

Regarded members of the Municipality,

Re. Toilets

I would like to share some thoughts with you regarding the proposed new development.

1. TOILETS. We live in a water-scarce country and the water-sources needed to have flush toilets is simply not sustainable in the long run. I have been involved with a KZN NGO in a deep rural area of South-Africa in the Umkhanyakude District. We also have severe water challenges. We in collaboration with Oxfam Australia experimented with alternatives to Flush toilets and Long-Drop Pit latrines. That was my first introduction in waterless technology. We tested two models, one a commercial self-contained unit from Enviro-loo (pictured below) that was costly and a combination of a urine-diversion seat with self-constructed chamber options. I am happy to share our limited experience with you, but highly recommend the far superior functioning model for thousands of people, that can be found with Durban Municipality (Thekwini Municipality). They had been busy with waterless sanitation technology for over 12 years. I have supplied links to websites that explain technically on various levels, **the challenges faced with introduction**, the success and the research done with various options. So I have pasted both the success and failures and the reason for the failures.
2. I will attempt to explain in layman's terms the principle behind different sanitation systems.
 - In pit latrines the urine and faeces are mixed and seepage into the groundwater a reality. Apart from its environmental danger, it is often times not accepted as an option and seen as an insult to a person's humanity. The aspiration of the average person is for a flush toilet as shown in some of the articles in the websites quoted.
 - Flush toilets in a water-scarce country is not a long term solution in any community and all communities should re-consider the cost of using cleaned water to flush toilets.
 - Ablution blocks for communal use of facilities is not an option. Most people would not feel safe to walk to a communal ablution at night and I personally feel that dealing with your own bodily waste and household waste makes us responsible humans.
 - Urine separating systems. An extract from a document
The UDDTs provide the following benefits: (1) waterless operation; (2) no odour when correctly used and maintained; (3) treated faecal matter is dry, odourless and less offensive; (4) does not attract flies or other vectors; (5) treated faecal matter is partially sanitised and safer to handle; (6) aboveground design or use of containers in belowground vaults makes emptying simple; (7) minimal risk of contamination of ground and surface water resources; (8) possibility of aboveground design facilitates construction in challenging environments; and (9) possibility of construction in close proximity to or inside of the home adds security and convenience for users (Rieck *et al.* 2012).
<https://iwaponline.com/washdev/article/7/1/11/30518/Urine-diversion-dry-toilets-in-eThekwin>

URINE SEPERATING TOILETS. This is the system I would like to propose.

Separating urine from faeces allows the faeces to **dry out completely, killing pathogens (harmful micro-organisms) and make it manageable**. The faeces dries like dog poop in the sun and become small and brittle and whitish. Because it is a waterless system, water is used for household and garden growing.

There are various methods to separate urine and faeces.

