



NON-POTABLE WATER SYSTEM SOLUTION

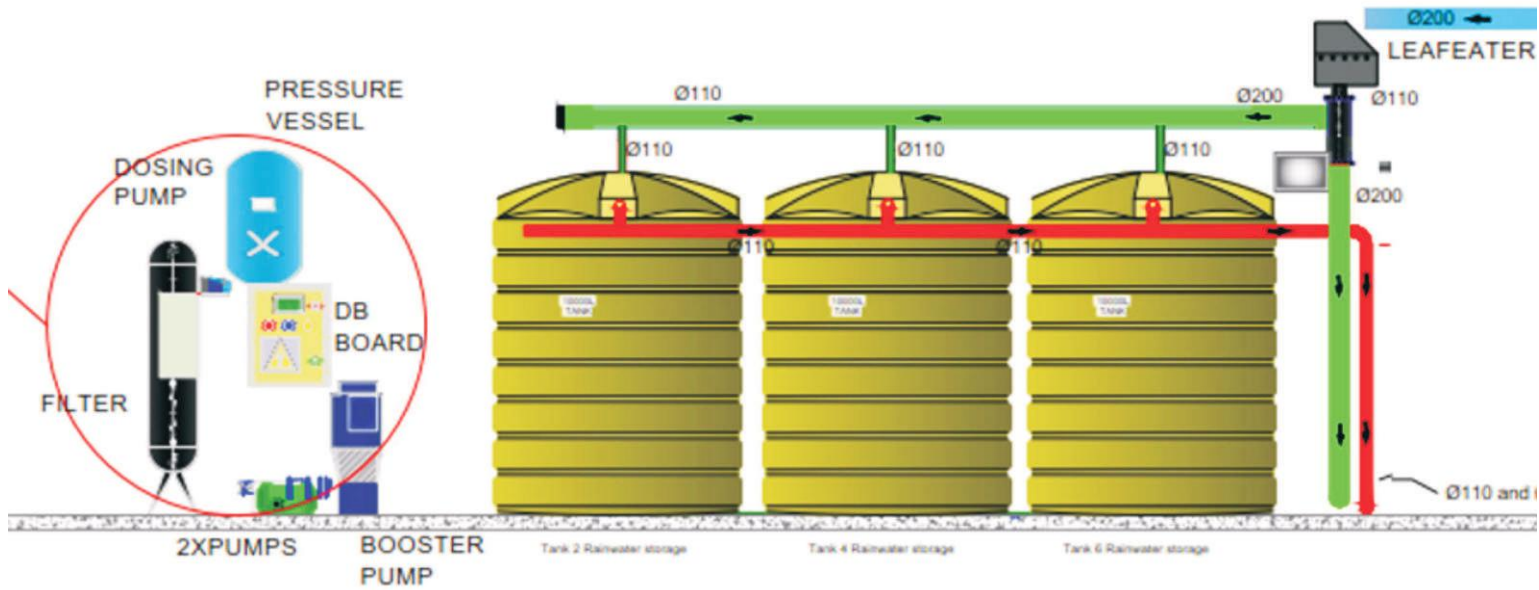
Water Supply NOT for Human Consumption

Our design approach is an attempt to be good stewards of the natural resources that are at our disposal, with our sustainability innovation engineering solution this system design including the reuse of reclaimed water.

The Non-potable water system solution design is based on utilizing the following reclaimed water sources:

- Rainwater
- Grey Water
- Ground Water
- Black Water

The water as noted above gets utilized solely for non-potable water consumption to the respective buildings. The potable and fire water storage supply is from a separate supply dedicated for sources for its respective purposes only.



FLUSHING WATER
makes up
approximately
85%
of THE
water
consumption
within
BUILDINGS.

