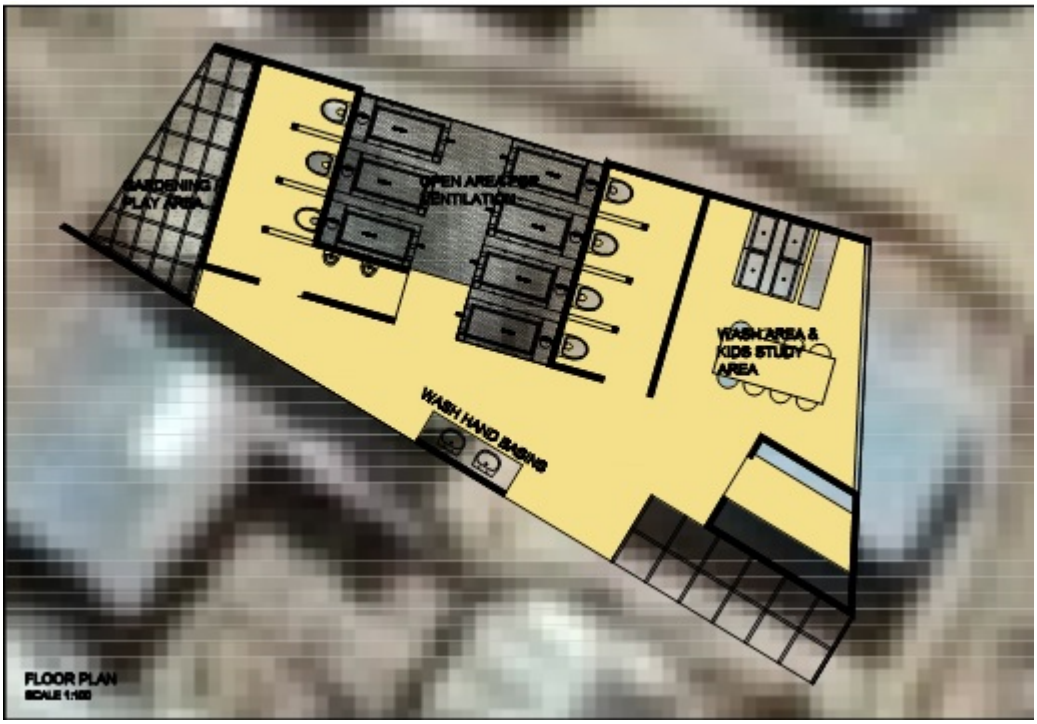
Proposal for the Zwelitsha Dry WaSH Facility



Conducted by the WPI WaSH Team, 2013
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Section 1: Zwelitsha Facility Proposal Summary

Needs Statement

An estimated 10 million South African citizens suffer from a lack of water supply and basic sanitation. Before 1994, about half of the people living in South Africa lacked proper health and sanitation facilities. Beginning with the new constitution in 1997, which states that access to basic health and sanitation is a human right, legislation began regulating the requirements for basic water and sanitation. Local governments and municipalities have been working hard in the last fifteen years to effect change in communities. Unfortunately, there are still many informal settlement communities that lack water and sanitation provisions.

The current conditions in Langrug are an indication of the long process required to meet these basic needs. Zwelitsha, one of three sub-regions of Langrug, is home to about 600 people without toilets, water supply, or a proper sewer system. Zwelitsha sits on the slope of a mountain and residents have been using the bush in replacement of a toilet facility. Community members have expressed fear of open defecation on the mountain due to the abundance of snakes, a risk of direct exposure to pathogens, unpleasant odours, disease-transmitting agents, toxic stormwater run-off, and personal indignity.

The Municipality of Stellenbosch approached this issue by providing 6 chemical toilets to the community, allocating R960/month per toilet, for an annualized cost of R70,000, and a toilet-to-person ratio of about 1:80. Zwelitsha members rejected and vandalized the chemical toilets because they were not maintained frequently and properly. Consequently, the chemical toilets were removed. Since then, Zwelitsha residents have had no choice but to continue using the bush or walking to the nearest facility, located in E block. These deficits are but an extreme example of the urgent public health crisis faced by many people and governments across the country.

Opportunity Statement

Since 2011, Langrug residents, the Municipality, CORC/SDI, and WPI have been working on an innovative “WaSH Upgrading Programme.” WaSH-UP is a multi-partnership effort to create and sustain a multipurpose facility in which the community would take responsibility and ownership. The multi-partnership is internationally recognized for Informal Settlement Upgrading leadership. In 2012, the WaSH-UP team built a Mandela Park WaSH-UP facility, which demonstrates that effective WaSH centres strike a balance of environmental, social, economic, and institutional sustainability and meet WaSH-UP principles mentioned below. The multiple partners drew lessons from the Mandela Park WaSH-UP facility to help foster the development and expansion of WaSH programmes in the new facility of Zwelitsha.

Community members of Langrug approached the 2013 WPI student WaSH-UP team in November with an opportunity to improve water and sanitation conditions in Zwelitsha.

A dry sanitation facility could serve the needs of the Zwelitsha community members, several of whom have traveled with WPI to see a dry sanitation facility at Signal Hill, similar to the one we are proposing, and have indicated the Zwelitsha community strongly supports such toilets in Zwelitsha.

With the working partnership between several stakeholders, we are proposing to pay for a new WaSH-UP facility in Zwelitsha at no cost to the Municipality. This facility, with dry sanitation, will have a lower operational cost than the Municipality's previous implementation of chemical toilets. The partnership proposes to provide a Zwelitsha WaSH-UP facility with water, washing services, caretakers and social spaces such as a gardening area and children development area for the community. The facility will have 7 toilets and 2 urinals, for an annual maintenance cost of R139,220.