1. ENVIRO-LOOS

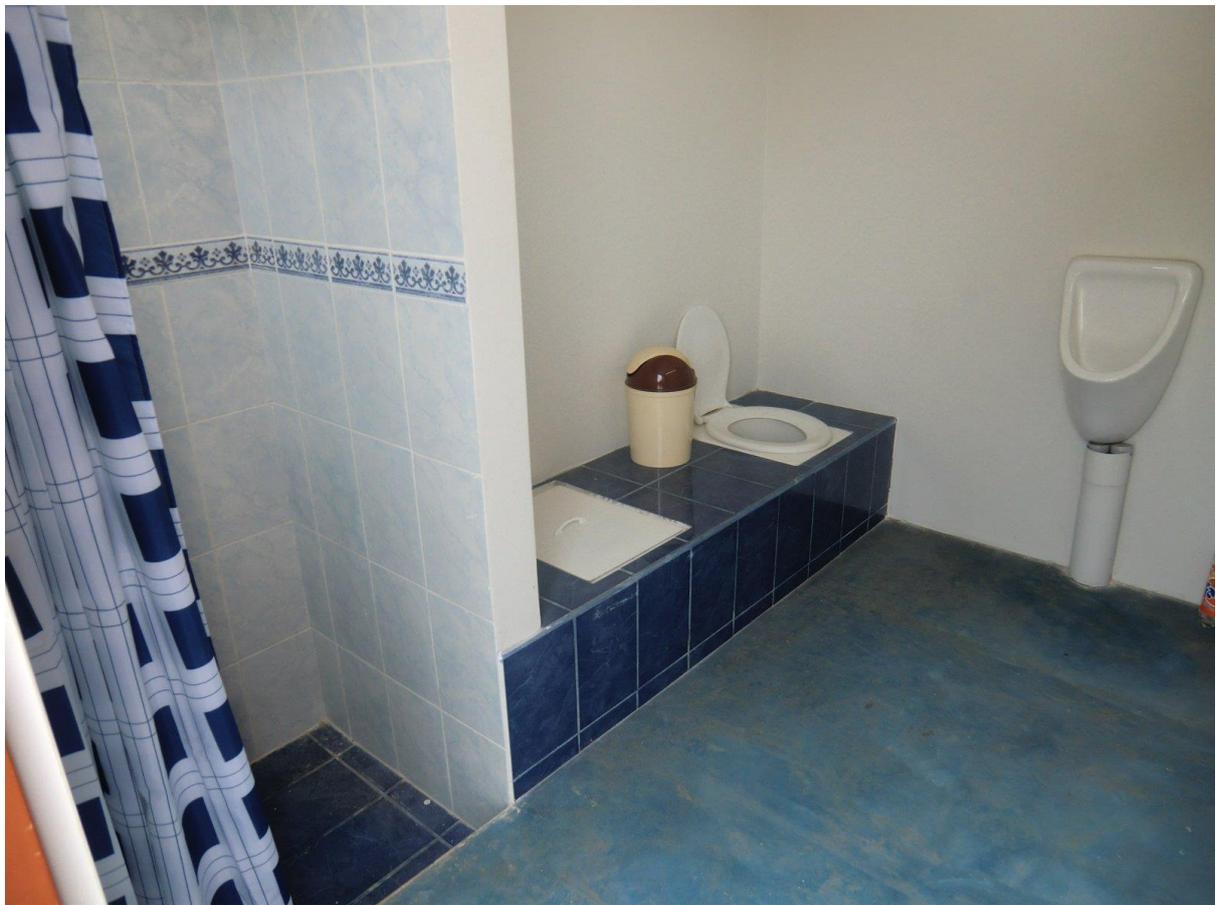
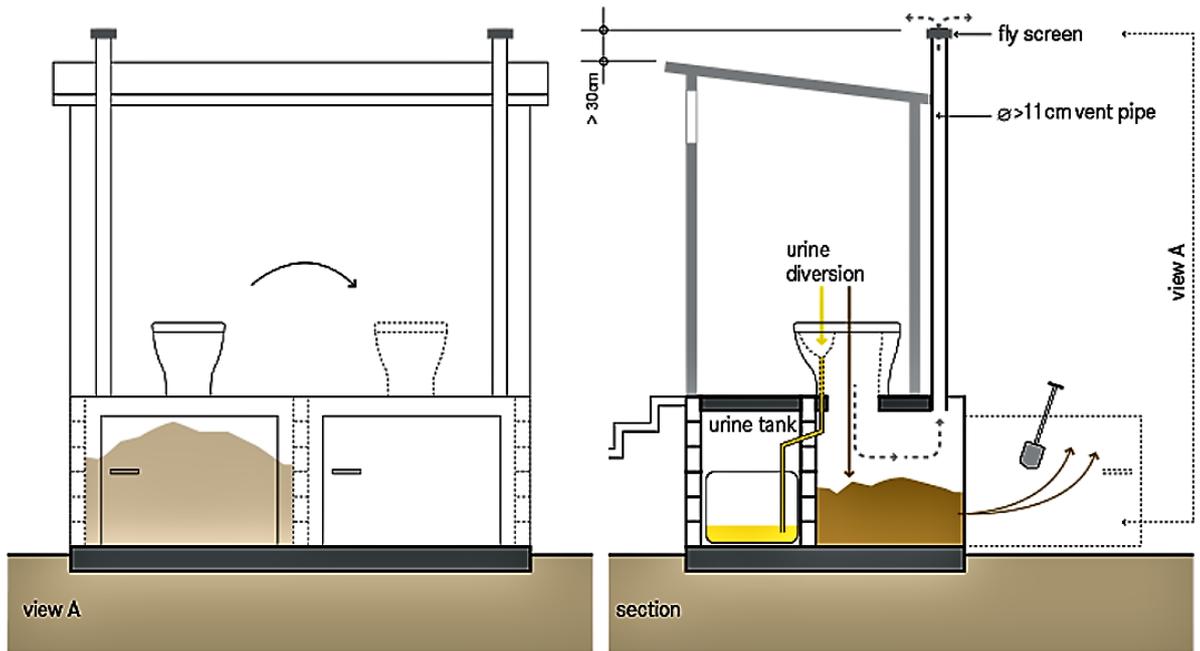
The **Enviro loos** system allow both urine and faeces to enter the chamber together and then the content falls on a sloped perforated surface...a hard plastic sheet with holes at an angle, that allows the urine to seep through the holes into the bottom enclosed chamber, with a pipe that leads to a urine soak-away pit nearby. The faeces then dries out, needs to be raked to the back of the box from time to time and then the hard dry faeces needs to be collected after a year or more to be disposed of. The challenge with this system is that the holes can block and the angle is not steep enough for the faeces to slide down. They remain wetter longer and there is an extraction fan at the top of the chimney to eliminate most smells.

