This leads to more satisfied users and prevents the people who rely on the facilities to revert to alternatives (e.g. because of long queues). In our view

it is therefore important to set a lower and more realistic target for the number of users, based on a consideration of the optimum number of users. This also gives a more realistic insight in the number of people that are not yet, or only partly being served. This will also allow RVO.nl to determine how many people are reached with its investment.

5.2.3. Sustainability

RVO.nl has provided a grant for the water and sanitation project with the intention of making a contribution to sustainable service delivery. There are several indications that the CAB facilities that have been constructed over the years have deteriorated at a higher speed than had been anticipated. At the same time, the maintenance organisation has had to deal with large amounts of repairs as well as unforeseen causes of deterioration. As a result, the costs for maintenance have been higher than anticipated. It will not be easy for EWS to ensure that the CABs, including those funded by RVO.nl, will be maintained and remain operational over the coming years. There have been initiatives to increase the capacity at EWS to deal with the increasing maintenance burden, but as these are ongoing we have not been able to determine how effective they are. The ability of EWS to recognize the shortcomings and challenges and to implement effective measures will determine how well it can cope with the increasing maintenance needs. Based on our evaluation we foresee some important risks (including for example relocation of people in order to remove containers from settlements). It will be important for EWS to minimize the deterioration of CABs and to develop an efficient and smooth-running maintenance process. Good communication and alignment (for example with the Human Settlement Unit) will contribute to increasing the lifespan of the investment (also of the bulk infrastructure delivered as part of the project).

5.2.4. Water availability and non-revenue water

Lastly, eThekwini has been facing low rainfall and water levels coupled with more demand on the water reservoir due to urbanization and migration. Lacking adequate measurements, we cannot be certain whether the CABs have also increased demand on the water supply, but this is certainly likely, for example as a result of water used in showers and for the flushing of toilets in settlements that previously were serviced only by public standpipes. Important concerns for the success of this water and sanitation project also follow from these trends. While the municipality undertakes initiatives to cope with this situation, structural low water pressures have been reported, affecting the usability of the facilities by current users. This problem also begs the question if it is feasible to provide more CABs to locations that previously did not use flushed toilet systems and running showers. An important part of the project rationale was the intention to significantly reduce the high level of water that was wasted or unaccounted for, the non-revenue water (NRW).

There are two concerns in relation to the way in which EWS has worked towards this objective. First, while a lot of resources have been made available to combat NRW, the activities and outcomes have not been closely monitored and, in the process of implementing a new information system information, were not available. This indicates a lack of capacity and an appearing lack of commitment for this essential aspect of the intervention. Secondly, the information that is available from mid-2016 seems to indicates that the level of NRW is still high, and even higher than it was at the start of the project. In our view, the relation between the NRW and the implementation of the CAB project should have been much more clear throughout the implementation of the project. The continued roll-out of the project should therefore be closely aligned with the non-revenue water activities. For RVO.nl, who has funded part of the NRW activities, it is important to receive information on this aspect, to be able to make a judgement on how effective its funding has been used.

5.3. Recommendations

We present the following recommendations to EWS and to RVO.nl to improve the implementation and sustainability of the ORIO project and EWS's overall Sanitation Programme.

5.3.1. Implementation & Output

5.3.1.1. Continue roll-out and maintenance

Based on the evident added value that the CABs have to the inhabitants of the informal settlements, we recommend to eThekwini municipality to continue the roll-out of CABs to unserved areas. However, it is crucial that the EWS structures for CAB maintenance and monitoring and reduction of NRW are simultaneously

strengthened. Otherwise, EWS will not be able to keep up with repairs and the CABs will break down. This risk should be addressed in a strategic way, with a vision for the medium term, in alignment with the different EWS units as well as the contracted implementers.

5.3.1.2. Assess best design

In relation to the seemingly practically motivated change in design from a containerized facility to a modular facility in SAN 3, we recommend to assess what the most suitable type of facility would be and to make a cost-benefit analysis, using first-hand experience with both types of facilities and taking into account the differences between various types of sites and the long-term annual costs of operation and maintenance. Based on this assessment, a strategic decision can be made that is consistently implemented.

5.3.1.3. Develop initiatives for participation and ownership

We recommend that the caretaker gets more authority and is supported in this role so that users will develop more discipline in using the facility. It is clear that the caretaker is unable to ensure the cleanliness and proper functioning of CABs due to the large number of users. The proposal to hire a supervisor for each ward might help in this regard, especially when it will be the responsibility of the supervisor to mediate between caretaker and community (members). However, the remarks made to the evaluation team about this proposal should be taken into account, to prevent that conflicts arise between the supervisor and caretaker.

The fact that the caretaker is paid to clean the CAB takes responsibility away from the community. Next to compensating the caretaker, another mechanism could be sought to place more responsibility with the community. In some instances, in eThekwini and abroad, a small payment has been requested from the CAB users. This could increase the communities' sense of ownership and responsibility. Another option would be to turn the hand-over of the CAB into a bigger community event, which could include a theatrical performance in which some common problems with CAB-use are covered, thereby engaging the community in a more entertaining way. Yet another option could be to introduce a kind of community service, so that every household assists the caretaker in cleaning the CAB for one week per year. A good starting point for such initiatives would be to gather views from current end-users on what they believe would work and could help the community to take responsibility for CAB maintenance.

5.3.1.4. Recalculate the optimal number of users

In the further roll-out of the programme reconsider if 450 end-users is realistic and desirable. We found that there are on average 225 users for each CAB site, and the capacity of the CABs (taking into account peak hours) mostly meets this number of users. The settlements that have received additional CABs have fewer users per CAB and also experience better cleanliness. Adjusting the users per CAB downwards would require a larger number of facilities to be provided to reach the same amount of beneficiaries, and should therefore be considered in relation to budget as well as forecasted availability of water supplies (see section 5.3.2).

5.3.1.5. Strengthen cooperation with partners (departments)

We recommend a stronger involvement of eThekwini's Health Department. This could somewhat help to improve people's knowledge of how to use the CABs.[85] Primarily, more regular engagement by the Health Department with the community about the CAB could contribute to people being reminded of their responsibility to use the facilities in a better way. It could also provide a feedback mechanism from the Health Department to EWS on further improvements to the project.

5.3.1.6. Incorporate health improvements

Consider providing soap for washing hands in the CAB, using a fixed dispenser that cannot easily be removed. Since this introduces another risk of theft, a design should be developed that makes it difficult or unattractive to remove the dispenser.

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[85] We refer to a recent systematic review of water, sanitation and hygiene interventions by 3ie, the International Initiative for Impact Evaluation, for advice on the effectiveness of promoting sanitation behaviour. The review discusses the merits of different types of interventions, such as community-based approaches and messaging (3ie, 2017, available at http://www.3ieimpact.org/en/publications/systematic-review-publications/systematic-review-summary-10/)

This evaluation has not been able to make an unambiguous assessment of the health effects of community ablution facilities. However, the potential positive effects of such facilities in dense urban settlements are important. More knowledge about them could inform the formulation and execution of sanitation policy in South Africa and other countries with large informal urban settlements. We would therefore recommend eThekwini municipality to incorporate an evaluation element in the next phase of the programme, in order to obtain rigorous evidence on the health impact of the facilities.

5.3.2. *Sustainability*

Given the results of the project as they have been achieved in SAN 3 and the preceding phases, and may be achieved in SAN 4 and later phases, attention should be paid to their sustainability. The positive effects of the CABs for the inhabitants of the informal settlements will not remain without continued input from EWS and other stakeholders. The focus on sustainability of the CABs and the results they bring is particularly salient now that this study has found that the CABs can no longer be regarded an interim measure. The decision not to provide formal housing to all inhabitants of the informal settlements makes the CABs an open-ended solution until other measures are implemented to replace them.

5.3.2.1. Revisit the long term strategy

For this reason, our primary recommendation regarding sustainability is to thoroughly revisit previous expectations of the lifespan of the CABs and the period they are in service, and develop a revised strategy for their operation and maintenance (O&M). Such a strategy should take into account both the technical and the economic lifespan of the CABs.[86] It should also take into account that currently no "exit strategy" exists in the form of a solution that will replace the CABs, even though the project was designed based on the expectation that the CABs would be replaced by formal housing, including water and sanitation facilities.

We advise that based on this assessment of the revised O&M strategy, RVO.nl will be informed and consulted by EWS through the preparation of a proposal for RVO.nl which covers the technical, financial and organisational measures to be taken to ensure the good working condition of the CABs for the years to come, allowing the RVO.nl project officer to comment on how RVO.nl's investment will be maintained and the project's results will be ensured.

5.3.2.2. Assess the project context

The eThekwini water system is currently operating under less than ideal conditions as a result of the ongoing drought. Combined with the finding that the NRW reduction component of the project has not met its target, this should lead EWS to consider to what extent delivering further CABs to the informal settlements will not reduce the service level to existing water users to new lows. The strain on the network of adding more users is likely to put more stress on the old bulk infrastructure because of shutdowns of part of the network for several hours daily. This should also be taken into account before the decision is taken to move on to SAN4, in order to avoid widespread failure in some sections of the network.

5.3.2.3. Work on innovations

The technical solutions that the Wastewater Network Branch (WWNB) as well as the University of KwaZulu-Natal is currently experimenting with – water-saving devices for taps, showers and toilets, as well as so-called Juno devices that will likely make maintenance more efficient – should be given the necessary attention to be implemented forthwith if they prove to contribute to saving water and making operational cost reductions. We would encourage the WWNB to keep experimenting with the application of solutions proven abroad.

[86] The economic lifespan is the period until the point in time when maintaining the existing CAB becomes more expensive than constructing a new one (or an alternative solution that provides the same service level or better).

Appendices

A. Full list of research questions

1. Implementation (output); What activities have been undertaken and how were these implemented?

Does the number of facilities sufficiently meet the number of end-users?
Are the locations of the CABs and their design well-chosen?
Have end-users been involved?
How are insecure surroundings, unhealthy/unhygienic situations and vandalism prevented?

2. Outcome; How have the new facilities and related activities influenced the user-behaviour?

Do intended end-users, differentiated by demographics, use the CAB facilities?
How are CAB facilities being used and/or are end-users still using alternative locations?
What is the metered quantity of water consumption?
How long does it take to go to the water point, get water, and come back?
To what extent are the CABs used properly and kept clean?
How is consumer education and communication effectuated and what are the results?
Have people received training and how has this affected their activities?
In terms of personal safety, what is the perception of the end–users on the location and design?

3. Impact; What is the effect of the changed behaviour and of the project on socio-economic development?

What is the effect of CABs on migration and settlement?
What is the effect of CABs on official development planning?
What is the impact of the project on health?
Does the increased availability and in many cases proximity of facilities generates a time saving component?
What is the impact of the project on economic benefits?
What is the impact of the project on private sector development?
Which other effects can be attributed to the project, including environment effects?

4. Sustainability; How likely is it that the results will be sustained after the project has completed?

Is the financial situation and organisational capacity of the eThekwini Municipality viable?
How well is the availability and quality of a transfer plan?
What activities are undertaken to sustain results?
What training and awareness activities are undertaken?
How is society affected in terms of factors such as workers' rights?
How is society affected in terms of displacement and land acquisition

5. Cost-effectiveness; Are the results and costs as anticipated and is this acceptable?

Do the (socio-economic) benefits of the project outweigh the costs?
To what degree do the outputs offset the cost of the chosen inputs taking into account quality?
Was the ORIO grant required to realise these results?

B. Quantitative methods and sampling

B.1. Descriptive analysis

Many of the evaluation questions concern the use of and opinions about the CAB. The issues discussed are only relevant or applicable for sites that already have a CAB: a comparison with sites without a CAB is often not possible. Therefore, the descriptive analysis makes up a large part of the report.

The descriptive results show p-values for a test of the difference in the variables between SAN 3 CABs and SAN 2 CABs.[87] These p-values are corrected for clustering at the site level.

B.2. Regression analysis

The impact of the programme is analysed using a linear cross-section regression model. This analysis covers the topics of health, time saving and economic benefits. The estimation model is specified as follows for outcome y for individual i at site s:

$$y_{i,s} = \beta_0 + \beta_1 SAN3_s + \beta_2 SAN2_s + \gamma_1 X_{i,s} + \gamma_2 Z_s + \varepsilon_{i,s}$$

Where SAN3 is a dummy for the sites that recently received a SAN 3 CAB and SAN 2 is a dummy for sites that have had a SAN 2 CAB for a longer period. X is a matrix of household control variables, Z is a matrix of site level control variables and ε is the residual. Standard deviations are adjusted for clustering and stratification.

Even though the assumption of comparability was verified during the inception visit, we still control for confounders that may influence the treatment effect. Appendix C elaborates on the comparability of the groups. As control variables, we use number of household members, trust in community leader, age, number of friends, distance to Durban, average distance to work per site, education of the household head[88], wealth[89], crime that household experienced in past 12 months[90], years living in the settlement and region dummies. For the health analysis, drinking water treatment, water storage duration and having a health facility within 30 minutes were added as controls.

B.3. Sampling design and realization

B.3.1. Target population

This evaluation targets the beneficiaries of the EWS Sanitation Programme in eThekwini municipality, part of the KwaZulu-Natal province of South Africa. Currently the programme is in its third phase, which is partly funded by ORIO. The original ORIO project plan of 2012 describes that the programme had selected 173 informal settlements in the eThekwini municipality that would be upgraded with 1776 CABs. However, the Sanitation Programme is an on-going process, meaning that numbers are subject to change. In SAN 1 and 2, 302 and 871 CAB sites were completed respectively. Approximately 750 additional CABs will be constructed in

[87] The p-value is a reference value that indicates in this case the probability of finding the observed difference in mean value in our sample if in fact the compared groups have the same population mean. A low p-value indicates that it is unlikely that the different groups have equal population means, leading us to conclude that the difference is statistically significant. It is a measure of the preciseness of the observed mean difference, rather than its relevance or magnitude.