This proposal outlines a potential design of a new facility including a developing social programme, built facility, a plan created for operation, and identifies important elements to both the design and programmes for the centre. This is an evolving facility proposal with a lot of momentum and commitment from stakeholders that has not yet been finalised and further discussion on elements of the facility, its operations, and its programmes is ongoing.

Facility Overview

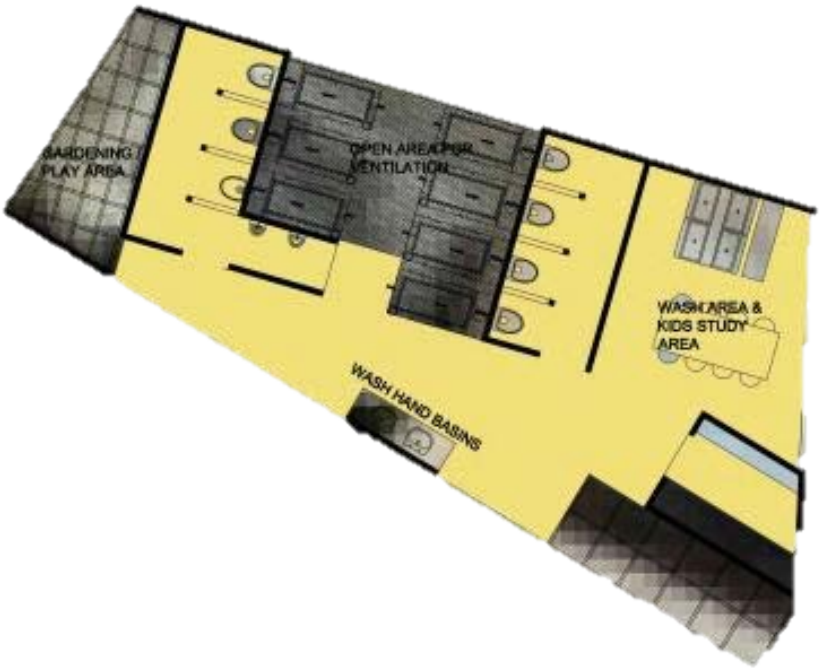

Figure 1 WaSHUP Facility layout, including 7 toilets, 2 urinals, hand washing sinks, laundry basins, play area for children, and an innovation area for children. A second story community "Innovation Centre" has also been proposed.

Figure 1 shows the layout of the new WaSHUP facility. The community was consulted throughout an initial design process, and the team of co-researchers from Zwelitsha has given their approval to this draft. The toilets used in this facility will be dry, which means water or a sewer system will not be used for the disposal of waste. Enviro Loo, a toilet company, manufactures such dry sanitation and has been engaged to use their units in this facility. In addition to the ablutions, the facility will serve as a social space for the community. The design incorporates a children play area and a garden. A caretaker's office will be stationed at the front entrance of the facility for caretakers to keep supplies and sell health products, as community health and hygiene outreach and they will be trained.

Partnership Roles and Responsibilities for Facility Development

The involvement of multiple partners in the implementation of this facility will ensure a balanced division of responsibility. WPI proposes the following roles and responsibilities and invites all partners to converse and seek consensus on the way forward.
The Langrug community will be responsible for reporting any issues to CORC and the municipality, and for upholding the social environment of the facility. CORC will assist in the communication between the Zwelitsha facility and the Municipality and overall project insight. TTEL will work with all parties to reach consensus on major decisions, and improve the design process. Enviro Loo will be responsible for design, construction, and conducting periodic check-ins on the facility to make sure the dry sanitation technology is operating properly. Together, these stakeholders will work together to support the facility's operation and sustainability. These roles and responsibility are still in discussion, but are presently as follows:

- The Zwelitsha Z-Team (Community Representatives)
  The Z-Team oversees project development and participation of community in facility design and operations. The team will engage with multiple stakeholders about all aspects of the project, including design, construction, and operations. Also, the Z-Team will develop community programme ideas to continue to improve community structure.
- Community Organization Resource Centre (CORC)
  Two CORC representatives will serve as a Technical Director and a WaSH-UP Coordinator (WUC) to oversee overall project development and financial schemes. These positions will also facilitate communication between stakeholders.
- Touching the Earth Lightly (TTEL):
  Touching the Earth Lightly (TTEL) will help facilitate community-based design process for most aspects of facility development. TTEL will also work closely with all parties to reach consensus on all such facility design plans, and then serve as Construction Manager in partnership with, and mentoring of, the Local Project Manager, below.
- Local Project Manager (Community Member):
  A community member will act as a Local Project Manager to participate in all phases of project design and construction in close collaboration with TTEL and WUC.
- Construction Laborers (community members):

Construction workers will work to meet their tasks efficiently and report to Project Manager.

- Caretakers:
  Caretakers will maintain a clean and welcoming facility. They will work closely with WUC to report any issues and set up a duty roster and facility cleaning schedule.
- Enviro Loo:
  In collaboration with all partners, Enviro Loo will design the sanitation system and install system components under agreed upon conditions. Enviro Loo will also help with the implementation of the facility by leading public education about dry sanitation and conduct monthly check-ins to dispose the waste.
- Worcester Polytechnic Institute:
  WPI will help envision and build the long-term CORC-WPI WaSH Innovation Program with operational management plans. WPI will also fund the project and contribute to all phases of project development except construction.
- Municipality of Stellenbosch:
  Even if not a formal partner, we should specify for internal understanding how we plan to work with them.