OCCUPANCY

Residential

| Number of Persons | Total Storage Required (Liters) |
|-------------------|---------------------------------|
| 50 | 1 960 |
| 100 | 3 920 |
| 150 | 5 880 |
| 200 | 7 840 |
| 500 | 19 600 |
| 1 000 | 39 200 |
| 1 500 | 58 800 |
| 2 000 | 78 400 |

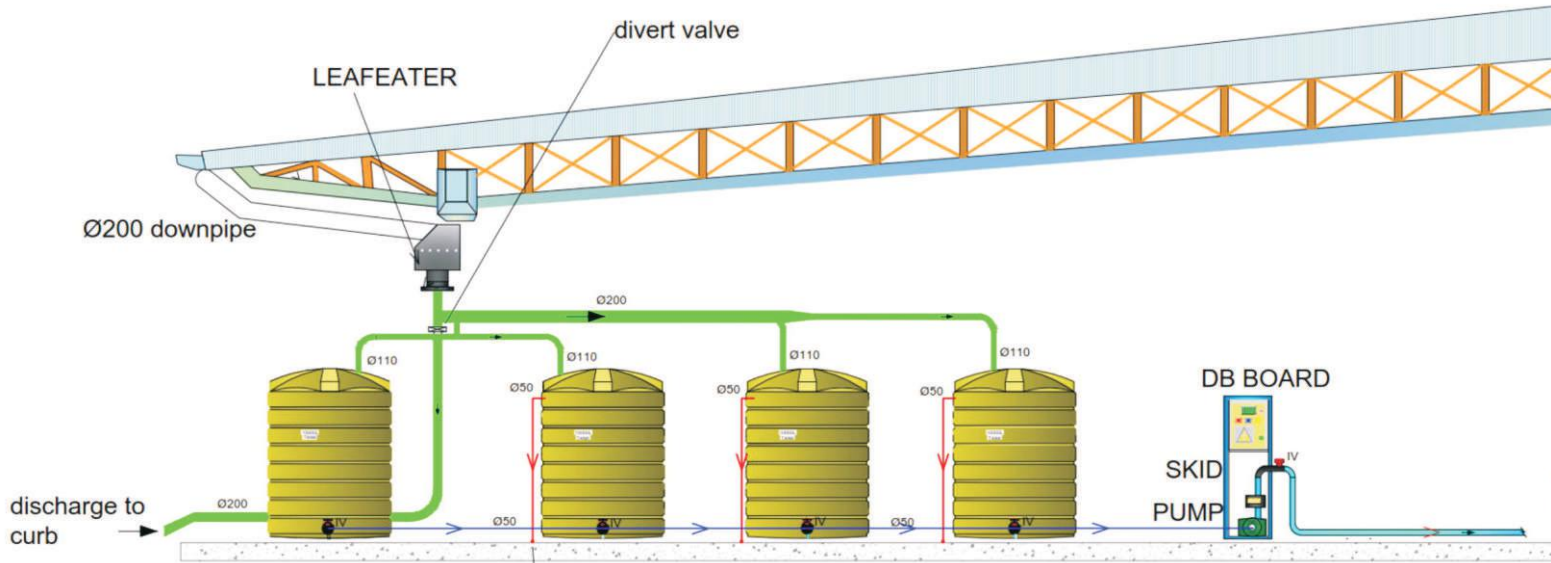
Office

| Number of Persons | Total Storage Required (Liters) |
|-------------------|---------------------------------|
| 50 | 980 |
| 100 | 1 960 |
| 150 | 2 940 |
| 200 | 3 920 |
| 500 | 9 800 |
| 1 000 | 19 600 |
| 1 500 | 29 400 |
| 2 000 | 39 200 |