[88] Dummy for 'household head started Further Education and Training (grade 10) or higher'.

[89] We used Principal Component Analysis to generate an index of assets (18 items: dummies for ownership of car/truck, motorbike, bicycle, donkey/horse, sheep/cattle/goats, power generator, air conditioning, television, radio, wrist watch, landline telephone, mobile phone, computers, refrigerator/freezer, electric fan, gas or electric cooker/rice cooker, beds, tables/chairs/sofas) and dwelling situation (3 items: dummy for cement floor, dummy for cement, prefab or brick walls and number of rooms).

[90] Total number of incident types that respondent experienced in past 12 months (maximum 11: insulted in public, robbery from home, physical robbery, physical violence, sexual violence, witchcraft, land dispute, vandalism against their property, property destroyed by fire, gang violence, or other).

SAN 3 and around 400 of these are financed by ORIO. It is expected that a total of 150,000 to 210,000 inhabitants will benefit from these facilities, of which 60,000 from the ORIO funding.

The phased implementation of the programme allows us to survey at the same point in time a cross-section of households from sites that are in different phases of the programme. Note that a site is defined as the area with potential beneficiaries for a specific CAB and that a settlement may have multiple sites. Below we discuss the sampling procedure and realization, which was carried out in two stages: first we randomly selected thirty CAB sites, and subsequently we randomly sampled ten households per site.

B.3.2. *Site sampling*

For the quantitative evaluation approach we identified three sub-samples, of ten sites each. First, we sampled SAN 2 sites, where CABs were completed more than two years ago.[91] Within this sub-sample, we opted to stratify by year of completion, enabling us to track sustainability more precisely. Since 91.8 percent of SAN 2 CABs were completed in 2013 and 2014, we sampled five sites for each of these years.[92] Second, we selected a sub-sample of recently completed SAN3 sites, which should have been in operation for at least three months. Our sampling universe therefore consisted of sites that were handed over by the programme manager to the municipality between 1 April and 31 July 2016. Third, we selected a sub-sample to serve as comparison group. It was essential that these sites would in principle be eligible to obtain a CAB. In practice, this meant that we wanted to sample sites that had passed the first stages of the implementation cycle. The longlist from which sites are selected into the programme also includes sites where it would be technically difficult to build a CAB. Moreover, people could have moved away from a certain plot of land after it was put on the longlist, so that no CAB would be built there after all. In consequence, we used SAN 3 prospective sites as comparison group, and sampled from the list of sites for which a work order had been issued after 1 August 2016, but that had not been completed yet on 1 November 2016. Table 1 gives an overview of this sampling strategy.

Sub-sample	Programme phase	Sampling universe	Comments	Sites sampled	Sampled households per site
CABs completed more than 2 years ago	SAN 2	List of CABs by year of completion	Stratified by year of completion	10 (2013: 5 2014: 5)	10
CABs recently completed	SAN 3	Sites handed over between 1/4 and 31/7/2016		10	10
Prospective CAB sites	SAN 3	Sites issued for construction after 1/8/2016	Comparison group	10	10

Table B.1 Sampling strategy

All sites were randomly sampled from lists provided by EWS and SMEC, which contain a unique code for every site. The male and female CABs also have their own number. By checking the CAB numbers when arriving at the site, the enumerators knew whether they are at the location that was actually sampled. Since separate CABs can be close to each other, this was not a trivial check. The field work for the household and caretaker survey was done in November 2016.

During the field work, we observed that three of the recently completed SAN 3 CABs had not been put into operation yet. After verification with the municipality we decided to draw replacements for these sites, as people obviously could not tell us about their experience of the sampled CAB. However, two of the three replacements sampled had not been in operation yet either. To complete this sub-sample, we drew two replacements. This experience indicates that CABs that are handed over to EWS are not necessarily put into operation immediately. In consequence, it is not certain that all SAN 3 CABs in our sample had been

[91] During SAN 1, CABs were closer to formal housing areas compared to SAN 2 and 3, making it easier to tap into existing water and sewage lines. We therefore sampled SAN 2 sites rather than those of SAN 1, as implementation differences between phases 2 and 3 are likely to be less pronounced than those between phases 1 and 3.

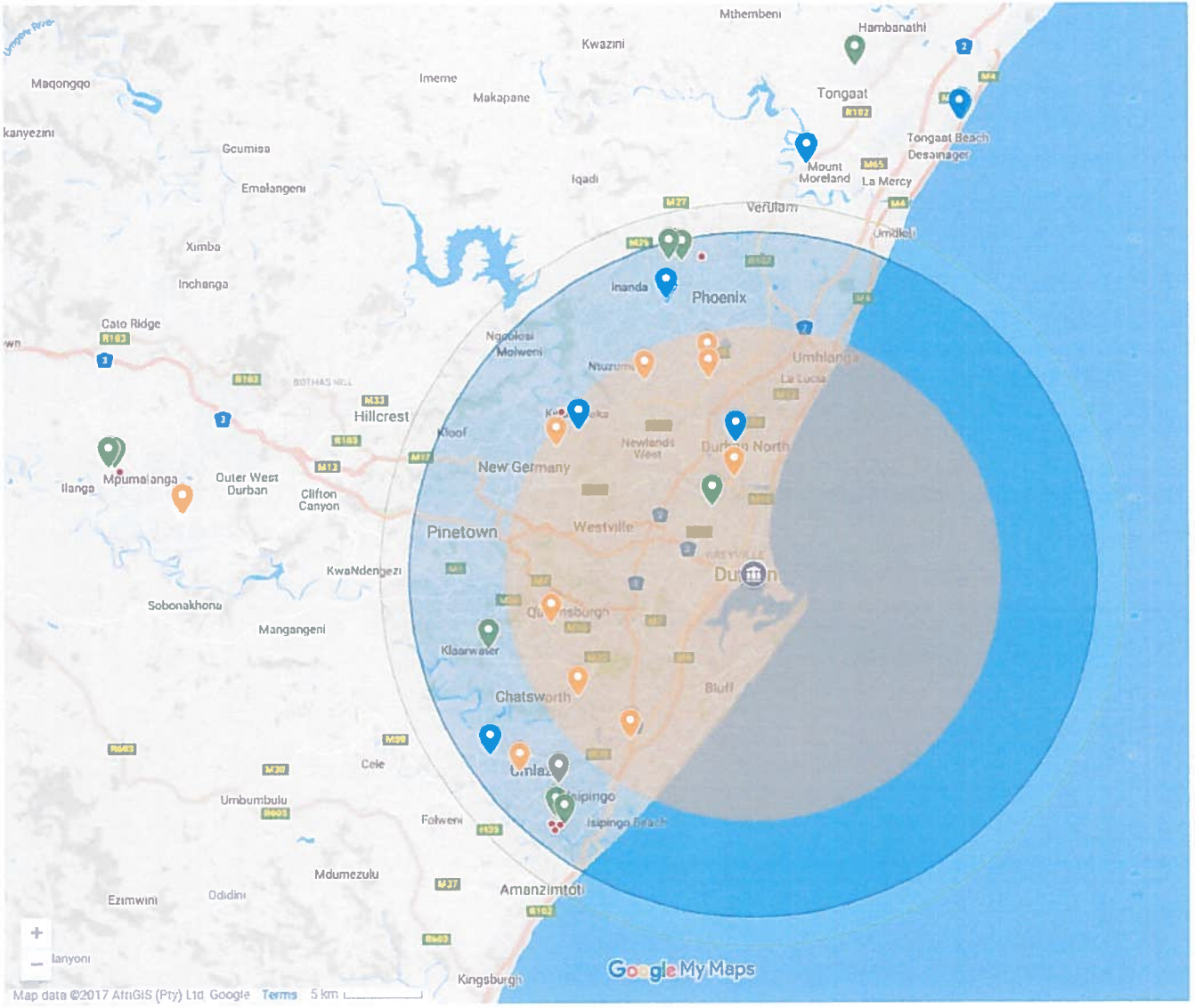
[92] A small proportion of SAN 2 CABs (6.2 percent) had a set-up different from the standard one (one container for men, one container for women). Those were excluded from the sample in order not to jeopardize comparability.

operational for at least three months: it might have been less. In addition, one of the sampled sites for the prospective SAN 3 CABs indicated sewer instead of a CAB, hence we also re-sampled here.

Figure B.1 maps the sampled and replaced sites. Furthermore, it shows for each sub-sample the average distance to the city hall, which serves as a proxy for the centre of Durban. SAN 2 sites are on average situated significantly ($p<0.1$) closer to the city centre than SAN 3 sites. The map also shows that the sampled sites are quite dispersed.

The exception is formed by three completed SAN 3 sites (all located in the settlement Thuthukani (close to Tongaat Beach on the map), and three SAN 3 sites in the settlement Bhambayi (close to Inanda). These CABs were close to each other, and therefore the pointers on the map overlap.

Figure B.1 Map of sampled sites



Legend

- SAN 2
- SAN 3
- No CAB
- Replaced sites
- Durban City Hall
- SAN 2 – average distance to city hall (15.4 km)
- SAN 3 – average distance to city hall (21.4 km)
- No CAB – average distance to city hall (23.3 km)

B.3.3. *Household sampling*

We sampled ten households per site generating a total sample of 300 households. First, the fieldwork coordinator sampled the households, after which the enumerators visited them for the interview. The households are stratified by distance to the CAB, as how long it takes to walk there may influence the decision to use it. It was challenging to identify which households belonged to the catchment area of the sampled CAB, i.e. to define of which households the site actually consisted. This was not something that could be taken from project documentation. We however set up a procedure to demarcate the site.[93] We could not set fixed categories for the stratification, since the size of the catchment area varied from site to site. Nevertheless, we randomly sampled households that were at different distances to the CAB, relative to the site's size.[94] The enumerators checked with the respondent which CAB he or she used, had used, or would use, in order to verify that the household was located within the catchment area.

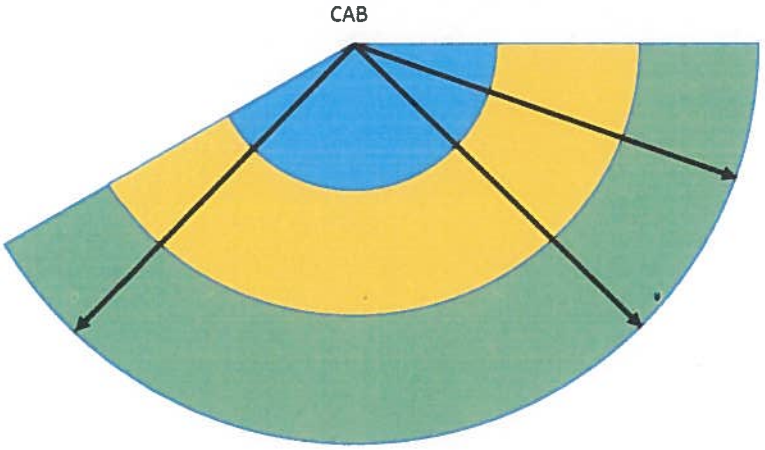


Figure B.2 Household sampling (blue: close to the CAB, orange: intermediate distance, green: further away)

The household sampling results in terms of distance to the CAB are given by the table below.

Household results	Comparison	SAN 3	SAN 2
Walking distance to sampled CAB		2.89	3.10
		(2.96)	(2.82)
	[0]	[100]	[100]
Distance to the CAB in km (GPS)	0.09	0.09	0.05
	(0.06)	(0.15)	(0.03)
	[100]	[100]	[100]

Table B.2 Average distance between households and the CAB

We interviewed the person in the household who does most of the household tasks such as laundry. We expect them to benefit most from the CAB.

B.3.4. *Caretaker sample and CAB observation*

The caretaker of the CAB has an important role in the programme. He or she has to make sure that the facilities are clean and working, reporting any malfunctions to EWS. Next to the experiences of the inhabitants of the

[93] Note that in many cases SAN 3 CABs are added to settlements that already have CABs from the SAN 2 phase. Besides, CABs, of all phases, can be next to each other, sometimes with only a few metres in between. We defined the catchment area as follows: for SAN 3, it consisted of all households that are closer to the sampled CAB than to another CAB, regardless of which phase it was built in; for SAN 2, it consisted of all households that were closer to the sampled CAB than to other SAN 1 or SAN 2 CABs, disregarding functioning or prospective SAN 3 CABs.

[94] The fieldwork coordinator started from the CAB, set out in a randomly selected direction and walked in a non-linear way towards the perimeter of the catchment area. Houses are sampled along the way at a pre-set regular interval, until the perimeter is reached. Depending on how soon the perimeter is reached, this process was repeated two to four times. For the comparison sites that do not have a CAB yet, we do know the planned location.

settlement, they provide another perspective on the daily use and upkeep of the facilities. Every CAB has a caretaker, and each caretaker of the sampled CABs was interviewed about their experiences. This resulted in a total sample of twenty caretakers, since the ten prospective CABs do not have caretakers yet. Interviews were carried out by the fieldwork coordinators, who also independently recorded a number of observations on the sampled CAB.

C. Household and caretaker characteristics

This section describes the characteristics of the households and caretakers. We compare the characteristics between the SAN 2 sites, SAN 3 sites and sites without a CAB.[95] Finding few differences would confirm the comparability between the groups in further analysis, although observable differences will be controlled for.