WaSH UP Principles

The success and longevity of a WaSH-UP Programme is based on 6 core principles:

1. **Community Has Responsibility and Ownership**
   a. Community-Driven Solutions: When designing a communal toilet facility, it is essential for community involvement. A top-down government implemented approach to water and sanitation will not succeed because the facility must fit the specific needs of a community, and as one size does not fit all, it is best for the community to have a say in the design and implementation of their own facility.
   b. Community-Driven Operation: The community is responsible for the operations and maintenance of the facility. The people hired as caretakers come from the community but the entire community is responsible for maintaining the condition of the facility.
   c. Creation of Livelihood: The community's involvement in the operation of the facility allows for job creation as community members are hired as caretakers, and security guards.
2. **Full-Service Facility Meets WaSH Needs**
   It is important that the facility is not simply an ablution block, but a centre that has all of the basic water and sanitation needs of the community. Where there are toilets, there should also be water taps, hand washing sinks, and laundry basins.
3. **Public Health Programme**
   A WaSH facility could be used as a centre for public health education as it pertains so heavily to water, sanitation and hygiene. Caretakers can facilitate the spread of public health knowledge through workshops.
4. **Multi-purpose Facility Increases Usability**
   Multi-purpose use of the facility is an element that increases usability of the centre. As people have more than one reason to come to the facility, whether that is to use

the toilet, clean laundry, or fetch water, they are able to become comfortable with it and are more likely to embrace it as part of their community.

5. **Multi-partner Involvement**
   Multi-partner involvement is an important element to the design, construction, and operation of a new WaSH facility. The commitment of several parties will help to see the construction to completion, and check in on the operations of the facility once construction is complete. Involvement must be consistent with all partners' core values and commitments.
6. **Management Facilitates Maintenance and Fosters Program Development**
   It is important that caretakers be hired from the community to clean and maintain the facility. It is also important to have a WaSH-UP Coordinator to make decisions when needed, report to CORC any issues, and to strategize the best operational budget.

Vision and Operational Plan

The current WaSH facility was designed, constructed, and is managed by the Langrug partnership. The partnership has shaped the WaSH facility to meet the needs and wants of the Langrug community, and create a learning environment for developing new approaches to meeting the water, sanitation, and hygiene needs of communities. One of the key components of the facility's success is its operational procedures, mainly by the caretakers.

- **Cleaning and Maintenance**:
  Caretakers are responsible for daily cleaning of the facility. This includes cleaning the wash areas, toilets, and floors. Caretakers will do a thorough cleaning routine once a day. Caretakers are also responsible for reporting any issues or damages in the facility to the Community Leaders.
- **Health Training:**
  Caretakers will be health trained by the health professional. If the caretakers learn about hand washing and other hygiene practices, they can serve as educators in the community on health and wellness. They could potentially hold separate workshops for adults and children to promote public hygiene practices.
- **Health and Hygiene Product Sales**:
  The facility will offer health products for sale such as soap, diapers, health products, cosmetics, bandages, and other related products that community members have already suggested. This will improve the convenience of the facility as well as provide income for the facility, thus improving social and economic sustainability. The caretakers will sell these products in the booth by the entrance of the facility that also serves as the caretakers' office.
- **Money collection:**
  A money collection system is necessary for the health shop sales. There will be a record keeping book for the service, along with a money box. Caretakers will be able to keep track of the facility's income that could fund the facility's utility bills and other expenses