It needs a **full sun site**, additional **power for the extraction fan** and people living higher might still get a whiff from the extraction fans, but the biggest deterrent is possibly the **cost, it is more expensive**. It is the best application for schools and community halls as seen in the photo below. The two glass tops are for the urinals. It is a very good method of coping with the urine. The urine dries into crystals.



2. URINE SEPERATION TWO CHAMBER SYSTEM

- a. An attempt is made to **separate urine from faeces before the faeces drops down** the seat. It is important for the success and acceptance of the systems to buy white high **quality urine separation pedestals/seats**. As can be seen in the photo below the system can be incorporated into the bathroom. It is advised to incorporation of a urinal against the wall in the blue bathroom picture as well. The urine can be collected in the same container the seat urine is diverted to.
- b. **Build a two chamber system**. Faeces are collected in one chamber until it is full, the seat is then removed and placed over the new empty chamber. The seal of the empty chamber is placed over the full chamber. The full chamber is left like it is until the second chamber is almost full. By now the faeces should be dried out. The dried out faeces is accessed through the sealed back wall and either disposed of or ground up and used as fertilizer in agricultural applications. The municipality can collect and dispose of the dried faeces.
- c. The selection of the site: It is vital for the optimal drying of the faeces that the back wall of the bathroom **unit face North**. To increase the absorption of the sun rays the back panel and the chimney should be painted black or be manufactured from hard black plastic. Place a mosquito net above the chimney. The bigger the chimney the greater the up draft and reduced smell.
- d. The **urine can be diverted to a soak away, or a solar evaporation** site similar to the environ system or utilized in a diluted form in agriculture. It is important to be aware of the hesitance of local communities to use human waste in any form as part of a greater agricultural system and extensive community awareness activities should accompany such use.
- e. By placing a **bucket of sand, ash or sawdust** next to the toilet with a little scoop, visual unpleasantness and smell will be further reduced. In addition, the material like ash or sand can accelerate the drying time.
- f. Should flies find their way into the system, they would try to get out and the only light will be at the top of the chimney that is sealed with a mosquito net. The **flies will then fly up and down the chimney until they die**. It is highly unlikely if the seat remains closed.



In the image above the toilet stool is a porcelain seat, that can also stand on its own, going straight downward without the u-trap of standard toilet seats. To the right on the photo is a urinal, for the use of men, with an outlet that joins the urine caught with the separate division in the seat. This photo was sourced from https://en.wikipedia.org/wiki/Urine-diverting_dry_toilet an example from Peru.



This is what a urine separation seat can look like. The front chamber catches the urine and the dark blue is where the faeces drops down into the chamber. In this photograph there is a division that is not there. It is a pipe that have straight sides.



This is local, South-African manufactured urinals on the market. It is advisable that the pipes should take the shortest route out, but protected from sun and damage.

Additional resources:

1. <http://www.wrc.org.za/wp-content/uploads/mdocs/Demonstrating%20New%20Sanitation%20Solutions%20through%20the%20Engineering%20Field%20Testing%20Platform%20in%20eThekweni.pdf> This is a very comprehensive study for waterless Sanitation options as done in Thekwini(DURBAN)
2. http://www.susana.org/_resources/documents/default/2-874-technology-review-of-uddts-18-june-2013.pdf A comprehensive document filled with options and diagnostic fault finding.
3. <https://iwaponline.com/washdev/article/7/1/111/30518/Urine-diversion-dry-toilets-in-eThekwini> Introduction challenges faced in Thekwini (Durban)
4. <http://ccaa.irisorku.ca/2011/07/flushing-out-the-realities-of-urine-diversion-toilets-in-south-africa%E2%80%99s-ethekweni-municipality/>
5. <https://researchspace.csir.co.za/dspace/handle/10204/839>
6. https://www.fsmttoolbox.com/assets/pdf/269_-_Complete.pdf
7. <https://www.greenloo.org/enviro-loo-urinal.php>