Starting with the respondents, 66 percent of them are female and they have a mean age of 37 years. They are primarily household heads (65 percent) or spouses (20 percent). There are no significant differences between the groups in terms of respondent characteristics.

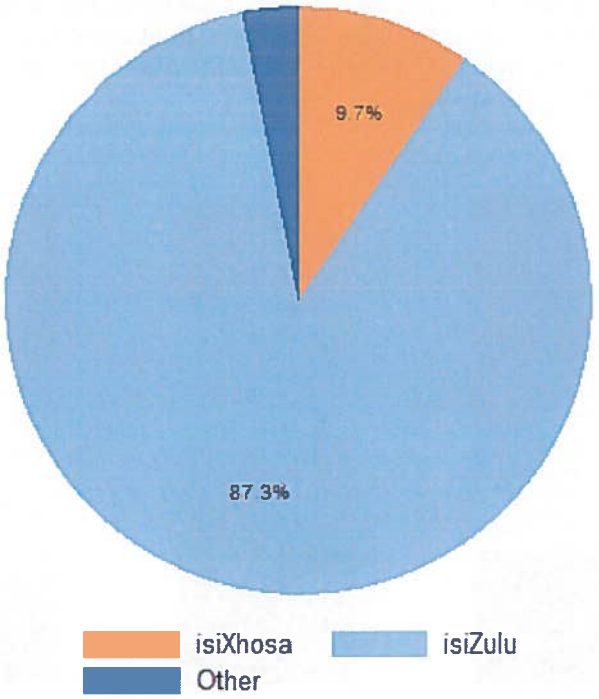


Figure C.1 Home language

Figure C.1 shows that most households in the sample speak isiZulu as their home language. Other household characteristics are presented in Table C.1. Comparison households have almost one more household member, and are more likely to live with at least one child under 18. About half of the households has a female household head. The differences in wealth and years of education are not statistically significant, suggesting that the groups are comparable in these respects. The difference in the number of household members makes controlling for this variable necessary.

Household results	Comparison	SAN 3	SAN	(P1-2)	(P1-3)	(P2-
Number of household members	4.29	3.35	3.40	0.035**	0.068*	0.912
	(2.33)	(1.87)	(2.17)			
	[100]	[100]	[100]			
Fraction with female household head	0.55	0.52	0.54	0.650	0.878	0.756
	(0.50)	(0.50)	(0.50)			
	[100]	[100]	[100]			
Fraction with at least one child under	0.71	0.52	0.50	0.028**	0.031**	0.821
	(0.46)	(0.50)	(0.50)			

[95] Note that if we do not specify the sub-group, the information provided concerns the full sample.

18 in the household	[100]	[100]	[100]			
Fraction with at least one child under 5 in the household	0.31	0.25	0.25	0.339	0.223	1.000
	(0.46)	(0.44)	(0.44)			
	[100]	[100]	[100]			
Standardised wealth index	0.19	-0.12	-0.08	0.278	0.367	0.870
	(1.01)	(0.99)	(0.98)			
	[100]	[100]	[100]			
Years of education of the household head	9.52	9.71	9.04	0.698	0.358	0.191
	(3.09)	(3.46)	(3.80)			
	[100]	[100]	[100]			

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table C.1 Household characteristics

There are, moreover, dissimilarities in terms of income source, as shown in Figure C.2. The fraction of households with formal employment is significantly different between all groups (p<0.05). SAN 2 households are less dependent on informal work (p<0.05 SAN 3, p<0.1 comparison), while SAN 3 households are less dependent on grants and remittances (p<0.01). The large fraction of households that mainly rely on irregular work, grants and remittances (54 percent) reflects the difficulties that the inhabitants of the informal settlements face in finding stable employment.

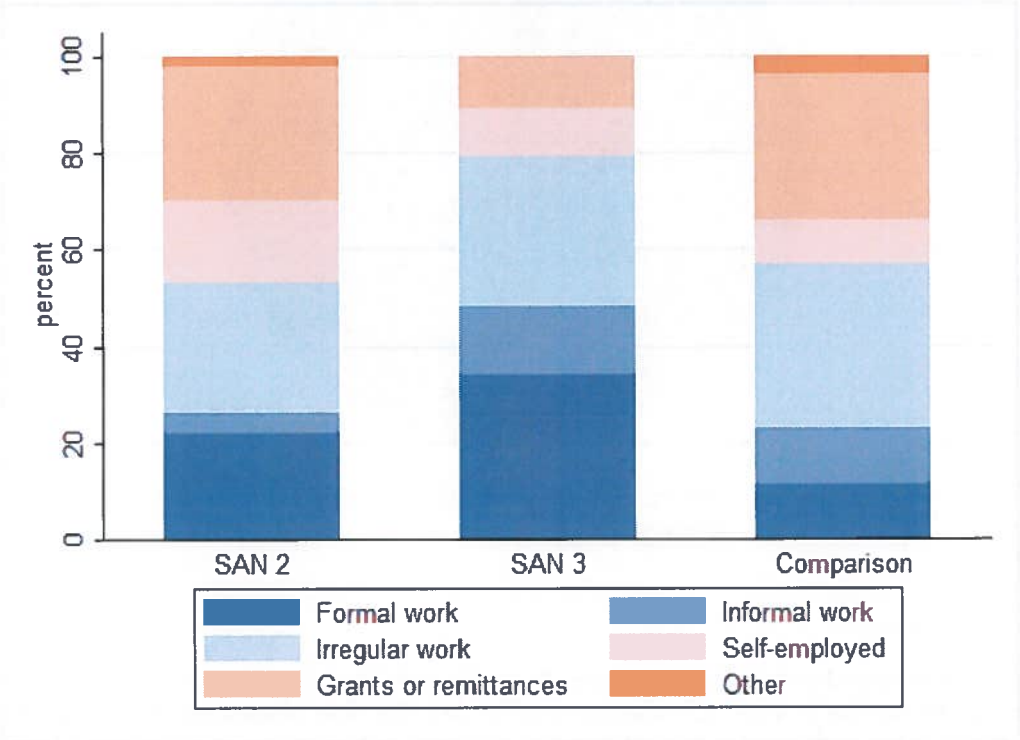


Figure C.2 Main source of income

Turning to the caretakers of the CAB, Table C2 provides their main characteristics. Most of them are female household heads or spouses of household heads. All of the caretakers live in the settlement where the CAB is situated. They are 8.7 years older on average in SAN 3 sites and live 7.5 minutes walking closer to the CAB, although this difference is not statistically significant. We advise the reader to keep these differences in mind when considering the results, because we do not control for them.[96]

Caretaker results	SAN 3	SAN 2	p-value
Fraction female	1.00	0.90	0.331

[96] Since the comparison group does not have a caretaker, we cannot control for caretaker characteristics in the regression analysis.

	(0.00)	(0.32)	
	[10]	[10]	
Age	43.80	35.10	0.076*
	(10.71)	(9.92)	
	[10]	[10]	
Fraction that lives in the settlement	1.00	1.00	
	(0.00)	(0.00)	
	[10]	[10]	
Minutes walking to the CAB from caretaker's house	2.30	9.80	0.205
	(1.57)	(17.97)	
	[10]	[10]	
Position in the household			
Household head	0.70	0.60	0.660
	(0.48)	(0.52)	
	[10]	[10]	
Spouse of household head	0.30	0.30	1.000
	(0.48)	(0.48)	
	[10]	[10]	
Daughter of household head	0.00	0.10	0.331
	(0.00)	(0.32)	
	[10]	[10]	
Number of household members	3.80	3.20	0.350
	(1.69)	(1.03)	
	[10]	[10]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table C.2 Caretaker characteristics

The caretakers decide on the opening hours of the CABs. Table C.3 shows the result of their decisions. Only one AB is not open every day. This SAN 2 CAB is open four days a week for 24 hours a day, while three other SAN 2 CABs are open for 24 hours every day. The other CABs open between 4 AM and 7.30 AM, and close between 5.30 PM and 9 PM. On average, SAN 3 CABs are open for 13.9 hours a day and SAN 2 CABs for 17.2 hours a day.

Caretaker results	SAN 3	SAN 2	p-value
Fraction of CABs that are open every day	1.00	0.90	0.331
	(0.00)	(0.32)	
	[10]	[10]	
Opening hours per day	13.90	17.20	0.121
	(1.66)	(6.20)	
	[10]	[10]	

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table C.3 Opening hours of the CAB

D. Detailed survey results

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
Main toilet during the day						
Toilet at sampled ablution block/CAB	0.00	0.62	0.76	0.000***	0.000***	0.225
	(0.00)	(0.49)	(0.43)			
	[100]	[100]	[100]			
Another flush toilet	0.29	0.07	0.13	0.065*	0.187	0.380
	(0.46)	(0.26)	(0.34)			
	[100]	[100]	[100]			
Ventilated improved pit latrine (VIP)	0.06	0.03	0.01	0.330	0.088*	0.276
	(0.24)	(0.17)	(0.10)			
	[100]	[100]	[100]			
Pit latrine with slab	0.42	0.17	0.04	0.022**	0.001***	0.019**
	(0.50)	(0.38)	(0.20)			
	[100]	[100]	[100]			
Pit latrine without slab/open pit	0.15	0.06	0.02	0.096*	0.011**	0.276
	(0.36)	(0.24)	(0.14)			
	[100]	[100]	[100]			
Composting toilet	0.01	0.01	0.01	1.000	1.000	1.000
	(0.10)	(0.10)	(0.10)			
	[100]	[100]	[100]			
Bucket	0.00	0.01	0.00	0.318		0.318
	(0.00)	(0.10)	(0.00)			
	[100]	[100]	[100]			
No facilities or bush or field	0.02	0.00	0.01	0.141	0.546	0.318
	(0.14)	(0.00)	(0.10)			
	[100]	[100]	[100]			
Toilet at another Ablution block/CAB	0.04	0.02	0.01	0.437	0.220	0.546
	(0.20)	(0.14)	(0.10)			
	[100]	[100]	[100]			
Other (specify)	0.01	0.01	0.01	1.000	1.000	1.000
	(0.10)	(0.10)	(0.10)			
	[100]	[100]	[100]			
On a scale from -2 to 2, how pleasant is it to use your main toilet facilities during the day?	-0.15	0.33	0.53	0.126	0.004***	0.464
	(1.35)	(1.41)	(1.14)			
	[100]	[100]	[100]			
Main toilet at night						
Toilet at sampled ablution block/CAB	0.00	0.29	0.47	0.001***	0.000***	0.173
	(0.00)	(0.46)	(0.50)			
	[100]	[100]	[100]			
Another flush toilet	0.28	0.08	0.17	0.076*	0.370	0.239
	(0.45)	(0.27)	(0.38)			
	[100]	[100]	[100]			
Ventilated improved pit latrine (VIP)	0.06	0.04	0.02	0.520	0.185	0.343
	(0.24)	(0.20)	(0.14)			
	[100]	[100]	[100]			
Pit latrine with slab	0.42	0.25	0.09	0.118	0.003***	0.020**
	(0.50)	(0.44)	(0.29)			
	[100]	[100]	[100]			
Pit latrine without slab/open pit	0.15	0.14	0.04	0.853	0.045**	0.037**
	(0.36)	(0.35)	(0.20)			

Household results	Comparison	SAN 3	SAN 2	(P1-2)	(P1-3)	(P2-3)
	[100]	[100]	[100]			
Composting toilet	0.01	0.00	0.00	0.318	0.318	
	(0.10)	(0.00)	(0.00)			
	[100]	[100]	[100]			
Bucket	0.03	0.11	0.18	0.008***	0.004***	0.168
	(0.17)	(0.31)	(0.39)			
	[100]	[100]	[100]			
No facilities or bush or field	0.02	0.05	0.01	0.370	0.546	0.220
	(0.14)	(0.22)	(0.10)			
	[100]	[100]	[100]			
Toilet at another ablution block/CAB	0.02	0.02	0.02	1.000	1.000	1.000
	(0.14)	(0.14)	(0.14)			
	[100]	[100]	[100]			
Other (specify)	0.01	0.02	0.00	0.546	0.318	0.141
	(0.10)	(0.14)	(0.00)			
	[100]	[100]	[100]			
On a scale from -2 to 2, how pleasant is it to use your main toilet facilities at night?	-0.59	-0.26	0.02	0.120	0.006***	0.170
	(1.24)	(1.27)	(1.19)			
	[100]	[100]	[100]			

Notes: standard deviations between parentheses and sample sizes between brackets. * p<0.1 ** p<0.05 *** p<0.01

Table D.1 Main toilet use

E. List of interviews

E.1. Inception visit

Implementing organisations	Interviewees
RVO	Mirjam Keijzer, (Team leader RVO), Wouter Eisen (team member RVO)
EWS: Execution	Siduduzo Mtshali (Program Manager EWS)
EWS Customer Services and Education	Lucky Sibiya (Acting Manager CS&E)
EWS Non-Revenue Water	Simon Scruton (Manager NRW), Sean McCormick (Consultant to NRW)
SMEC	Craig Perritt (Senior Project Manager SMEC)
Design consultant: Bosch Stemele	Rajen Ramchuran (Project Director), Jason Holder (Divisional Manager), Prakash Mohan (Administrative Manager)
EWS Waste Water Network Branch	Sibusiso Vilane (Deputy Head, Sanitation Operations), Vusumuzi Mkhwanazi (Senior Manager Waste Water Network), Dave Wilson (Consultant, former Senior Manager Waste Water Network), Nedon Ramsurin (Overseer Maintenance)
Other departments	
Human Settlement Unit	Faizal Seedat (Senior manager Housing)
eThekwini Environmental Health Services	Phumzile Toto Mzobe (Senior Environmental Health Practitioner)
National Department of Water Affairs, regional office KwaZuluNatal	Angela Masefield (Chief Director)
Independent stakeholders	
Civil society organisation Abahlali baseMjondolo (Shackdwellers movement)	Thapelo Mohapi (Member and General-Secretary)