Schedule

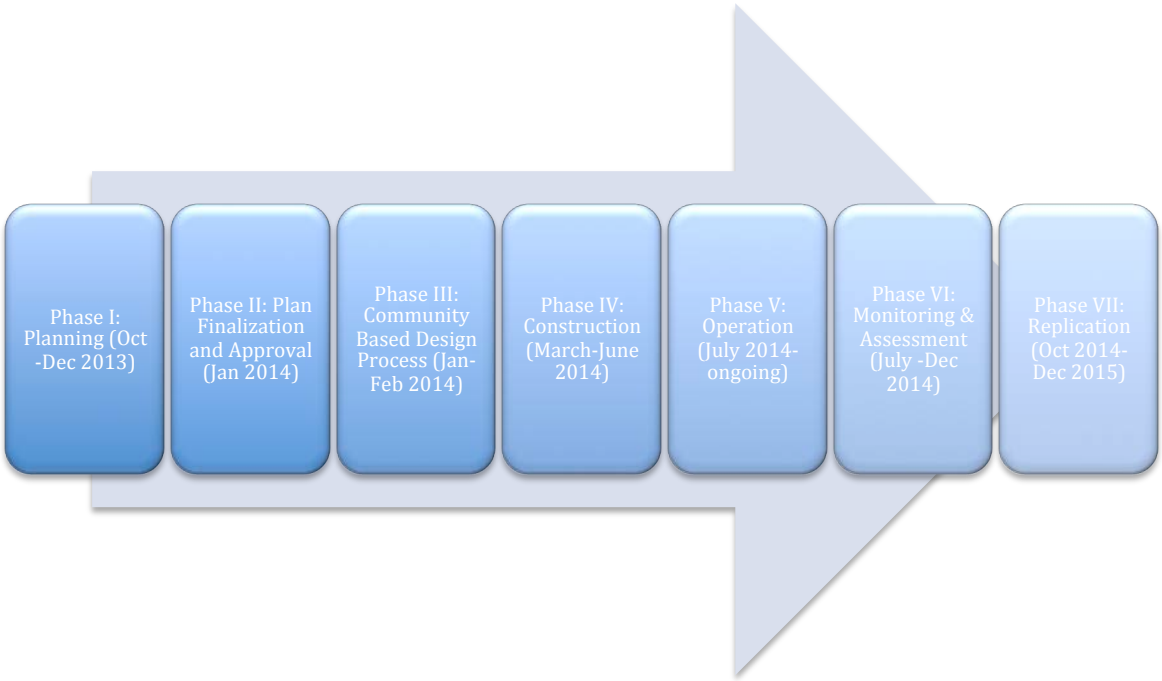

Figure 2: Phases of creating the Zwelitsha Facility with estimated dates, from planning phase to replication phase.

Section 2: Description of Facility

2.1: Layout of Facility

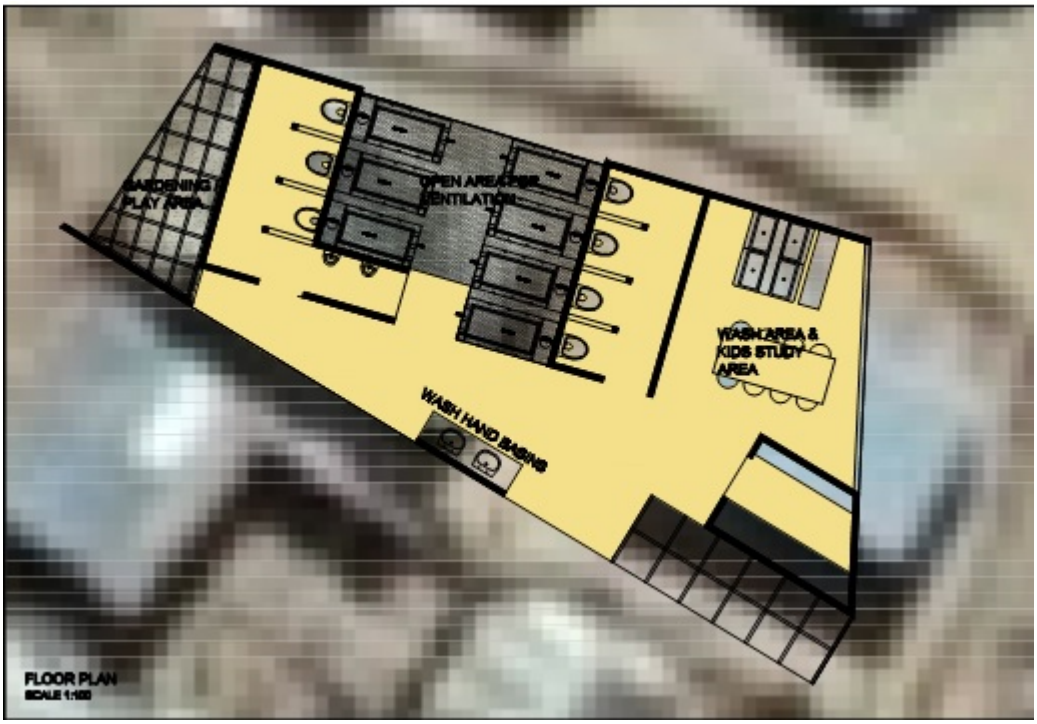

Figure 1 shows the proposed layout for the dry sanitation facility. The community was consulted throughout the design process, and the team of co-researchers from Zwelitsha has given their approval to this final draft. The facility will contain seven toilets, two urinals, two hand washing sinks, four laundry basins, and a water tap outside. The facility will be open to the public on two sides.
The toilets used in this facility will be dry. That is, water or a sewer system will not be used for the disposal of waste. A company called Enviro Loo manufactures such toilets and has been engaged to use their units in this facility. Ideally, the solid and liquid waste will be diverted from one another so that they could separately be used for composting. Dehydration of the solid waste reduces its mass and sanitizes the waste to make it suitable for composting use. Urine would ideally sit stagnant for thirty days, with some of it possibly evaporating, while the remainder becomes sterile and suitable for either composting or for drainage into a soakaway. The section behind the toilets will be enclosed for access to the stored waste.

A caretaker's office will be stationed at the front entrance of the facility. In addition to storing basic cleaning supplies, this office will serve as a miniature storefront for the sale of basic health items. (See section 5.2)
In addition to the ablutions, the facility will serve as a social space for the community. Parents often bring their children with them while they are doing laundry. Because of

this, the community expressed a desire to have a children's area near the laundry basins. This design incorporates a children's table where youths can entertain themselves by drawing or coloring with materials supplied at the caretaker store. There is also an open space in the back of the facility, which could be used as a garden or play area.

Section 3: Structural Subsystems Planning Notes

3.1 Site Work

Key considerations (challenges, issues, etc):

- Winter brings heavy rains to the area
- Site soil is rocky to a depth of approximately 0.5 m, with hardpan clay beneath.
- The site and surrounding area is on a slope
- A road runs along the north and eastern sides of the area
- There are several shacks in close proximity to the work site
- Enviro Loo utilises a drop of several meters into a drying tank
- Tank(s) must be several cubic meters to accommodate the entirety of the Zwelitsha community. The land must be dug out to accommodate those tanks

Possible Solutions/Options:

- Work will be conducted during the summer
- Site will be leveled to lay foundation.
- Access for delivery will be easy

Main contact person/Company contact info:

- Trevor and Alfred have much construction experience in Langrug.