Commercial Retail

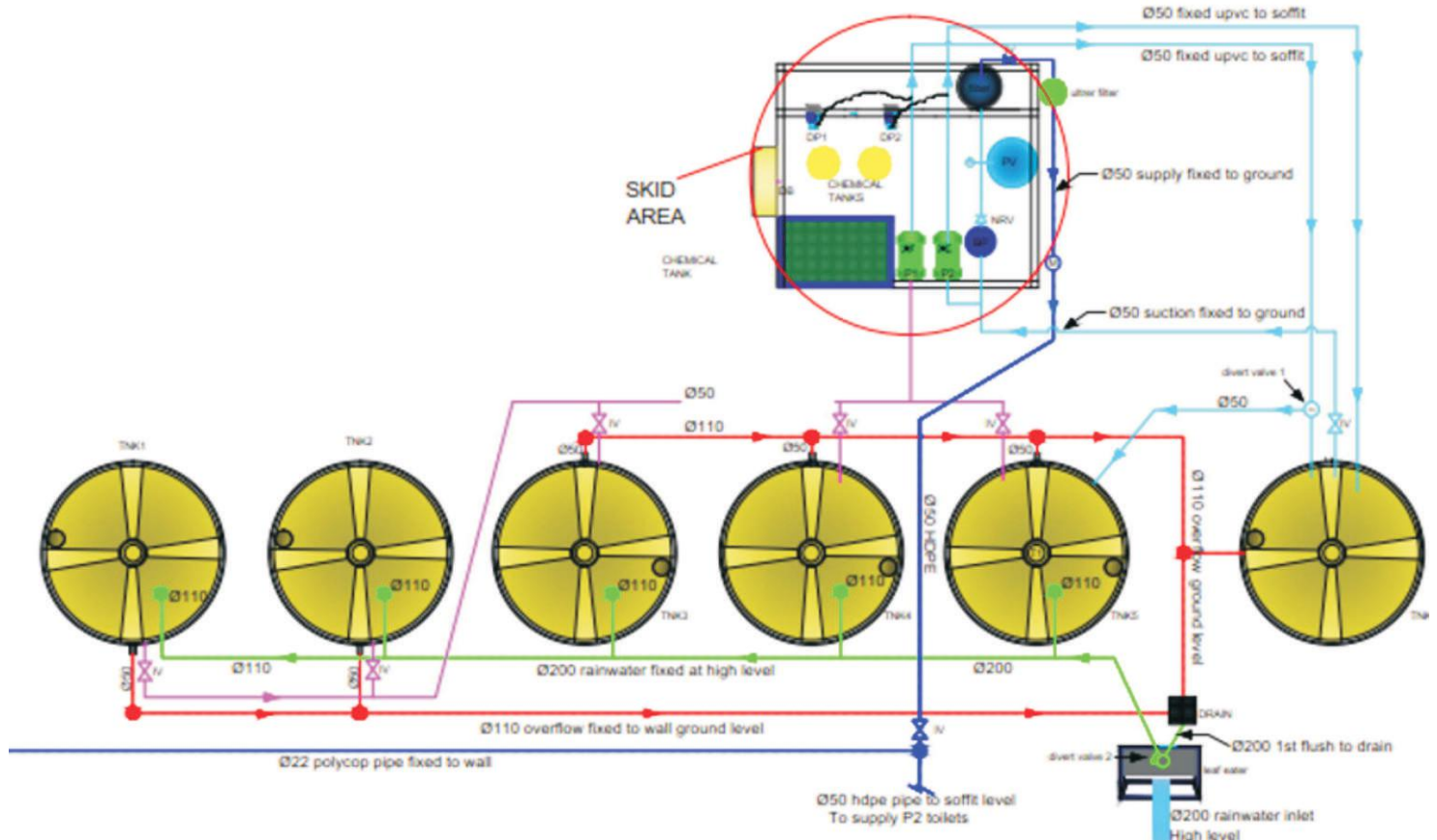
| Number of Persons | Total Storage Required (Liters) |
|-------------------|---------------------------------|
| 50 | 490 |
| 100 | 980 |
| 150 | 1 470 |
| 200 | 1 960 |
| 500 | 4 900 |
| 1 000 | 9 800 |
| 1 500 | 14 700 |
| 2 000 | 19 600 |

Rainwater is reclaimed by means of harvested rainwater via storm water attenuation tanks or rainwater run-off from roof and other surfaces, as far as possible. The rainwater is then pumped through a filtration skip in order to treat the water to non-potable water standards conducive for flushing water purposes. This water can also be treated to potable standard in accordance to SANS 241 but this will be on request and in discussion with S-Pro.