E.2. Data collection visit: Semi-structured interviews

Implementing organisations	Interviewees
EWS Executive	Siduduzo Mtshali (Program Manager EWS)
EWS Customer Services and Education	Lucky Sibiya (Acting Manager CS&E)
EWS Non-Revenue Water	Simon Scruton (Manager NRW)
SMEC	Craig Perritt (Senior Project Manager SMEC)
EWS Waste Water Network Branch	Nedon Ramsurin (Overseer Maintenance), Vusumuzi Mkhwanazi (Senior Manager Waste Water Network)
Manager Assets	Roj Hararag
Other departments	
Human Settlement Unit	Nomalungelo Moroka (Principal Project Officer: Informal Settlements Programme), Nkululeko Xulu (Project Officer)
eThekwini Environmental Health Services	Phumzile Toto Mzobe (Senior Environmental Health Practitioner)
National Department of Water Affairs, regional office KwaZuluNatal	Angela Masefield (Chief Director)
Independent stakeholders	
University of KwaZulu-Natal	Chris Buckley (Head of Pollution Research Group)
Community scholar/activist	Gcina Makoba

F. Case studies selection

Through the survey data collection a better understanding has been gained on several aspects of the operation of the CABs, the interaction of the inhabitants of the informal settlements with the CAB and the influence of the CAB on their lives. The outcomes have also created some additional questions which we aimed to better understand with a more in-depth analysis of the dynamics caused by the intervention of placing CAB facilities in informal settlements. We have used a case study approach, and thereby focused on three specific settlements to form a more detailed picture of the experiences and views of different people in each area. The three case studies have been selected from the CAB sites where surveys have also been held.

Below we describe the selection rational and process, the methods used in the case study data collection and the realization of the data collection and any changes that have been made compared to the design.

F.1. Case study selection logic

The survey and the qualitative data collection have a sequential relation. The qualitative data collection methods and objectives were partly based on the initial findings from the survey and the questions these raised. Since the survey showed differences (1) between locations with no CAB and those with a CAB and (2) between locations with a recently placed CAB (SAN 3) and those with older CABs (SAN 2), there are two main criteria based on which the case study locations are selected, namely:

5. CAB (SAN 3 and SAN 2) / No-CAB (SAN 3): **Impact** on health, formal work and other impact.
6. Old CAB (SAN2) / new CAB (SAN 3): **Outcome** in terms of use and **sustainability** in terms of maintenance. We have selected one case for each of the three sub-samples.

F.2. Discussion of selection method and representativeness

There were several possible case study set-ups that allowed comparisons of cases to be made. Within the surveyed locations, there were cases that already had a SAN 2 CAB and for which an additional SAN 3 CAB is constructed. One option would be to compare two CABs from different phases within a single area. We have, however, selected cases from different locations. Regarding the representativeness of the case studies for the entire sub-sample it must be noted that the survey results show much variation within each sub-sample. For that reason the findings from a single case study cannot be seen as representative for all the other locations. We increased the likeliness that the cases provided us with insights into mechanisms that are common for the sub-sample by selecting the cases based on characteristics on which the sub-sample scored higher relative to the other sub-samples.

F.3. Characteristics of cases

The following criteria were set up to select cases relevant for comparison in relation to the survey findings[97]:

Characteristics	No CAB	SAN 3	SAN 2
Number of diarrhoea cases reported	↑	↓	↓
Prevalence of formal work	↓	↑	
Cleanliness of CAB		↑	↓
Frequency of defects to CAB		↓	↑
Number of users		↓	↑
Secondary:			
Private water source	↑	↓	
Distance to Durban	↑	↓	
Distance to work	↑	↓	

Table 26. Criteria for case study selection

[97] The arrows indicate if the locations to be selected should ideally score higher or lower relative to the averages for the other groups.

Based on these selection criteria we made a selection of locations for the case studies. For each group (No CAB, SAN 3 and SAN 2) one settlement has been selected.

	Settlement	Distance to Durban	Users per day	Mean score for how clean the CAB is (-2 to 2)	Observed score for how clean male CAB is (-2 to 2)	Observed score for how clean female CABis (-2 to 2)	Number of facilities out of use in male CAB (max 12)	Number of facilities out of use in female CAB (max 11)	Male facilities broken every week due to improper use (1=yes)	Female facilities broken every week due to improper use (1=yes)	Fraction of respondents who suffered from diarrhoea in past 2 weeks	Fraction hh main income formal work	Average minutes to work per site
SAN - 3 No-CAB													
R/0106/001	Dunpals	32,19									0,2	0,14	44,51
R/0012/048	Lower Malukazi Phase 2	19,58									0,1	0,08	50,53
R/0163/016	Amaoti Angola and Mozambique	19,94									0,1	0,17	51,85
		23,27									**0,1**	**0,11**	**45,45**
SAN 3													
R/0515/019	Bhambayi	17,96	55	1,43	1	1	0	0	0	0	0	0,39	23,16
R/0515/015	Bhambayi	17,78	65	1,12		1	0	0	0	0	0	0,22	32,40
R/0159/008	Canelands	25,93	100	0,91	2	2	0	0	0	0	0	0,52	36,36
		21,45	**78,7**	**1,39**	**0,78**	**0,8**	**0,7**	**0,1**	**0,1**	**0**	**0,06**	**0,34**	**34,68**
SAN 2													
P/081/001	Manyaleni	13,36	300	0,34	-2	-2	3	0	1	1	0	0,16	46,90
P/020/002	Burlington Station Overspill	13,01	100	-0,45	-2	-2	11	8	1	1	0	0,12	41,52
		15,44	**172**	**0,36**	**-1,33**	**-1,11**	**2,8**	**1,7**	**0,4**	**0,4**	**0,05**	**0,20**	**38,87**

Table 27. Proposed selection of case study sides (*Mean shown for each sub-sample from the survey)

F.4. Final Selection

The following settlements were selected as the final case studies.

Site number	Settlement	Strata
R/0106/001	Dunpals	SAN 3 no CAB
R/0159/008	Canelands	SAN3 CAB
P/081/001	eManyaleni	SAN 2

Table 28 Final settlement selection

Out of three options Dunpals was chosen as the site with no-CAB because of its high score on diarrhea prevelance and low score on formal work. For SAN 2 we selected eManyaleni (SAN 2) primarily for the high number of users and the low level of cleanliness. The site for SAN 3 should be suitable for comparison to both the SAN 2 and the No-CAB site on all these criteria (as presented in table 28). Initially we selected Bhambayi (019), which was most representative for SAN-3 on all criteria. At the start of the case studies our sub-contractor Progressus, responsible for data collection, visited the CAB site Bhabayi and found out that it was largely demolished. After informing EWS they were informed that a stolen car had crashed into the women's side of the CAB and forced EWS to close down the CABs. This led us to select another site that met our criteria, which was Canelands.

F.5. Case study data collection

After selecting the case studies based on the survey findings, we started the case study by collecting background information on the process of design and construction of the CAB. We contacted EWS and SMEC about the respective CAB sites and received information in the form of product information reports by SMEC, containing technical information on the CAB site.

Data collection in the settlements was done during May and June 2017 by sub-contractor Progressus. Prior to the case studies detailed question lists, a FGD guideline and structured observation forms had been jointly designed.

F.5.1. Interviews

Each case study consisted of several interviews with key stakeholders including:

- Caretaker (only SAN 2 and SAN 3)
- health staff
- community leadership
- Ward councillor
- Maintenance staff
- Optional: local CSOI

In eManyaleni (SAN2) key informant interviews were held with all these stakeholders. In Canelands (SAN3) five interviews were held (all stakeholders accept for a local CSO). In Canelands (SAN3 with CAB) four interviews were held. These were held with the ward councillor, community leader, health staff and the Local CSO (Dunpals).

It must be noted that the ward councillors that are currently in office have been there for only 10 months since they were elected last year in August. These newly elected councillors haven't been very involved in the CAB project and its history and though they tried to answer the survey questions, it was noticeable that some did not have much information about their areas.

F.5.2. *Focus group discussions*

For each site a FGD with multiple users has been carried out. The FGDs were attended by an unequal amount of males and females. Progressus recruited 10 for each FGD hoping about 6-8 would attend. The FGD of Canelands had 3 males and 7 females, eManyaleni had 7 males and 6 females and Dunpals had 5 male and 6 females. In eManyaleni, one community committee member took part in the FGD discussion but we don't expect he influenced the responses of other participants.

While the group consisted of both male and female participants, each group was split up at some point to discuss some topics which might be more sensitive to discuss in a mixed group. This approach worked well. From the ease with which people answered most questions, it appears they were at ease and provided honest answers.

F.5.3. *Structured observations*

While much of the data that is collected is narrated by users and stakeholders, the observations have provided more first-hand information on the actual way in which CABs are being used.

Observations have been done for all three case studies. For both SAN 2 and SAN 3 observations have been done at three times of a week-day: a peak hour in the morning and the evening and a less busy hour during the afternoon. Observations were done by four observers simultaneously: at the inside and outside of both the male and female CAB. In addition, before the opening of the CAB static observations were done of the conditions of the CAB. For the SAN 3 No-CAB site observations were done at a public standpipe for 1,5 hour at the middle of the day. For all purposes a specific observation form had been developed that has been used.

It must be noted that for Manyaleni, the CAB was being cleaned for half an hour during the last hour of observation. The CAB was closed during this time, which explains the lower number of users during these observations.

F.6. Reporting

The Focus Group Discussions were recorded and have afterwards been translated into English and fully transcribed. From the interviews, detailed notes have been taken. All observations have been organized in excel sheets.

The local team has provided the raw data for the interviews, the FGD and the observations to our evaluation team. Based on a triangulation of the data we have developed concise case study reports for each of the case studies. These are included in Annex G.

Based on the case study reports, the case studies have been used to triangulation with the other data sources in this evaluation.

G. Case study reports

G.1 Case Study Report: Dunpals (No-CaB)

General info

Location	Dunpals
Date / Day	14th of June 2017
Construction phase	No-CAB (SAN 3)
Number of CABs in area	Already have CABs at the beginning of the settlement, next to the taps. Now new ones are being constructed closer to these people.
Important notification	FGD: People are very emotional because they have been told they will be moved but still CABs were build. They are now in the dark and have no idea what will happen. This made it more difficult to lead the FGD.

Summary

The CABs in Dunpal have been constructed but not opened for several months. Reason is a political conflict between DA and ANC. The location of the CAB (next to a temple) was disputed by some. Protests took place. People are hurt and dissatisfied because houses have been promised for 20 years and recently again, and there is confusion. Illegal connections are common because services have never been provided.

Dunpals is part of an area with 5000 people. There are some CABs already which are used but are distant. There are several taps but mainly illegal connections. Most commonly people use pit latrines or the bush for needs. They feel like the CAB is a welcome facility and expect that many people will use them. People expect that cleanliness will be an issue and recognize need for good behavior and cleaning.

There are currently many health issues in the area, because the area is filthy and there are insufficient water and sanitation facilities. Diarrhea and tuberculosis are widespread but also other diseases occur. Bacterials and germs from faeces reach drinking water and food because of spreading when raining and flies/insects/rats. Also handwashing is less common right after toileting. Main concerns for negative impact are privacy and safety of the CABs. Moreover, the area has many people from outside Durban and temporary and informal 'piece work' is easy to get here, as opposed to formal work.

Key findings

Current facilities (Pre-output)

- Water facilities: Mainly illegal taps and little municipality services
- Sanitation: mainly self-created pit latrines and the bush are used

Expectations (on outcome):

- People are positive about the CABs, as temporary service
- Alternatives would still be used (bucket/pit/bush), particularly during the night and for people living further from the CABs (illegal taps/storage)
- Some people note they might even prefer their pit because of privacy and safety

Current living conditions (impact potential):

- Health status: diarrhoea and TB are prevalent and linked to poor water and sanitation.

- Informal work is a characteristic of the settlement and relates to the informal nature of the settlement: low development, minimal services,
- Experienced lack of recognition by government and high uncertainty: the area was earmarked for housing and therefore no services were provided
- Many people from other area coming into the area for piece work, and are allowed to build shacks as opposed to other communities

Findings of case study

Opening of the CAB

Opening of the CAB has been delayed for some time due to political conflict between two parties, the DA and the ANC. They are using the CABs for their own political agenda. The leading party, DA, has taken action to ensure the settlement would receive the CABs. The ANC, who has lead the area for many years, appears to be rallying against the CABs in many ways, in relation to the promise of formal housing, which they now feel is being broken. They even stopped the construction workers, and had a protest by which they burned car tiers. People are displeased with how long the opening of the CABs is taking. At the same time people are uncertain about their future because they have recently been informed again that they will be moved for development of the area. For the past 20 years the community has been informed that their area was earmarked for development. According to users and stakeholders, this was also the reason that almost no basic services have so far been provided.

Dissatisfied with long duration
Jeanet: The reason I am saying I am not happy at all is because it has taken a very long time to be completed and like Mazwi said we don't have access to water at the moment, and we already had a hope to access to water close by hence I am saying that I am not happy, because it has taken a very long time to finish, you know?