3.2 Storm Water Management

Key considerations (challenges, issues, etc):

- Winter brings heavy rains to the area
- The facility and surrounding area is on a slope
- Existing grey water channel is 15 meters away from facility

Possible Solutions/Options:

- Add to existing grey water channel to bring all the way up to facility
- Must be able to handle the large volume of water present in the winter
- May integrate waste water system
- Water Catchment
    - Use gutter system to collect water running off facility into rainwater collection barrel.
    - Collected water reused
        - Garden water
        - Cleaning water
        - Laundry water
        - Soak away

Required Materials:

- Plumbing
- Gutters
- Catchment Barrels

Main contact person/Company contact info:
Aron of Ubuntu Plumbing 084 6087771

3.3 Waste Water Management

Key considerations (challenges, issues, etc):

- No existing infrastructure that provides water into this section of Zwelitsha.
- No sewer to move water out of Zwelitsha
- The nearest grey water channel is 15 meters away
- Two types of waste water generated by facility
    - Hand washing water, low in chemicals
    - Laundry water, high in chemicals
- Waste Water low in chemicals could be reused for gardening

Possible Solutions/Options:

- Hand washing water
    - Catchment barrel
    - Garden water
    - Soak away
    - Cleaning water
- Laundry Water
    - Catchment system
    - Soak away
    - Cleaning water

Required Materials

- Plumbing
    - Pipes
    - Fixtures
- Catchment Barrels

Main contact person/Company contact info:

Aron of Ubunto Plumbing 084 6087771

3.4 Foundation

Key considerations (challenges, issues, etc):

- The site is not currently level
- Dry sanitation will require holding tanks entrenched below the foundation
-

Possible Solutions/Options:

- Elevation measurements taken by community
- Foundation elevation will be at approximately the median elevation
- Small retaining wall may be required

Required Materials:

- Cement
- Crushed stone
- Sand
- Brick (for edges of foundation and holding tank)

This manual provides the site specification for the Enviro Loo unit.

http://www.enviro-loo.com/pdf/INDUSTRIAL1040%20Manual.pdf

Main contact person/Company contact info:
Trevor, Alfred and Siya are experienced in laying foundations.
Enviro Loo technical staff know the necessary specifications for dry sanition
Shaun Andreasen – local Enviro Loo representative
shaun@streetyze.co.za, 083 675 1881
Mark and Garry – Enviro Loo technical directors
garrymac@vodamail.co.za
mark@eloo.co.za

3.5 Walls and Roof

Key considerations (challenges, issues, etc):

- Common exterior materials for informal settlement are timber and corrugated zinc
- Informal settlements are prone to spreading fires.
- Current WaSH facility uses wood for interior aesthetics
- Current WaSH facility uses a half brick wall and steel bars for part of the exterior
- During summer, enclosed structures become very warm
- The settlement gets much rain during winter

Possible Solutions/Options:

- Fireproof materials (corrugated zinc, brick, etc)
- Wood for framework
- Corrugated Zinc for exterior and roof
    - Lends itself for rainwater collection
    - Tight fitting for waterproofing

Required materials:

- Wood
- Corrugated Zinc
- Brick
- Steel bars (If doing half wall)

Main contact person/Company contact info:
Trevor and CORC, Olwethu

3.6 Plumbing

Key considerations (challenges, issues, etc):

- Once clean water is delivered to the facility, connection will need to be made to sinks and laundry basins
- Hot water not necessary for hand or laundry washing
- Water tap on outside of facility for bucket filling
    - Foot pedal operated would reduce spread of germs
        - May not be necessary with hand-washing sinks inside facility
        - Foot pedal taps need re-designing based on failures of past efforts
    - Metal tap heads and knobs are at risk for theft
    - A plastic tube without a head is used at the current wash facility
        - It is not at risk for theft, and direction of flow is able to be controlled
        - It is at risk for breaking
- Current WaSH facility has plumbing embedded into the concrete to prevent theft or vandalism
    - In the event of plumbing breakage, would be difficult to fix
    - Aron (the plumber) does not view pipe failure as a concern, as long as there is an access point for cleaning out pipes

Possible Solutions/Options:

- Connections from water source to sinks and laundry basins
- Water tap Options
    - Foot pedal operated
    - Plastic spout and handle
    - Plastic tube
- Plumbing Options
    - Fully embedded in concrete
    - Partially or not embedded in concrete

Required materials:

- PVC Pipe
- Plastic tubing
- Plastic knob (for water tap)
- Plastic water spout(?)
- 2 hand-washing sinks and necessary plumbing
- 4 laundry basins and necessary plumbing
- Tools and joints necessary for plumbing installation

Main contact person/Company contact info:
Aron of Ubuntu Plumbing 084 6087771

3.7 Toilets – Enviro Loo

Key considerations (challenges, issues, etc):

- Enviro Loo is a dry sanitation toilet system
- Separates solid and liquid waste in a holding tank
- Uses a turbine to ventilate the tank
- Optimal location is in a windy area with the holding tank facing the sun for optimal dehydration
- Urine is evaporated as much as possible
- Dry, sanitary waste ideally used for composting, though Enviro Loo is not a composting toilet
- Requires regular maintenance
    - Rake waste for even dehydrating
    - Empty once or year or when full
- Largest commercial units designed for 40 daily users, or 120 uses/day/toilet

Possible Solutions/Options:

- Incorporate the toilets in the design so that the majority of holding tanks face North
- Enviro Loo will provide input throughout the construction process
- Enviro Loo will educate community members on proper maintenance of toilets

Brief description of service and/or product (prices):
R10000/toilet unit
R8000/urinal unit
R5000/unit for installation

Main contact person/Company contact info:
Shaun Andreasen – local Enviro Loo representative
shaun@streetyze.co.za, 083 675 1881
Mark and Garry – Enviro Loo technical directors
garrymac@vodamail.co.za
mark@eloo.co.za

http://www.enviro-loo.com/pdf/INDUSTRIAL1040%20Manual.pdf

3.8 Solid and Liquid Waste

Key considerations (challenges, issues, etc):

- Quantity of waste
  - An average adult produces about 0.14 kg of feces per day, and 0.8 to 1.5 L of urine per day
  - Maximum number of users, 500 people/day
  - Plan for 70 kg of solid waste and 750 L of urine per day
  - Solid waste minimizes in size when dehydrated
  - Dehydration system will reduce volume
  - Portion of urine may evaporate

- Treatment of waste
  - Dehydration of solid waste reduces harmful bacteria
    - Urine sitting stagnant for 30 days become safe to use as a fertilizer for vegetation for human consumption.

http://wp.wpi.edu/capetown/homepage/projects/p2009/water-sanitation/key-design-elements-of-sanitation-facility/toilets/

Possible Solutions/Options [provide links if needed]:

- Dried compost can be sold for profit
  - Will take time to establish maintenance system and buyers
  - Buyers:
    - local gardeners
    - David (Batho's Place) may have some contacts
    - Shaun from Enviro Loo may have contacts

  - If using properly functioning Enviro Loo:
    - The toilet unit will dehydrate the solid waste
    - Waste will only have to be removed once a year
    - Urine will separate in collection tank
    - Soak away pipe prevents urine tank from over filling
    - Soak away Requirements
      - Cannot be used when ground is saturated
      - Cannot soak away towards shacks
      - Must be deep enough under ground for urine to not reach surface.

Required materials:

- Urine system
  - Pipes
  - Holding tanks
- Dry system
  - Brick
  - Toilets

- container lids
- ventilation shafts
- turbine

Main contact person/Company contact info:

Shaun Andreasen- Enviro Loo
Garry McKenna- Enviro Loo
Mark La Trobe- Enviro Loo

3.9 Clean Water

Key considerations (challenges, issues, etc):

- There are currently no clean water pipes that come near the site.
- The closest water taps are 85 m and 110 m away.
- The tap that is 110 m is uphill of the new facility site. This would be an ideal location to tap into the water supply.
- Water pressure at this tap is less than ideal. Whether the pressure of this water downhill will be sufficient needs to be determined.

Possible Solutions/Options:

- A connection to the water supply will need to be installed
- Pipes will have to be laid between the supply and the new facility site

Brief description of service and/or product (prices):

- Piping necessary (Price TBD), 110 m
- Connection equipment
- Tools for laying pipes

Main contact person/Company contact info:

- Aron of Ubuntu Plumbing
- Municipality has information on the nearby water systems
- Trevor and Alfred, community leaders

3.10 Stall Systems

Key considerations (challenges, issues, etc):

- Separate toilets for women and men.
- Materials should be cost effective, and facility should be modular so it can be replicated in other places.
- Private stalls.
- If stalls are fully closed off from facility then they will need individual lighting
    - To save on lighting, stalls should not span from floor to ceiling.

Possible Solutions/Options [provide links if needed]:

- Pre-made toilet partitions
    - Aluminum
    - Pastic
- roof over toilets but not containers
- Stall door reaches floor but does not touch ceiling
- 4 womens toilets, 3 men toilets, 2 urinals

Brief description of service and/or product (prices):

- Dividers for toilets with maximum privacy.

Main contact person/Company contact info:

- Ask around locally
- Find local suppliers
- Trevor (078 946 2778)
- Alfred (083 863 3522)

3.11 Electricity

Key considerations (challenges, issues, etc):

- There currently is no electricity in Zwelitsha.
- The nearest electricity pole to the proposed site is approximately 90 m away. It may be possible to connect this facility to the electricity
- Electricity is used for basic functions in a WaSH facility
    - Lighting
    - Hot water (when necessary)
    - Power outlets (for charging station, etc.)
- If not possible to bring electricity to Zwelitsha facility, then solar power could supply electricity, and would be environmentally sustainable.

Possible Solutions/Options:

- Solar panels and battery unit
- Liters of Light - plastic bottles providing light during day

Main contact person/Company contact info:

- Kwiksol for solar panels

3.11.1 Lighting

- Community identified lighting as an important factor for safety, especially at night
- Liters of Light could provide light during the day
    - Uses recycled water bottles with bleach
- Solar power

3.11.2 Water Heating

- At current facility, a solar geyser is used to heat water for the hand sinks and showers.
- This new facility will not have showers. A solar geyser may not be worth the investment.
- If solar geyser is used, the following companies were used for the current facility:
    - Handsome Plumbing cc T/A Therido Energy, unit price R13,584
    - Biz-zip Construction & Electrical Services installed the geyser for R750

3.11.3 Cell Phone Charger

- Community members like the idea of having a cell phone charging station at the facility.