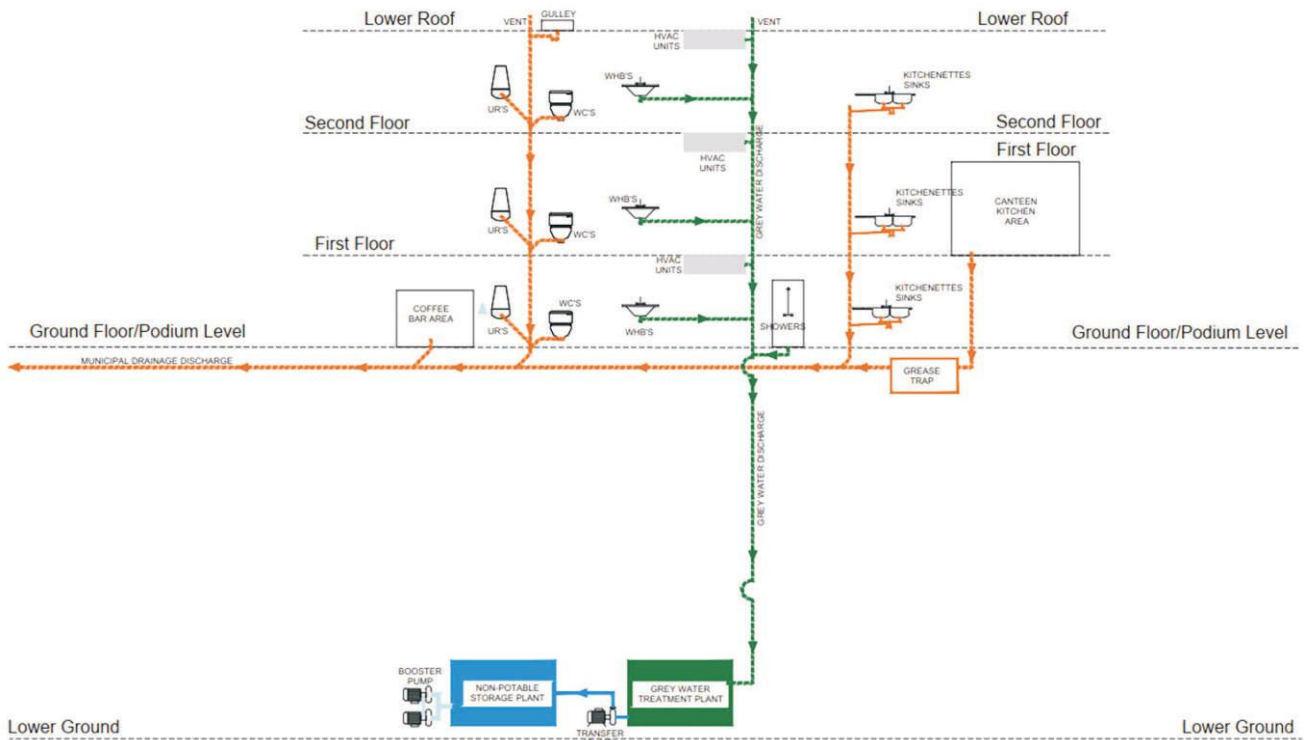
The water will be guided via the rainwater discharge reticulation to the leaf-eater, sand and Oil separator traps and then to the Bio holding tank. The First tank will be biological treatment and the second will hold the biologically treated water.

This water will then be pumped to the non-potable water storage plant for distribution.



The system is also equipped with a potable water top-up and potable water by-pass system complete with a valve arrangement that prevents the possibility of cross contamination of the water sources.