Delay political and housing issue
Mazwi: I would say the construction was fast but the reason why they have not yet being opened it is because there are a lot of negative talks that is happening in this community. They are fast with what they do. So, when they are in the middle of their work, then they started doing it slow, no longer in a hurry. Because the community leadership is different. Because now that there is DA, there is ANC. You see? That is where they both want to work at their own sides.

Jeanet: I wanted to say that as well that the meeting was called to announce that they were going to build the showers here and we were happy about that. Then when the caterpillars arrived they started fighting against that and burned tires. We were then puzzled because were all the ANC members and then decided to go with those who make things possible (DA party).

Current facilities

People are using different facilities currently. The Municipality has provided almost no services to them because of the plans to develop formal houses. For water they are using illegal communal taps and some private taps. There are 3 or 4 legal taps from the community for the wider community but the water pressure is too low and for some people they are too far. Furthermore, many people store water in the house after fetching it. They use this for all purposes, including for laundry and showering. There are no communal sinks. For toilets people use different facilities. They mainly use private pit latrines that are constructed by people in their garden. Some even prefer this option over the prospect of communal CABs. Secondly open defecation by going in the bush is common practice or otherwise in a bucket in the house. Also existing CABs all the way at the other side of the area are sometimes used by people at this side. Lastly one person noted there is a portable toilet which some use but is very unclean.

Illegal communal Tap
There is some small tap we are using to fetch water. We have to fetch water to go and use for those things at home. We are not able to take shower but only make use of a small bath at home. It's a small tap that is shared by all of us. Once a day we go to the tap to fetch fresh water to drink because the one we fetched previously maybe it's no longer fresh for drinking and you can use that for washing.

Current CABs are far
Local CSO: I think they [people at other side of church] are using the bush because they are far. They don't have a choice. Because even us we are far from the CABs, I will give a practical example about myself; sometimes showers become too far and then I have to find the alternative place to relieve myself.

Community leadership: Yes even when they wanted to use the toilet they would come up here in these ablution blocks, which is very difficult at night or even when a person is not feeling well for them to come all the way down there to here that is very difficult.

1. *Implementation (output)*

Does the number of facilities sufficiently meet the number of end-users?

There are 2000 registered people living in the area but the community leadership estimates around 5000 people are living in the area (which includes Dunpals). People do think the CABs will be an improvement in many respects. Especially regarding health and cleanliness of the area. The current facilities do not have enough capacity and people often have to wait long times by the taps and toilets, especially in the weekend. However, the capacity of CABs might neither be considered enough and people consider using their private pits instead of waiting in queues. The area is expanding in numbers rapidly which puts additional pressure on facilities.

Not enough taps
Err, I will talk about water. There is a problem I have identified; as there is not water supply by the church side, you find maybe 2 young ladies doing their washing and they are doing it right underneath the tap then you have wait for them to move their basins before you can be able to fetch with your bucket. That is the problem I am seeing and I was suggesting that if there could be some more few taps where we can be able to fetch water while others are still doing their laundry in other taps.

Queuing issue for toilet
Jabulani: TT, let me explain it to you. The reason why I ended up building my own pit toilet is that with the current ones that we have sometimes you go to the toilets and you have a running stomach and you find that it is full, and you wait and queue. So that is why I built my own I did this for convenience. Because you might end up messing yourself while waiting on the queue.

Not enough for all in weekend
Jeanet: Because there are too many people, especially weekend. Because, if you can see, it's better now because people are at work but during the weekend most of the people do the washing, so they won't be able to cater for us all.

Urbanization is taking place and population increasing
Ward councilor notes that she has 2000 people registered for this area but actually 5000 living here. (see migration impact)

Are the locations of the CABs and their design well-chosen?

Peope are happy that the CABs are closer to their settlement. The new location is closer for most but some people still live far. The municipality planned moving these people closer to the CABs. There was a conflict over the location being next to a temple. The priest was afraid of church being polluted. On the other hand the leadership argued that that church users could benefit.

Have end-users been involved?

The site was chosen by the designers. The community was not consulted for the location. The community and representatives have put pressure on the municipality to receive services and this appears to have had an effect with the delivery of the CABs.

How are insecure surroundings, unhealthy/unhygienic situations and vandalism prevented? (Expectations)

There is disagreement between stakeholders whether the CABs should be open at night or closed. The main argument to close it is safety issues for the users but also for anyone securing the CABs during the night. Arguments to keep it open are the problems of then needing to use alternatives during the night. One proposed solution is to keep the key at someone close to the CAB for people to collect in in the evening. The ward councilor suggests a caretaker for the night, which creates work and allows people to use it at all times. Others disagree with this because it is too much to ask from someone to be available the whole night to provide the keys. According to this person the most important is for the community to agree on specific times it will be opened and closed and to realize these. Furthermore, there is (twilight) lighting outside the CAB (twilight lights) but no light inside,

2. *Outcomes*

Do intended end-users, differentiated by demographics, use the CAB facilities?

CAB is intended for all and expected to be used by all. Also people who have migrated to the area will use them.

How are CAB facilities being used and/or are end-users still using alternative locations? (Expectations)

Women will continue using buckets during the night as alternative. Some people already noted that they prefer private pit toilets over communal facilities. They might also use pit latrines in the garden. People might also still use the bush during the night.

Women use bucket during night
Thando: We do not go out during the night; we use the buckets.

People use bush at night
I: So if these CAB's are closed at night where do they go?
Leadership: Hmmm, yes that is a big problem because nobody can really know what they do until you meet and talk with them but I think what they do is to go to the bushes like animals, because there are no other options that they would have

To what extent are the CABs used properly and kept clean? (Expectations)

People worry about the fact that the community might not take enough care of the CABs leading to uncleanliness. People use other things than toilet paper and create blockage. The toilet seats get dirty soon which means others can't use them hygienically. Children are considered less capable of properly using CABs and flushing, which is why most note they should be accompanied while under 6 should use a bucket. Some parts are easily broken. A problem is the people smoking "Wonga" and taking parts.

There are disputes over who should be the caretaker which are politically loaded. The committee has proposed someone but this is denied by the leading party who would want to appoint someone themselves. The community finds it most important that the caretaker lives close to the CAB.

How is consumer education and communication effectuated and what are the results?

There has been a session during which the people were informed that CABs would be constructed.

3. Impact (expectations)

What is the effect of CABs on migration and settlement?

It is mainly the work that is driving people to the settlement. The fact that they expect formal housing might also be an influence, although there were expected to be only 800 houses while 2000 people are registered and 5000 live there. People from East Cape are coming to the area for jobs. In Dunpals new people can just build new shacks, as opposed to other areas, where it is not possible for people from outside to get work easily or to buy or rent a piece of land from another shack dweller.

Some locations allow building shacks other not
R: Maybe services because of the houses that are going to build now and also because of the jobs that they are getting in this area, you see in Gwala's farm and Zamokuhle it is far and people in Gwala's farm will not employ somebody who is not from that area, and this is how it works if I have brought you in my house you must stay in my house, you cannot go and build a shack next to mine that is what happens in Gwala's farm. So in Mumbhayi as soon as you come there one week; and give them the cash they give you rights to build your shack there, that is the problem and that is why we are getting over populated there.

What is the effect of CABs on official development planning?

The fact that facilities have been placed has influenced the expectations that people have regarding formal housing. The CABs are used by representatives and political parties to promote their political interest and the CABs have steered up and confused the debates and expectations around formal housing. The placement of CABs does not appear to be accompanies by other services such as waste collection and electricity.

Leads to doubt
I: Would you say the construction of the CAB has affected the expectation of people for housing? (and willingness to invest in housing and contribute to community activities, public spaces)
R: People are really loosing hope because they feel that if houses were going to be built then there was not going to be a need for the ablution blocks

No garbage removal
Thoko: We need also a dedicated place for refuse removal. It'd help a lot if there could be a place where we throw our rubbish at, like in rubbish bags. We'd wish to have that. so that municipality can come and collect it on a particular day

What is the impact of the project on health? (Expectations)

Overall the situation around health and hygiene is poor in the area. It is recognized that the lack of water and sanitation is contributing to many health issues. Open defecation contributes to the filthiness of the area (together with lithering), and contamination of the water, which is seen as main cause for bad hygiene and disease, such as diarrhoea, cholera, typhoid. Particularly vulnerable people are susceptible and many people have a record of tuberculosis. Washing of hands is expected to increase with the new CABs and is now less common because there is no water close to where people empty their bowels.

General effects
Health staff: Poor personal hygiene because people are not washing their hands and as a results there is an increased Burden of disease, caused by the faecal, oral route of transmission, people not washing hands and touching food And also people contaminating water storage containers with dirty hands, flies sitting on food due to dirty Environmental conditions. Ground Pollution as a result of sewer blockages, inadequate disposal of grey water, And poor waste management. Vector control as a result of rat and cockroach breeding and mosquito breeding due To stagnant water.

Cause of Diarrhoea

Leadership: Mmmm....I think the main cause of diarrhoea is the fact that the area is not clean; our area is very filthy... like I said I think what causes the level of diarrhoea to be high in this area is because our area is not clean, when people relieve them in the bushes when it rains there is some contamination that is happening whether through the water that they are drinking or something that they would eat that might be contaminated as well; so the only solution can be if people can be given houses where a person would have their own tap and their own toilet, that is what I think can be the only solution.

Expected improvement from CAB
John: Because there will be a tap for you to wash your hands afterwards using the toilet even if the toilet might not be clean but there will be water for you to wash your hands.

Tuberculosis
I: So this thing of going to the bushes how does it affect health in general?
Leadership: R: It really affects it a lot....it affects health a lot because most of the people that are staying here they have records of having TB at some point in their lives and I think it's because of polluted air because this area is not clean.

Other diseases
Health staff: Yes other diseases such as Typhoid / cholera are directly linked to poor sanitation requirements and Vulnerable groups like children, aged and immune compromised people are more affected.

Does the increased availability and in many cases proximity of facilities generates a time saving component?

People do spend more time now on fetching water and visiting the more distant CABs that have been placed seven years ago. The new CABs will thus create a time saving component for many people. On the other hand people note that the queuing could cost additional time as opposed to using your pit toilet.

What is the impact of the project on economic benefits?

The informal nature of the work that is common in the area is typical for the settlement. This attracts people from outside to come work in temporary jobs. While in other settlements the community is less tolerant of shacks being built by newcomers, in this settlement it is accepted. This tolerance might be caused by the experienced lack of recognition of the area by the government and the uncertainty about whether the people will be moved.

Some people voice the sentiment that local people are not hired for construction or for formal jobs. This is according to some due to the political parties who want their own people to benefit and according to some also because Indian people dominate the area and keep formal work for fellow Indians.

No local people hired
John: Err, the showers that are built near us, they never get to hire anyone locally (the new project), but maybe that's another point.

R: Eish it's because of the area that we are at, this area needs people that are strong because it is dominated by Indian so when it comes to formal work there is still that thing of them reserving it for their fellow Indians. We do have people that are qualified to do certain jobs but they don't get them when they are here, you would have to move and go to Isipingo or Durban, but when you are here you will never get a formal work even if you have the qualifications it's not easy.

Reason for Informal work
I: Okay and then again when we did our survey it showed that formal work amongst people who are living in this settlement is low as compared to informal work, so what do you think causes that?
Leadership: I think that simply shows that the employment that people can get in this area is those informal jobs than formal jobs, because ever since I have stayed in this area that is what I have also observed that the only job you can get in this area is those piece jobs.

Ward councillor: You see in Mumbhayi my database says I have about 2000 people living there but like I had already told you now it is about 5000, in Mumbhayi they are growing every day and when I say they are from Mumbhayi they are not originally from there, they are from eastern cape and when they come here they would get like a 3 to months job and when that is finished they can get another 6 months job and they end up not going back. So their friends from the eastern cape would come stay with them get 3 months job and so on and so on. So the majority of people from Mumbhayi are not from KZN but from the Eastern Cape and its easy for them to get piece jobs here.

Which other effects can be attributed to the project, including environment effects?

There are other effects that are expected from the CAB and risks of current facilities that will be taken away. When using the bush there is the risk of snake bites while pit latrines are unsafe for children, who could fall in. CABs will in that regard increase safety.

Considering the environmental effects, at the moment people are throwing washing water away around the taps (where there is no drainage) leading to puddles around the tap which make the location unhygienic. Also, the caretakers are making sure the garbage that is disposed in and around CABs is better cleaned and without it would be much more polluted.

Some problems that people have with the CABs is that privacy will actually be less, since others can hear what you do which makes them ashamed to use the toilets in front of others. Also the safety in terms of being assaulted is worse than with the private pit latrines in a garden. People are also more confused because of the CAB and loosing further hope of receiving formal housing. Some people note that a girl was recently raped at the toilets, showing that they can also be unsafe (and perhaps more so than a pit latrine in the backyard). This can even be related to the political conflict, for people being harmed.

Safety risk with old facilities
Thoko: It's possible to make a pit toilet next to our houses but it is still a problem because they need to be utilised by the adults, it's risky for children under the age of 2 because they cannot be able to sit on the toilet seat. For those you need to create some space in the yard where they can relieve themselves or use a bucket and then you will throw in the toilet for them. You flush away and clean it. Young children must not use them.

Negative
John: But most of the pit toilets are all private property. Those will always be clean because you are using it with your wife and children. So, his pit toilets is his and mine is mine. It's in your yard, you go anytime you want and you don't have to clean after somebody, and you don't have to wait for somebody if you want to use it.

Local CSO: the other thing there is a lot of political intolerance in this area so you will find that when you want to go the toilet you can be harmed in any way and not knowing who did that to you.