- Solar powered chargers are available at the following companies. Cost is roughly R400+

http://www.solar-panel.co.za/solar-products/waka-waka/
http://www.sustainable.co.za/solar-power/solar-battery-chargers.html

- Garry from Enviro Loo recommends a particular charging product

3.11.4 Public Phone

- Community expressed interest in having a public phone at the facility
    - In many circumstances, it is cheaper to make calls from a public phone than owning a cellular phone
- Telekom has public phones in the nearby area
- Phone would need regular maintenance to collect money.
- It could be an informal landline, with money being handled by the caretaker as income for the facility to offset the cost of having a phone
- Telkom Company INFORMATION

Rates for calling on a public phone:
http://www.telkom.co.za/general/pricelist/publicphones.html

3.12 Other Considerations

Handicapped, Children's Stalls

- The current WaSH facility has a separate, handicapped stall with a sink in addition to two children's toilets.
- The handicapped stall would be larger than a typical stall
- The handicapped stall could include a baby-changing station
    - Either purchased or made out of wood
- Enviro Loo offers smaller toilet seats for children
- The current WaSH facility recently decorated the children toilet stalls to distinguish them from the other toilet stalls.

Section 4: Construction Process and Management

The WaSH UP is a facility containing dry sanitation, washbasins, sinks, child learning space, and dedicated social space. The facility will serve the Zwelitsha region of Langrug, in the municipality of Stellenbosch. The facility will serve approximately five hundred individuals.

Construction management will be vital in ensuring rapid completion of WaSH UP. The management will ensure the adherence to the time line in the construction process. There are three parties involved in construction management: CORC, a community construction manager and a third party construction manager. CORC is the money manager and will facilitate payment for labor and supplies. The community construction manager will be responsible for the day-to-day construction process.

A) Overview of Anticipated time schedules and major decisions

B) Overview diagram of construction management "who does what" (very succinctly)
[Insert Ivy Graphic Here]

C) WPI roles

a. Provide monetary support for the project, to be managed by CORC.
b. Collaborate with TTEL, Enviro Loo, and CORC on the final floor plan and structure for the facility.
c. Provide Construction Management plans for the timely completion of the construction project.

D) CORC roles

d. Hire a WaSH Specialist to be the main point of contact to Zwelitsha.
e. Help facilitate discussion between the Zwelitsha Team, Enviro Loo, and TTEL.
f. Manage funds provided by WPI
    i. Use to employ WaSH Specialist
    ii. Use to employ Project Manager
    iii. Use to employ Construction Laborers
    iv. Use to employ Caretakers
    v. Use to purchase construction materials
    vi. Use to purchase Enviro Loo Systems

E) **Zwelitsha Steering Committee**

g. Communicate between CORC, WPI, Enviro Loo, and TTEL about aspects of the project, including designs and time frames.
h. Elect a community member to fill the role of Project Manager.
i. Monitor the construction process, and communicate to WaSH Specialist any issues.

F) **Community Construction Manager**

a. Coordinate with TTEL and WaSH Specialist about site visits.
b. Maintain project schedule and project budget.
c. Direct Construction Laborers in completing construction.
d. Know location of tools at all times, and keep record of overnight housing for all tools.

G) **Touching the Earth Lightly**

a. Provide design input for the exterior structure of the facility.
b. Work with Zwelitsha Team to generate floor plan and exterior structure of facility.
c. Make sure final structure is compliant and is signed off by an architect and a structural engineer prior to the beginning of construction.
d. Coordinate with the WaSH Specialist about supervision during the construction process.
e. Be onsite at least two times a week to ensure supervision of the construction process.
f. Mentor the WaSH Specialist in construction management.
g. Coordinate with Project Manager to make sure project stays on time and on budget.

H) **Enviro Loo**

a. Provide seven toilets and two urinals to be purchased with WPI funds.
b. Provide technical considerations for system design, including urine divergence, with WPI input.
c. Provide design viability checks during the design process to ensure the optimal and proper operation of the Enviro Loo systems.
d. Inspect the construction process to ensure the proper instillation of the Enviro Loo system, when the systems are being installed.
e. Provide an engineer to be on site and inspect tank instillation during construction.
f. Provides certificates of compliance, construction success, and operation viability upon the completion of instillation.

G) WaSH Specialist (CORC)

e. Be main point of contact between the Zwelitsha Team, CORC, Enviro Loo, TTEL.
f. Ensure supervision of the construction site by visiting twice weekly.
g. Facilitate the payment of the Project manager and Construction Laborers.

Section 5: Operation Plan

The current WaSH facility was designed, constructed, and is managed by a series of stakeholders. The multistakeholders have shaped the WaSH facility to meet the needs and wants of the Langrug community. One of the key components of the facility's success is its operational procedures, mainly by the caretakers.

5.1 Operations Overview

Stakeholder Responsibilities

- Community Organisation Resource Center (CORC): CORC is a non-governmental organization (NGO) that supports professionals and grassroots activists in empowering communities to improve themselves. CORC will seek ways to support the facility and serve as a voice between the Zwelitsha facility and the municipality. Members of CORC will visit the facility at least once a week to examine operations, collect receipts, and/or purchase more supplies. CORC will also be responsible for payroll through direct deposit.

- Municipality of Stellenbosch: The Municipality of Stellenbosch will be responsible for the funding of caretakers, security guards, and maintenance. More specifically, they will pay for the utility bills and employ someone to perform maintenance procedures at a set schedule. Municipality officials will visit the facility regularly to check on operations and make sure facility is running smoothly. The Municipality will reimburse CORC for their payments.

- Community Leaders: Community Leaders will be responsible for checking on the facility and reporting any issues or observations to CORC and the Municipality. Also, Community Leaders will serve as the voice of the community. Community Leaders willl be dedicated to listen to and address the concerns of the community.