Grey Water is reclaimed by means of harvested grey water discharge from wash hand basins, showers and HVAC condensate water, as far as possible. This system also have the ability to be a hybrid system that combines potable, rainwater harvesting and borehole water, with the grey water system. This water can also be treated to potable standard in accordance to SANS 241 but this will be on request and in discussion with S-Pro.



Water from wash hand basins and shower areas contain soap, oil, fat, COD and potentially E.Coli, Coliforms and other pathogens.. It is therefore required to create an environment for purification of the water utilizing enzymes. This takes place in the SOG filters and thereafter water flows to the Bio Tanks. This water can further be treated by ceramic filtration before entering and blending with rainwater harvesting supply.

The non-potable water reticulation system design can also be based on utilizing reclaimed treated grey water with the top-up to the tanks from reclaimed ground water , rainwater and lastly potable water supply. Non-Potable water will be supplied by means of a variable speed booster pump set for the non-potable water reticulation system.

A complete system for the non-potable water reticulation to all water closets and urinals in the building will be designed and installed. Sizing and design will be in accordance with the pressure and flow requirement of the cisterns and urinals.

As there is no quality requirements for greywater reuse in South African, we would recommend that the grey water system comply with the following systems: British standard (BS 8525-2), US standard (NSF), Australian standard (NSW) or similar approved compliance standards.