4. Sustainability

How is society affected in terms of displacement and land acquisition?

There was no displacement for the construction. Some people were intended to be moved closer to the CABs because for them the distance would be too far.

Policy of Human Settlement Unit - Perception of temporary nature of CABs

People have apparently been told they have to move in a short period, to formal housing. This is of concern to them. For that reason they have never received services from the municipality, but they were neither moved as promised for many years.

Issue of moving
Leadership: thing is that we were promised houses in 1996 and not even a single house was built, they came back again in 2007 and started again to count the number of households living in the area and they told us that the budget was approved but again not a single house was built until now. So for us politicians are using housing as an opportunity for them because if they want us to vote for them that's when they will promise us houses,

Availability of toilet paper

Lack of toilet paper being provided is a concern to people.

Information sources

Interviews	
Dolly Monnien	Ward Councillor
Thembela Makhiloyi	Community leader
?	Caretaker
FGDs	
Number of participants	11
Number of female/male	6/5
Duration	
Important notifications	Progressus had recruited 10 males hoping 6 or 8 would attend but they since dropped us at the last minute as they had to attend to other matters.
Observations	Communal Taps
Time	10:10 AM - 13: 10 PM
Number of users	8

G.2. Case Study Report: Manyaleni (SAN 3)

General Info

Location	Manyaleni
Date / Day	16th of June 2017
Construction phase	SAN 2
Number of CABs in area	Only on one location, 4 containers.
Opening and closing time	5 or 6 am until 6 or 7 pm. Closed at night.
Important notification	The settlement is smaller and build full. There is no place to expand or open bush for people to relieve themselves.

Summary

There are four CABs in the settlement. These have been placed at the same location, because this was the only open space and trucks could not get the other two CABs to the planned location. According to the caretaker only two are opened and the other two are standby. Generally, capacity is seen as insufficient and distance too far just for fetching water or urinating. Request is made for additional standpipes. Queuing takes place but is accepted.
The capacity in terms of water pressure is insufficient, and use of each application disables the other facilities.

People are generally content with the design of the CAB and the facilities. There could be improvements such as (solar) geyser for warm water (cold water is problem in winter), bucket for women utilities. Some materials easily break, such as doors, leading to lack of privacy. Also, the area is very wet and leads to puddles forming outside CAB and wet and muddy floors, also from bad drainage of showers. The caretaker is doing here job very well but people (admittedly) abuse the facilities. Around 6/7pm the CABs close and people resort to (neighbours) pit latrines, buckets, or open defecation (behind CAB or in bush). Maintenance does not take long to repair defects.

There is mostly positive impact from the CABs. The important improvement is that with flush toilets the area is cleaner, with excrements not being spread around, but flushed away. Therefore less germs and bacteria's and less risk of disease. Laundry water is drained, leading to less puddles. These changes also improve the environment and smell around the area. This leads to more dignity and people feel more recognized. The safety around CABs is better than with previous facilities or bush, but (at night) remains a worry. On the other hand, using one facility with the whole community also brings some hygiene risks and problems, especially when using defect facilities. People wash hands more often, but not with soap.

Key findings

Output

- There is only one CAB location, which is seen as insufficient, but there is no place for additional ones. Standpipes are requested.
- Capacity is insufficient in terms of water pressure. This is an important issue.
- Lack of privacy is considered an issue, since door is broken and not repaired.

Outcome:

- At night the CABs are closed and people use buckets, pit or go behind the CAB
- The quantity of toilet paper provided fluctuates. When people do not receive/find it they use

whatever they can.

Impact:

- Health is considered to be impacted by the CAB. People wash their hands more often
- The area is also cleaner, although it is a wet land and the CAB location is always wet
- Dignity of the community has been positively influenced

Findings of case study

1. *Implementation (output)*

Does the number of facilities sufficiently meet the number of end-users?

People feel that the CAB facilities are not sufficient to meet the number of users. At the same time they realize that there is no place for additional CABs. They therefore suggest standpipes to be constructed so that people do not have to walk all the way to collect water to shower at home. There are often queues but people generally accept this. There are different views but the number of users seems to have increased, while the CABs were placed based on original counts. Moreover, people from surrounding areas use the CABs. While there are 4 containers, only two are opened and the other are used as standby.

Queueing
Point: The second problem with regards to showers, let's say you go down there to bath, you are in a hurry to go to work, you'll find a long queue. The showers are full. You can't be late for work because its full inside and outside.

Local CSO R: Yes queues are always there but that has never been an issue because everybody understands that these Facilities are supposed to be used by community members so that makes them to be more patient with each Other. From my view these CABs are not enough to cater our community but there is also a challenge of space if we Were to get additional CABs.

Lack of space for CABs
Caretaker: There are not enough CABs and I don't know how they can be increased as there no longer space in the settlement. There are other 2 CABs that are closed and are on standby for in case those other ones are broken then these ones can be opened. It would be better if all are opened so that males could have 2 facilities and female 2 as well so that these ones are no overloaded. There are 202 shacks.

People from other areas use it too
Lala: Yes and that these showers are not being used by us people living here only, there are people from other parts of this place who come here. They disturb us, maybe you want to do you laundry but you find people from BBC, the people renting there, some who have shacks there. They make that group come this side to bath and wash this side. That affects us badly, because now I have to turn back with the laundry and when you complain they will ask you if you are the one who came with these showers here.

Number of users increasing
Welcome: I like that point that my sister is raising, when they built these toilets they built them based on numbers. They counted the people here and built the toilets. But now the numbers are increasing and the more we are having problems and now include the people who come from outside.

Local CSO: From what I have observed the number of people is still the same from when they were just opened even Today many people are still using them the same as before.

Observations: Even though there are inside queuing problems, no outside queuing is reported in the observations.

Are the locations of the CABs and their design well-chosen?

The locations has been selected because it was the only open space. The second batch of CABs were supposed to be placed at a different point (at the lower part of the settlement) but the trucks were not able to get there. Some people complain that the place is to muddy and was not a good place for the CAB. This is partly because the whole area is wet but also partly because pipes leak leading to muddy surroundings.

Location not as intended

Welcome: You see all the platforms and containers down there, it was supposed to be two, males and females and the other two up here with males and females. So the problem was the truck and that this place is very watery. I'm not sure if some people were there but the lot that we tried to set up, a truck was stuck and entire weekend in the mud. They tried pulling it out but they failed until they managed.

Location to far

Welcome: Look at our place, the way things are set up, especially the toilets, females can use the buckets but males cannot. Males cannot find a place to hide and relieve themselves. Males have to walk all the way just to urinate.

Caretaker: It would have been better if we are provided with water 2 taps on the other side of the settlement because we are now forced to go to those CABs to fetch water. There are others who like to bath at their homes but due to the fact that we don't have taps on this side of the settlement they are forced to walk to CABs to take a shower.

The capacity is still considered insufficient in another respect, which is in terms of water pressure. There is insufficient pressure to use several taps at the same time. When people are showering others cannot flush the toilet and when people start using the taps at the outside people in the showers are left with very little water.

Water pressure to low

Kagi: It's sometimes a challenge when there's someone doing their laundry, when you open on one side it comes with great pressure and then someone asks you to close your tap a bit while doing your laundry. It's also a problem when the taps are being used simultaneously

Welcome: maybe some are in the showers, and some are doing their laundry in the sink, its four sinks. So sometimes when all the taps are open in the sinks and then there are people in the shower, when you want to flush Siza: nothing comes out you have to go and ask at the door

Design

While people do find the design very good and meeting their needs they also have several complaints and preferences for improvements. There are no geysers and water is too cold for many people, especially in winter, so they don't use it. Other people recognize the risk of placing geysers, which might be vandalized or lead to unequal use. Moreover, there should be more hangers in the showers to allow people to keep valuables dry and to dispensers to sanitize the toilet seat. Also for women there should be a trashcan to dispense sanitary tissues. Floading is an issue in the showers due to lack of drainage capacity. The inside is therefore often wet. Currently cheap plastic materials are used to prevent theft and the concrete deck has already cracked. This could affect their sustainability negatively.

Discussion on geyser

Local health: Also a huge challenge is that the water is cold especially for winter we should consider solar geysers to be installed at least

Madam: But that will cause more problems, you know when you bath at home where there's a bathroom and then someone stays long in the bathroom when you get there all the hot water is finished. This thing will cause more problems, the water is fine as cold as it because its a lot of us here.

This water won't be enough, its better when it's in your own house. Even the ones from the township will now come here with towels to shower

Design is good but some improvements possible
Nkunzi: No in that regard I do commend the showers because there is a space to undress, get into the shower and lock. Unless if there's someone coming there with their own intentions. they are perfect, they were well built.

Dini: I was saying the one to put your soap.
Madam: And then the place to hang your towels, there's nothing, you use the wall. Some when they try hang their things which have money, it falls off and goes into the water. He dropped one thousand three hundred. He was crying badly. Even cell phones get lost there.

Lala: There aren't any places to discard of our things when we are on our periods when we take off our underwear there aren't such places in there
Taprim: I wanted to mention this one regarding [sanitary] pads, it's a problem. Maybe if we can place a rubbish bin in there

Floading of showers
Siza: It just breaks my sister, sometimes you find that I'm bathing, I think the space is too small so it floods. I don't know but that's what I'd see when some people are bathing there you find dirt coming back into the place and then we walk all over it.

Observations: Observations showed that there is pipe-leakage and that there is waste water leaking.

Have end-users been involved?

End users have to some extend been consulted and could decide at what time the CABs would close. On the other hand, it is indicated by the leadership that people wanted to keep it open at night which was not allowed. It seems like this was also because not everyone agrees on this. Also, at later stages there was no consultation and while there are complaints by people, most of these are not really addressed. These include additional facilities, privacy issues, smaller repairs and closing times of CABs. People themselves also indicate that they feel less responsibility to report defects or voice complaints to the municipality.

Consulted but not sufficient ownership
Community leader: We were involved and were told that they were going to be closed at night but were afforded the choice to determine what time they to be closed.

Ward councillor: R: Well I don't think that they were involved based on the information that I have because they complained about the fact that the CAB was placed in a wrong place and two weeks ago I also I heard a complain about the CABs being closed at night and people not being able to use them. The other thing they also came to complain to me about the other CAB that has not being cleaned because its caretaker is sick and they don't know who they should complain to and who is supposed to take the responsibility if not able to do so.

How are insecure surroundings, unhealthy/unhygienic situations and vandalism prevented?

To some extend insecure surroundings have been dealt with, and one of the solutions has been to close the CABs at night. There is light outside when it is dark but not inside. Also the CABs are surrounded by houses which improves the security. Men sometimes stand in groups outside and sometimes they are smoking sugar inside the CABs. This creates a sense of insecurity and has not been effectively addressed. Furthermore, there is a lack of privacy due to a door missing and the male and female CAB facing each other. This has led to shameful situations and the toilet which misses a door not being used.

Groups of men make them unsafe
Taprim: It's scary though because you find "paras" there, those who smoke sugar. They'd stand and be a group of people and you are inside but you can't undress or bath freely because there's a group of men standing outside.

Lack of privacy – door missing
Madam: I will refer to the showers here at the bottom. It's opposite to the males and it does not have a door sometimes when both you and the males walk out, you wonder if he saw you or not when you were lifting your underwear you know. The people living here are the ones who are ashamed. There's a toilet that does not have a door period. Madam but we don't use it at all here at the bottom. I think its two. Even in the males, I think they even decided to put in a curtain but then now there's one toilet this side, you have to wait

No lighting inside the CAB
Ward councillor: No I don't think so [that CABs are safe for women and children] I think there should be lights installed inside the CABs

Caretaker: It's safe because there houses next to CABs and if one screams for help in the morning neighbours are quick to come out and assist. There is light at night and in the morning and I'm not even scared to go clean the CABs in the morning when the sun is about to come out.

2. *Outcomes*

Do intended end-users, differentiated by demographics, use the CAB facilities?

CABs are used by everyone in the community, at least for water or toilets. People are overall very content with the facilities.

How are CAB facilities being used and/or are end-users still using alternative locations?

At night people still use alternatives because CABs are closed. All female note using the bucket at the home (especially for children) and clean it the next day although some appear to throw it anywhere. When they find the CAB closed they also tend to go behind the CAB to relieve. Other people who live there find this problematic. Male apparently do not use the bucket, but noted using private pit latrines (of neighbors) or go anywhere outside. Some people also shower at home because they find the water too cold at the CABs.

People go behind the CAB at night
Madam: At night when we find that the showers are closed we go around Showers and do our business behind there but make sure that no one sees us and then we leave.
Taprim: You see this is the problem people because behind the showers it's my house. You use a plastic and then just throw it on someone's roof.

Most women use the bucket at night
Taprim: We close the buckets until the morning when they open the showers so we can throw in there
Nkunzi: What I normally see other people doing even though I haven't done it myself. I see people spilling a bucket with the remains, meaning they do their business in the house and then throw it outside.
Lala: Like that is allowed that when it's a child, you can use a bucket and then ask that to spill, wash your bucket and come back with it as opposed to making the area dirty.

A few people still use pit latrine at night
Health worker: A few [still use private pit latrines] and we have educated them and tried to discourage them to use them but this is only used at night
Because they can't walk to the CABS at night for issues of safety and the CAB also closes at night. It is a serious concern and causes germs and bacteria

How long does it take to go to the water point, get water, and come back?

People feel like an additional tap or water point is needed because the distance to the CAB is far for some households (see section on impact fetching water).

To what extent are the CABs used properly and kept clean?