- Caretakers: Caretakers will be employed by the municipality, but report to CORC about their work hours. Their main responsibility is to clean the facility during a set schedule. They will also report any issues or damages to Community Leaders, CORC, and/or the Municipality for repair. See below for job description.

- Community Members: Community Members will feel a sense of responsibility for maintaining the Zwelitsha facility because they are going to be part of the construction process and have provided input for the layout design. They will use the facility to meet their WaSH needs but also feel more connected to their community.

- Enviro Loo: In the first year, Enviro Loo will conduct monthly check-ins for the first year, and every other month for the second year to ensure proper maintenance of the system. They will also hire community members to clean and remove dried waste for off-site disposal.

5.2 Caretaking

- Cleaning and Maintenance: Caretakers are responsible for daily cleaning of the facility. This includes cleaning the wash areas, toilets, and floors. They will use the usual cleaning chemicals except they would use sanitary wipes to clean the toilet bowls. Caretakers will do a thorough cleaning routine once a day. Toilet areas will be inspected regularly. Also, Caretakers are responsible for reporting any issues or damages in the facility to the Community Leaders.

- Health Training: Caretakers will be health trained by the health professional. If the caretakers could learn about hand washing and other hygiene practices, they can serve as educators in the community on health and wellness. They could potentially hold separate workshops for adults and children to promote public hygiene practices.

- Health and Hygiene Product Sales: The facility will offer health products for sale such as soap, diapers, health products, cosmetics, bandages, and other related products that community members have already suggested. This will improve the convenience of the facility as well as provide income for the facility, thus improving social and economic sustainability. Community members also suggested having snacks for children. The caretakers will sell these products in the booth by the entrance of the facility that also serves as the caretakers' office.

- Money collection: A money collection system is necessary for the health shop sales. There will be a record keeping book for the service, along with a money box. Caretakers will be able to keep track of the facility's income that could fund the facility's utility bills and other expenses.

5.3 Waste Management

a. Urine management

Urine in the Enviro Loo system is supposed to evaporate and dry up as much as possible. A hired community member will clean up residue monthly.

b. Solid waste management

Solid waste in the Enviro Loo should become dehydrated and break down to form compost. Community member will be responsible for emptying out containers and raking the waste [once a week?]. Compost will be transported out of Langrug.

5.4 Community Space Management

The Zwelitsha facility will promote community interaction and comfort. There will be benches in the laundry area, a communal cell phone charger/public phone, and a caretaker health shop. Currently there is a child education area and a gardening area in the Zwelitsha facility layout design. Similar to the current WaSH facility, the community spaces are vital components to the social sustainability of the facility. These areas provide a communal space for Zwelitsha members to perform activities other than washing at the facility. Caretakers will be able to watch over the children while the adults do laundry. The gardening area can be another area where the current AIDS group can garden. It can serve the entire Zwelitsha community. A small portion of the compost could be used for the garden.

- Child education centre
    - Plastic table and chairs
    - Coloring books
    - Plain paper
    - Crayons or markers

- Gardening area
    - Behind Z facility
    - Could possibly use compost of toilets in the garden
    - Food garden
    - AIDS group
    - Vertical food gardens?

Section 6: Financial Scheme

For the facility to be built and operated on a daily basis, a financing method must be established. With the stakeholders involved in the building and managing of the facility, it is important to define the financial responsibilities of each party, as well as the components of the facility that require funding.

Section 6.1: Funding the Construction of Facility

The construction of the facility will be funded by WPI, TTEL, and potentially other donors. The money will go through CORC for the acquisition of materials, labor, and equipment.

Section 6.2: Funding Maintenance of Facility

In order for the facility to serve the community in the long term, it should stay clean and well maintained by a caretaker during the hours of operation, and a security guard at night. The caretakers will also need cleaning supplies to perform this maintenance.

In addition to daily maintenance and cleaning that can be performed by the caretakers, there will need to be periodic cleaning and removal of excess compost from the dry sanitation containers. While EnviroLoo will provide this maintenance for the first year, the community will eventually need to provide funding for this maintenance.

The maintenance of the facility will be subsidized with business opportunities in the facility, including the selling of health products and having a cell phone charging service available.

Section 6.3: Facility Income and Current Funding

The self-sustainability of the facility will rely on the economic independence that the community can provide, rather than depending on outside stakeholders. The facility will last longer if its operation relies solely on the community that benefits from it. While the facility will need outside stakeholders' support in during initial implementation, there should be a financial plan in place for the community to operate the facility on its own with little outside help.

Caretakers can be responsible for selling health and hygiene products in the facility. These products would be sold at a low cost and would promote good health and hygiene practices.

In addition to the health and hygiene product sales, the facility can make income by investing in a solar panel cell phone charger which community members can pay to use.

The municipality currently spends R95 on each chemical toilet every week. If a fraction of this allocated funding went to the maintenance of the composting facility, then sanitation could be made available to the community in a facility that they embrace and appreciate.

Section 6.4: Annual Cost Comparison

Annual Cost Comparison		
Enviro Loo	**Enviro Loo**	**Chemical Toilet**
Installation	R 10022	R 125
Annual Maintenance	R 87	R 960
Total Cost in 1 Year	R 10109	R 1085
Longevity	20 years	5 years
Total Cost/Unit/Year	**R 588**	**R 985**

Table 1: Annual Cost Comparison. Compares the price of installation and maintenance of Enviro Loo toilets and Chemical Toilets.