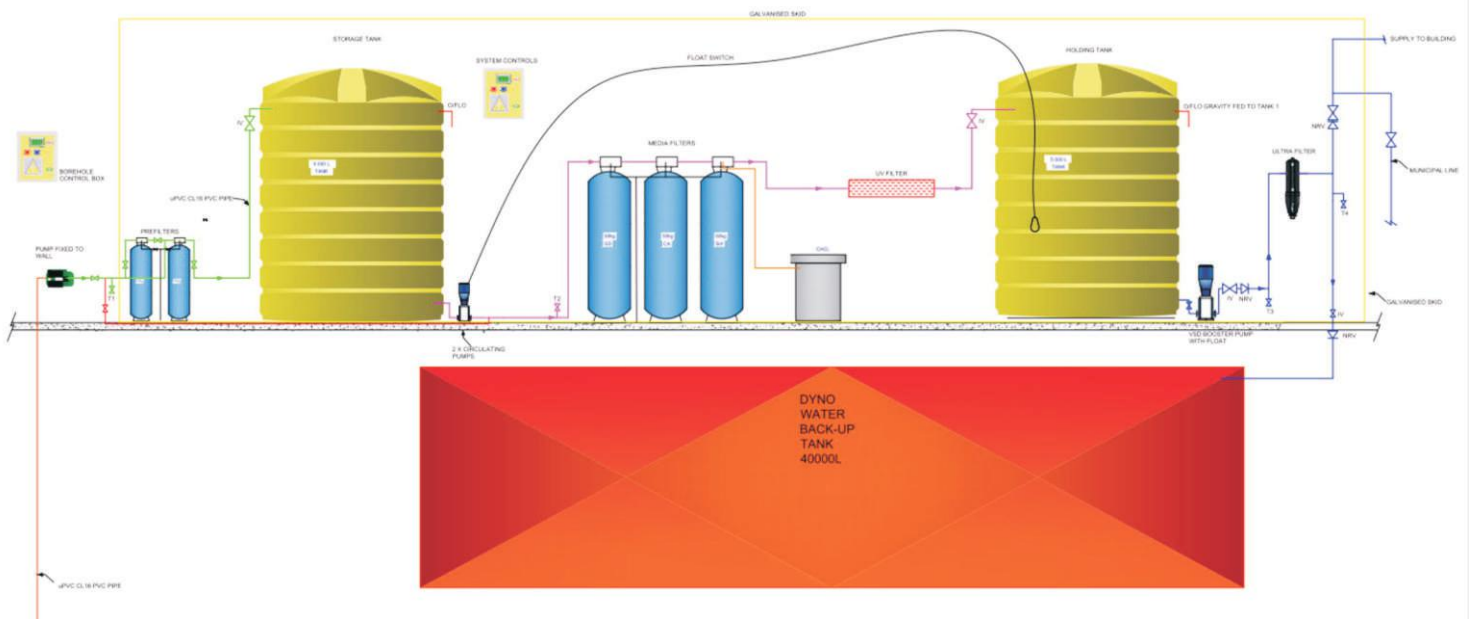


3D View

The use of borehole water as an alternative source of water to address the prevailing water emergency situation brought about by the prevailing drought. The aquifer is defined as the geological structure that can hold the water, groundwater is the water in the aquifer and a borehole is the mechanism to access the water.

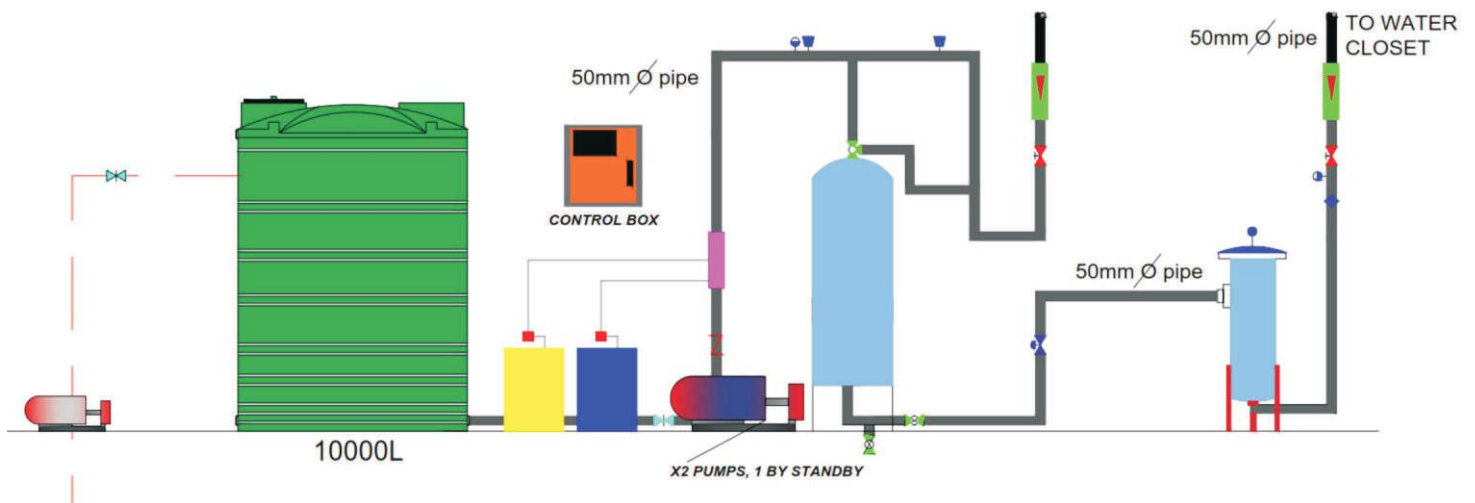
The drilling and registration of boreholes is regulated under the municipal by-laws of the area. The decision to register water use or not is based on the intended uses and limits of the resource and is discussed herewith.

The proposed abstraction, treatment and distribution of groundwater for use as potable water must comply with all relevant regulations on water quality, operations, maintenance and management of the treatment plant. The water quality requirements are outlined in SANS 241 which includes the acceptable limits per determinant; frequency, number and location of monitoring points; risk assessments guidelines and incident reporting.



The quantity and quality of groundwater need to be confirmed to determine the feasibility of using a borehole as alternative source of water supply to the facility. This requires the drilling of a water supply borehole and subsequent groundwater yield and quality testing of the borehole. Once the yield is proved viable, a quality analysis must be conducted to identify the appropriate treatment technology for the intended water use.