There are serious issues around the behavior of users and CABs are dirtied by most users. The fact that there is a caretaker makes people more careless, sometimes even purposefully, because the caretaker is paid for cleaning it. At the same time people recognize this as an issue. Children are left unattended and dirty the facilities. People use defect facilities, use materials other than toilet paper regularly, and leave food waste when washing dishes, thereby blocking the drainage. Some religious people use plastic cans to wash themselves and leave these lying around. Trash is left outside the CABs. People value the work of the caretaker very much, as she cleans daily, but they recognize that it is not possible for her to keep them clean all the time. Vandalism has been an issue and many parts have been stolen from the CABs in the past. For this reason the materials were replaced with plastic ones.

Uncleanliness due to users
R: The showers are being cleaned but another thing our children go to the toilet and when they get there they do their own thing, they don't flush or stand up on the toilet seat while doing their business. When you go there, you'll think the cleaning lady isn't doing her job but it's the children's fault. Someone sends a child on their own; they don't check what their children do in the toilets. We as parents should accompany our children, check what they get up to because when I enter and find that it's not clean, I'll start swearing only to find that it's the child. The lady cleaned, the child got here and didn't flush. It's us who mess up that place we cannot blame the cleaners.

Taprim: Oh God the lady that cleans there she tries with all her might but the problem is us the people living here. We are dirty, I won't they are but we are. She'll clean now
Taprim: So when someone leaves their remains without flushing how do they think? These people just become this way because the cleaning lady is paid to clean after them. That's wrong.

Littering and leakage
Welcome: Then let's get to the ones using water bottles, those people are wrong. Yes it's right that they use them but it's wrong that they leave them in the toilets because we do have Muslims who don't use toilet paper.
Welcome: So the problem is that they dumb the bottles inside and then the place gets packed with bottles. We cannot dispute their religion that they use water.

Caretaker: There is mud around the CABs because there are taps and toilets that are leaking.
Every day at night people come to wash their dirty dishes and throw food around the CABs and in the drain as result drains are blocked.

Vandalism
Welcome: Then when I go to the communal one because they are closed at night, people get there and steal the taps and then they've installed the plastic ones because these people steal them and sell them at the scrap yard to buy their Wonga that they smoke. They even take shower and toilet doors. If thirty minutes could go past without any movement in and out of the toilets, you'll find something missing.

Observations: Observations showed that there was a pool of water in and around the CABs and that there were a lot of flies around the CAB because of dumping. Inside the CABs no bins were provided either.

Availability of toilet paper

Previously paper was left in the toilets but it would then be taken by users or get spread around the CAB floor. There is now less toilet paper provided but it is still received by the caretaker most months. She distributes it amongst users, either by going by their places or by handing it when users come to here. It is only sufficient to last a few weeks. People use newspapers but also clothing or any other materials. This is left for the caretaker to

clean or causes blockage. While some people bring their own toilet paper, the expectation is that this is supplied.

Toilet paper no longer provided
Welcome: Okay, I will start with the tissue paper, my brothers are telling the truth that it's a problem. When the toilets started, there was a way that the toilet papers were rolled and placed in a box so that people coming in can just take what they need, use it and leave. But then people started taking toilet paper to use in the toilet and when they are done, take some more to keep at their homes. And then some when they find nothing there they would complain and the end they stopped putting toilet paper. Some now just give people using the toilets a roll.
Caretaker: Last month we were not provided with toilet paper and it's only this month that we were provided with two packets. One packet contains 24 toilet papers if I'm not mistaken and they last for a week. We are also provide with five litter of cleaning soap, gloves, big and small broom and wiping cloth

Observations: Observations showed that there was no toilet paper in the CAB.

Maintenance

The community has good experience with maintenance. After complaints have been issued on blockage it normally takes around three days for repairs to be made. There was one instance where the sewage was blocked at the bottom of the CAB and it took much longer. Some issues such as small broken materials or leakages and bursts are not repaired or take longer.

Does not take long
Mike: They break and they are fixed, they don't stay long not working.

Community fix things
Caretaker: Yes they do, there was a problem at the male's CAB where two toilet door fell down and reported to the municipal and didn't respond quickly and the community organised money and repaired the doors by themselves. They do voice complaints to me and even take initiative to repair some of the problems themselves if the municipality don't address them quickly. They do that because they don't want the CAB to close due to defects, they even unblock drains were possible. EWS does but there are challenges sometimes leaks and bursts take long to be repaired

How is consumer education and communication effectuated and what are the results?

Some briefing took place after the facilities had been opened but most people had not been involved. According to local health staff, while EWS did not provide training on health and hygiene, this is being done by the local health staff.

Briefing took place
Welcome: But the community was briefed with regards to the plans, they were able to ask questions on how they would get water and it was explained that there will be taps and sinks.
Training by health
Health staff: EWS didn't give out any information so we as the leadership took it upon ourselves to educate the community about proper use of the CABs so that it can benefit their health and we are still continuing to educate the community.

What is the effect of CABs on migration and settlement?

There seems to be no effect on migration and settlement. The same people we're seen before and after the installation of the CABS

What is the effect of CABs on official development planning?

The community leadership notes that electricity is being provided to the community. From the interview with a councillor, it appears the municipality is currently also working on pathways and steps to walk. These are welcomed by people.

What is the impact of the project on health?

There are several positive health effects. More people wash their hands although no one uses soap. Open defecation is no longer a common practice. Furthermore, because it is a wet area, people throwing their water away led to dirty water puddles around the public spaces. This is now being prevented. On the other hand the communal use of these facilities, and abuse of facilities by users (e.g. using blocked toilets and dirty floors) creates some health risks. The fact that people go outside the CAB when it is closed is another negative effect.

General health improvement
Caretaker: If it wasn't for the CAB children and adults in the community would be sick. There was bad smell in the community and people did their needs in the field but now since CABs were erected the area is clean.

Health worker: There is adequate ablution facilities, the CABS have had a direct result on this because remember they have proper flushing facilities all the times and they are sanitized, and that reduces bacteria and lowers the rate of diarrhoea.

Point: You can go inside the toilets it was a problem then for me to just go around my house and urinate. It ends up smelling

Negative
Communal use unhygienic
Ward councilor: Well I don't think so because not everybody that is using the CABs are using them in consideration that they Are being used by the whole community, some people are not flushing after using the toilet, some are urinating on The floor, some users even go to an extend of using the toilets even if its blocked t so that on its own can have a Negative impact on the health of other users.

Does the increased availability and in many cases proximity of facilities generates a time saving component?

The CAB provides some time saving to most users. Previously they also needed to go to the river and boil the water. Although for fetching water taps closer to the houses are preferred.

Time saving
Madam: We used to get water from the river, bring it back , boil it and wait for the water to cool only then can we use that water.

What is the impact of the project on economic benefits?

No impact is reported.

Which other effects can be attributed to the project, including environment effects?

Important improvements include better smelling settlement and lower safety risks than going to the field to relieve. From doing laundry the washing area would before be very wet and muddy affecting the community using the area. Now they have a designated laundry facility and the problem is solved. For people it has been mentioned to have increased their sense of dignity, as they feel acknowledged and their community being serviced. A negative effect is that people are littering around the CAB, although this might otherwise have been spread around the community.

Safety
Welcome: The urinating that happens at night because of the sudden number increase. But to us who have been here for a long time we can see the change. Because it used to be a bush here and people would just do their business and we have females as well here, **now they are safe** from rape because then it used to be a bush and when they would need to relieve themselves this guy would follow them into the bush and they would find themselves raped. Even young children, we had to accompany them and wait for them to do their business

More dignity
Health staff: There has been a positive change and restoring of dignity because these people were using pit latrines and some of them were not even proper structure as they were covered by plastics.
Local CSO: Yes I do think so because we now have a lot of things that we did not have before so I do feel and I am sure the Community also feels that the government does recognize that there are people living in Manyaleni. [also refers to electricity, waste collection etc.]

Less water spreading
Local CSO: Yes you see when you are doing your washing/laundry it requires you to use a lot of water and we didn't have a designated area where we could discard the water after washing, so you would end up throwing it anywhere and that caused a lot of mud in the area and as a result it would be difficult to walk and the children would have no choice but to play in that mud as well, and the other thing was as you can see our shacks are clustered and sometimes you would find that the water would also run to other people's houses, so now we
Have a place to do the laundry in those CABs and avoid things like that.

Negative
Littering
R: People throw rubbish around the CAB and there was one person who threw rubbish and burned it on top of the water meter not knowing that the meter was there and the pipe burst.

4. Sustainability

What activities are undertaken to sustain results?

With regard to the plan for a supervisor of caretakers, the leadership warns for choosing a supervisor from the community and to be aware of the political affiliations, which might lead to conflicts between caretakers and supervisors.

Care with supervisor
I: EWS wants to introduce a supervisor for each caretaker. Do you think this will improve services?

Community leadership: R: If the supervisor would come from EWS site then that would improve services but if they supervisor were to come from the community of this settlement then it can be a problem because that person appointed as a supervisor maybe would have a long standing conflict with the caretaker and that would create tension.
I would love if the supervisor was to come from this settlement solely for job creation but practically it would be good if the supervisor is from EWS and that person would only come in to check and monitor

the CABs.
If a supervisor was to come from this settlement then service would be hampered because we belong to different political parties within the community and there would always be tensions.

How is society affected in terms of factors such as workers' rights?

The caretakers are provided with gloves and cleaning materials. The caretaker is concerned about not having been provided with closed boots while they are working with chemical cleaning materials. The materials affect the skin.

No safety boots
Caretaker: The only problem we are facing is that we are not provided with safety boot and we are using chemicals on the floor and it comes into contact with our feet hence our skin on our feet is peeling off. I've confronted my manager with this problem and again we don't correct sizes for our work overalls and ere still waiting for them.

How is society affected in terms of displacement and land acquisition

No displacements were reported. It appears the place of the CAB was still available for construction.

Policy of Human Settlement Unit - Perception of temporary nature of CABs

People's expectations are that the CABs are temporary and that they will only remain for a couple of years. They also recognize that the CABs could cause a problem if they should stay longer because they will be broken.

Temporal solution
Welcome: Welcome, yes it was a temporal thing when this was started because there's still a lot that we are expecting since this was said to be a temporal thing and we were promised to have houses erupted for us. What is down there is temporal, I don't want us to look at it in any other way but as a temporal solution because those will be broken soon. When you go to the restroom down there the concrete has cracked already.

Information sources

Interviews	
Brandon Pillay	Local health staff
Minenhle Ngwazi	Caretaker
Nomfundo Ngidi	Local CSO
Welcome Mofetiso	Community Leader
Zanele Makhanya	PR Councillor
FGDs	
Number of participants	13
Number of female/male	6/7
Duration	
Important notifications	Progressus had recruited 10 males hoping 6 or 8 would attend, but they dropped it at the last minute as they had to attend to other matters.
Observations	Male/female CABs, inside/outside CABs
Times:	05:30 AM-6:30 AM - 13:00 PM-14:00 PM – 18:00 PM-19:10 PM
Total number of users inside	Males: 36 (22 – 10 -4) Females: 25 (16 – 6 – 3)
Total number of users outside	Males: 43 (21 – 7 – 15) Females: 42 (16 – 12 – 14)
Important notification	CAB was cleaned between 18.00 and 18:30 and inside CAB was therefore closed, explaining the lower numbers of users (4 and 3).

G.3. Case Study Report: Canelands (SAN 3)

General info

Location	Caneland
Date / Day	16th of June 2017
Construction phase	SAN 3
Number of CABs in area	Several not too far from each other
Opening and closing time	6 to 9 during day open. Night and in weekend closed. (15 hours open)
Important notifications	In some instances people appeared to be shielding the caretakers or giving more socially acceptable answers. With interviews and observations this can be checked.

Summary

In Canelands multiple CABs have been spread. People can choose the one nearest. The CABs are open until the late evening. Queueing is not an issue for most users. Overall, people are very content. Improvements could include a (solar) geyser for warm water, bucket for women's sanitary pads. Small defects such as broken locks, taps and toilet handles are common. Once water is leaked it stands in puddles, so drainage is considered insufficient. CABs are closed during the weekend and evening, while the community wanted them to remain open. People even sabotaged the lock so it could not be locked.

Almost all people use the CABs. Even in the late evening and dark they will use them when opened. Otherwise they use buckets or pit latrines. For showering some people prefer to bath at home for disliking colt water. No toilet paper is available anymore (or very small quantities) and many people resort to other materials. There is also littering of soap plastics outside CABs. The cleaning lady does very well to keep it clean. Maintenance is done quite quickly.

The CAB has mostly had benefits. Mainly for the health of users. There is a real difference in the hand washing, which has increased, but soap is not common. There is according to some, less water pollution. An important argument is better safety as opposed to pit latrines where children could fall in and the bush where could be bit by a snake or assaulted.

Key findings

Output

- Because there are multiple CABs there is no queuing issue.
- The CABs are closed at night and during the weekends. This helps prevent crimes but also makes people use alternatives. People sabotaged the lock to use it at night.
- People were consulted but this has not had much influence on the decisions around the CAB

Outcome

- People sometimes still shower at home because it is too busy or water is too cold.
- No pit toilets are being used anymore.

Impact

- Area is now cleaner: There is no longer a bad smell in the area
- The settlement is close to firms and places of formal work, which explains high formal work.
- The community also received other basic services and appears to be recognized.

Sustainability

- CABs are considered permanent. There is support for a policy strategy which allows people to build their own house

Findings of case study

1. Implementation (output)

Does the number of facilities sufficiently meet the number of end-users?

The settlement has multiple CABs and this is considered by most to be sufficient, although it seems that they are full most of the time according to end-users, especially when people go to work. Everybody lives close to a CAB. When the first CABs were constructed (by the Department of Health) there were always queues, but it has improved with the new CABs. In the adjacent area at the hill top on the other side of Canelands there is no CAB which means people come all the way to the CABs in this settlement. When a CAB has no water or is not open people go to the CAB further up to see if it is open.

Other people need CAB
Leadership: Here the number of CABs are enough for the number of people but there is a need for them at the hill top that is on the other side of Canelands, there are no CABs there and people have to walk a distance to come here and utilise CABs here.

Community leadership: Initially there were toilets build by the Department of Health and there were always queues as a result they were continually blocking but since provision of these CABs people no longer have to queue for toilets.

Are the locations of the CABs and their design well-chosen?

Almost all people live close to a CAB and locations are therefore considered well-chosen. Also, the CABs make it possible for different people to use basins for laundry simultaneously. People have learned to take turns in doing laundry and therefore can use them at the same time. There tends to be no queues for toilets. If people queue, they queue for about four minutes for showering in the evening.

Queues not an issue

Caretaker: There are sometimes queues for people who came to do laundry but they in turn fetch water from the taps and put their basins down and continue with their laundry when there are other people using the basins. So doing laundry is not an issue. There are sometimes queues at the showers mostly in the evening but people don't wait for a long time, maybe they wait for about four minutes.

Observations: This is in line with the observations where no people were reported queuing outside.

Design

Overall the CABs meet the needs of people in terms of facilities. Some people do not use the showers because the water is cold in the winter. They bath at home instead. (Solar) Geysers are seen as solution for this problem, and users note that other town ships have these. Women mention that the CAB now has a bucket (placed by caretaker) to dispose of sanitary pads, but some people still try to flush them. They're also in need of hangers etc. There is no drainage on the outside ground around the CAB which leads to puddles when water is spilled.

Lack of geyser
Phindi: Because, it's cold now, it's winter so it's not easy to come and take shower because there is no hot water. Just like now it's not easy that you can see someone walking out of the showers in a towel. So, if they could at least provide us with solar geysers on top of those facilities it'd highly appreciated. Other townships has that already. But if we have those geysers at least they will attract us to use them because it is too cold.

Trashcan in women CAB
Phindi: You are not free because there are those who come to the facilities to change sanitary pads whereas that is not flushable. They try to flush it as many times as possible until it becomes pure white

clean as it is not flushable at all. However, there it bucket provided for us to throw those sanitary pads because of that reason. But some people still try to flush it.

Not sufficient drainage on outside floor
Bongs: ...that side next to our toilets is some water dam that I think can pose danger. I was thinking they should be drained because it's just stops there like wet land. I think it's water that people spill away after doing their washing. I was thinking that maybe there could be a way to direct it way to prevent it from causing mosquitos that could be harmful to people's lives.

Although there was no sufficient drainage, the observations reported no leakage of waste water or leakage from pipes.

Have end-users been involved?

The community and leadership did get involved with the municipality to request more CABs and to request they stay open at night. However, the municipality requested closing at night, indicating that there were incidences of vandalism and as a result it becomes costly to repair damages. People went as far as putting things inside the lock to prevent it from being closed.

Requested CABs to stay open at night
Community Leadership: When the CABs were handed over to the community we requested to EWS that they should not be closed at night but they indicated that there were incidences of vandalism of CABs at night as a result it becomes costly to repair damages.

Observations: The observations showed differently, it seems that CABs do not close at night, the CABs

How are insecure surroundings, unhealthy/unhygienic situations and vandalism prevented?

To prevent insecure situations the CAB is closed during the night and during the weekend when most disturbance can be expected. According to the end-users, this is mainly caused by *people* who get drunk during the weekend. While instances of assault have been noted by women, the proximity of the CAB to the shacks in the community allowed people to come to their aid in time.

Risk is not prevented – people deal with it
Thanda: I am forced... for example, if she experiences a challenge and forced to come to the toilets, I am forced to accompany her and wait for her at the door and thereafter we go back. It's that we are living in difficult times where crime is very high around for women and children. Although it doesn't mean I will have anything with me to protect her but at least my presence would disturb that person to commit his wrong acts on her. That's why I am then accompanying her and wait for her until she's done. It's a bit distance from my house although not that far because it can maybe be 150 metres.

Central location prevents crime
Zusi: I was once attached during the night at the showers. I went with someone and only to find that I had not locked my door, and the other person had locked hers. The guys came in and choked me, I then shouted and the other lady heard me and started shouting for help. People came to help.

2. *Outcomes*

Do intended end-users, differentiated by demographics, use the CAB facilities?

The CABs are used by all people living in the settlement.

How are CAB facilities being used and/or are end-users still using alternative locations?

(Almost) No pit toilets are being used anymore. When CABs are closed during the night and weekends people still use alternatives. However, even if CABs would be open some people would likely still not use them because of safety concerns. Especially the (chamber) bucket is seen as a safe method for women and children. Buckets are then cleaned during the day (at least by some people with soap). Other reasons to not use the toilets is that it is by some considered less hygienic. For bathing some people use a basin and dish at home because the water is too cold in winter or because they don't want to wait and are in a hurry.

Alternative still used
Health staff: Yes [people still use alternatives] because they don't like to use communal facilities and fear of contracting infections due to poor hygiene status. Safety issues particularly at night that is also affecting them negatively

CABs closed during night and weekend
Bongs: It happens that I bath in my house because sometimes it's full at the shower facilities, and you find that maybe I am in a hurry.

Alternative: Use bucket (Women and children)
Phindi: For myself I come to the toilets during the night because I ask my partner to accompany me. That's because I don't know what I could protect myself with if he's not around and something happens. But when I first arrived here I had a bucket with a lid because he was not around, and if I feel pressed during the night I can use it and come very early in the morning before people wake up, to clean it thoroughly with soap and take it back home. Then after he came here I stopped using it and woke him up if I am pressed.

Observations: The outside activity that was reported the most in observations was fetching of water (25/62).

How long does it take to go to the water point, get water, and come back?

It is not far for people and they can choose the CAB which is closest to them. There was a standpipe before which appears to have been removed. Access to water was thus not an issue.

To what extent are the CABs used properly and kept clean?

According to end-users, everybody uses the CABs for some purpose, at least to fetch water for drinking or cooking. According to the caretaker, people litter around the CABs and throw plastic soap wrappers (from soap used for laundry) away and leave newspaper inside the CABs. According to end-users, people make a mess, particularly the children, and the caretaker does a good job cleaning it up. Vandalism is not that prevalent although the caretaker notes that people have once sabotaged the lock to prevent it from being locked at night. The caretaker then put a new lock on and reported it and the municipality promised to replace the mechanism.

Vandalism – people wanted to use at night
Caretaker: They once inserted an object on the key slot so that we can't put in the key to lock the toilet so they can use the toilets at night but I did buy a lock and a chain to lock afterwards. We managed to take that object out but the municipality had already promised to order a new locking mechanism when we reported the incident to them.

Maintenance

While it does not take the municipality long to repair most defects. After these have been reported, cars from the municipality come by to see the damage. There are several smaller defects that have been there for a longer period, such as broken door locks and taps. The broken door locks and taps are caused by people who are careless, not just children but also elders, according to end-users. These do affect the experienced privacy

negatively. The caretaker is considered responsible for reporting issues and is not always updated on issues because people don't want to come across as criticizing her.

Observations: The observations showed that taps outside were broken and that people were using main water switch to open & close water, should the main switch brake there would be nothing to close the water.

How is consumer education and communication effectuated and what are the results?

Before the CABs were constructed, people were informed about how it would work, the location and about the caretaker. In another meeting they were informed about how to use the CAB.

Observations: There is no leaflet hanging inside the CAB (from observations).

Briefing took place
Thanda: Yes, mobile toilets. They said they will... The way they were addressing it, it was supposed to be a temporary thing and after that something proper would come about. But even now we thought that this is going to a temporary thing. Even during the day it was opened, and the keys were issued to people to be responsible for cleaning those toilets, another meeting was called to address us on how to use the toilets in order to work together with the caretakers.

3. *Impact*

What is the effect of CABs on migration and settlement?

According to the leadership, no significant migration took place and the people living in the area have been here before the CABs were constructed.

What is the effect of CABs on official development planning?

There is also electricity, waste collection and road construction in the settlement. The CABs are thus part of basic services being provided.

What is the impact of the project on health?

The health effects are positive. People more often wash their hands after toilet use but not with soap, although some people claim to use it when they get home but the health staff and some end-users confirms that people generally do not use it. This is different from when people went into the bush or just a pit toilet because they would not bring water to wash their hands. There is also less storing of water because CABs are nearby.

Observations: This is in line with the observations, people do wash their hands after toilet use but not with soap.

Does the increased availability and in many cases proximity of facilities generates a time saving component?

Because of the large number of CABs people take less time in queues and in distance they have to cross. With the first CABs it would take longer to get there but also in queueing.

What is the impact of the project on economic benefits?

One explanation for the extend of formal work is that the settlement is close to firms and the international airport. Therefore there are better chances for formal work.

Community leadership: Our area is close to firms and our international airport (King Shaka) is not settlement so chances of formal work are much greater.

Which other effects can be attributed to the project, including environment effects?

The main additional effect from the CABs is that there is less pollution in the area and the settlement smells better. It is not common now to walk by human faeces in the street. This has an effect on, health, dignity and quality of living. The ward councilor notes that water streams and the beach water are less polluted which has a huge effect on the environment. Furthermore the risk (especially for children) of falling in a pit toilet, no longer exist. On the other hand the fact that all people now use the same facilities is seen as less hygienic

Beter smelling area
Thonji: They helped us regarding hygiene because the place was always smelling bad and even when you were walking in the street you would be forced to cover your mouth and nose.

Negative
Lack of hygiene communal use
Thanda: I see that there is some spot on the seat because we are so many; but because we are forced because no one has his own house or shower but the showers belong to the entire community. If there could be some chemical you could use to sterilise the seat. Yes we do wipe the seat with a tissue before sitting on it especially when you find that there are some wet marks out of the person's sweat but still hygiene is compromised. On my side I don't think it's a right thing.

4. Sustainability

What activities are undertaken to sustain results?

The leadership commented on the proposal by the customer service officer from EWS to have supervisors for Caretakers. According to him, this could lead to conflicts if the work of the caretaker is wrongfully seen as insufficient just because people do not use the toilets well.

Leadership: It can create problems between the two, the supervisor would think that the caretaker is not doing her job thoroughly when monitoring or inspecting the CAB and only to find that the caretaker did really cleaned the CABs well but people. The caretaker would have cleaned the CAB and just minutes later people create mess.

How is society affected in terms of factors such as workers' rights?

This has not been commented on.

How is society affected in terms of displacement and land acquisition

The leadership notes that the shacks of some people had to be moved and they were unhappy at first but understood it after being explained that this was in the best interest of the whole community.

Policy of Human Settlement Unit - Perception of temporary nature of CABs

People expect that the facilities are not really temporary because they have heard nothing about what will happen after the CABs. At the same time they have not started building their own houses, because they have no certainty that they can stay. There is support, from the ward councilor and implicitly with end-users, for the policy strategy to approve of people to build their own accommodation.

No Temporal solution - fixed
Thanda: *[laughter]* The way I view it, I don't see it a temporary thing anymore because nothing points that we will ever be moved from this area of Canelands. That's how I see it, that it's no longer a temporary measure.

Bongs: I also think they are permanent because since they were erected here, we were never told what

the next step is after these shower system project. Hence I am saying they are permanent.

Reason people not building
Thanda: It's a problem during raining season because our shack leak, we end up not being able to sleep. You see? (Okay). When you try to build a proper structure, the Human Settlement Unit comes and demolish it. If you can take a clear look around, no one has a brick structure here. (**Yes**). That is not because we do not have the ability to do that, but it's because we are just staying here but there are allegations that it's not proclaimed.

Ward councilor: If we carry on with our housing policy...there will be no improvement. In fact we are losing ground. We have to scrap giving away RDP homes. This is economically unsustainable. We need to let people build their own homes WITH official backing. More ideas, but too much for your survey

Availability of toilet paper

There is no or very little toilet paper provided since recently. Many people buy their own paper although poor people are not able to buy it and use newspaper instead. Other materials, even plastic or cardboard, have also been reported to be used. There are also materials being used which have an even larger chance of causing blockage such as card board.

Toilet paper no longer provided
Thanda: They are truly always clean. The only challenge is that in the beginning they were providing us with toilet paper but recently people use whatever they have, even plastic. And that will eventually cause blockage. The delivery of tissue paper is no longer taking place but the ladies do an awesome job in keeping them clean. Others bring newspaper and others to the extreme of cardboard. Those material are difficult or impossible to be flushed. That what the challenge is.

Observations: This is in line with the observations where there was no toilet paper seen at any times.

Information sources

Interviews	
Geoff D A Pullan	Ward Councillor
Fana Duma	Community leader
Phumelele Mdetshe	Caretaker
FGDs	
Number of participants	10
Number of female/male	7/3
Duration	
Important notifications	Progressus had recruited 10 males hoping 6 or 8 would attend but they since dropped us at the last minute as they had to attend to other matters.
Observations	Male/female CABs, inside/outside CABs
Times	05:40 AM-6:40 AM - 13:40 PM-14:00 PM – 17:30 PM-18:37 PM
Total number of users inside	Males: 38 (18 – 6 – 14) Females: 23 (8 – 1 – 14)
Total number of users outside	Males: 45 (17 - 8 – 20) Females: 17 (8 – 4 (3 children) – 5)