Reclaimed groundwater harvesting system is the collection of seepage groundwater or borehole water by means of a borehole pump and discharge into buffer storage facility complete with filtration system, treatment plant and booster pump set supplying non-potable water to the non-potable water storage facility that supply non-potable water to the building for water closet and urinal flushing purposes only. This water can also be treated to potable standard in accordance to SANS 241 but this will be on request and in discussion with S-Pro.

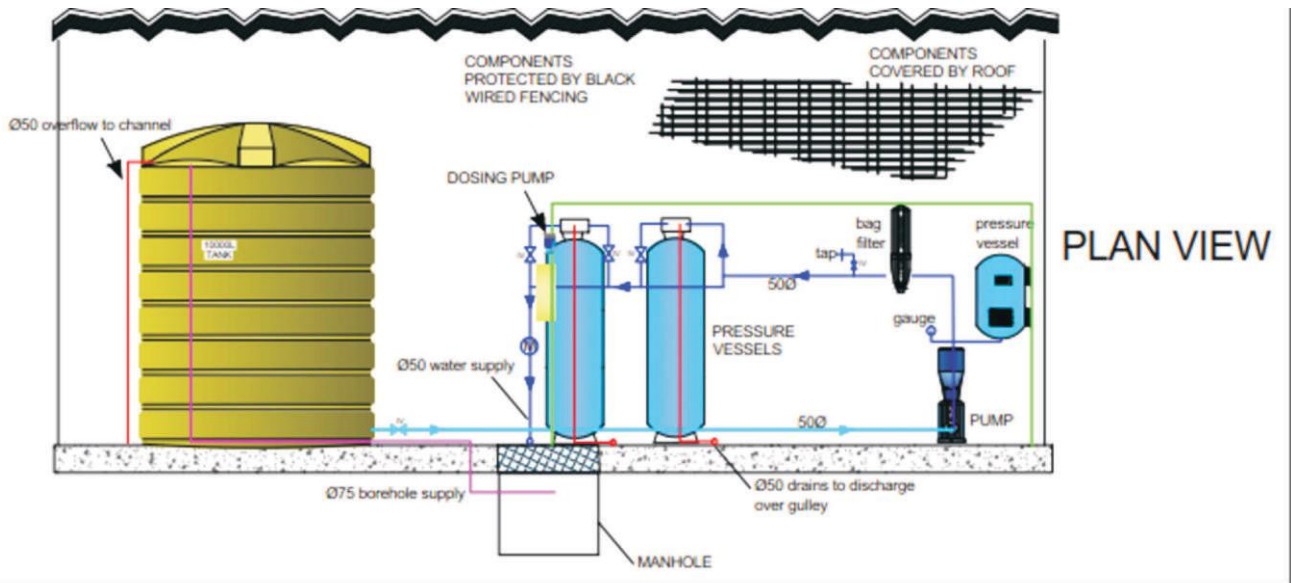


Extracting groundwater by means of sinking a borehole accompanied with associated pump, pipes and fittings. It should be noted that the uncertainty of the extraction rate and yield of the water will determine whether this is a feasible and viable option.

This comprises of the following plant items:

- Borehole pump and Control panel
- Buffer tank filler pipe, solenoid valve arrangement and float valve
- Borehole water buffer tank
- Transfer booster pump pumping through treatment plant
- Treatment plant (Only determined once water quality has been confirmed)
- Non-Potable water piping and fittings

System comprise of buffer tank, complete with a transfer booster pump, tank level indicator, float valves, treatment plant, associated pipes and fittings.



SIDE VIEW OF INSTALLATION.



SKID SET UP.

The intention is to transfer non-potable water that was delivered via the borehole pump into the buffer tanks. Non-potable water in the buffer tank is then transferred via a transfer booster pump through the treatment plant to the storage plant facility.

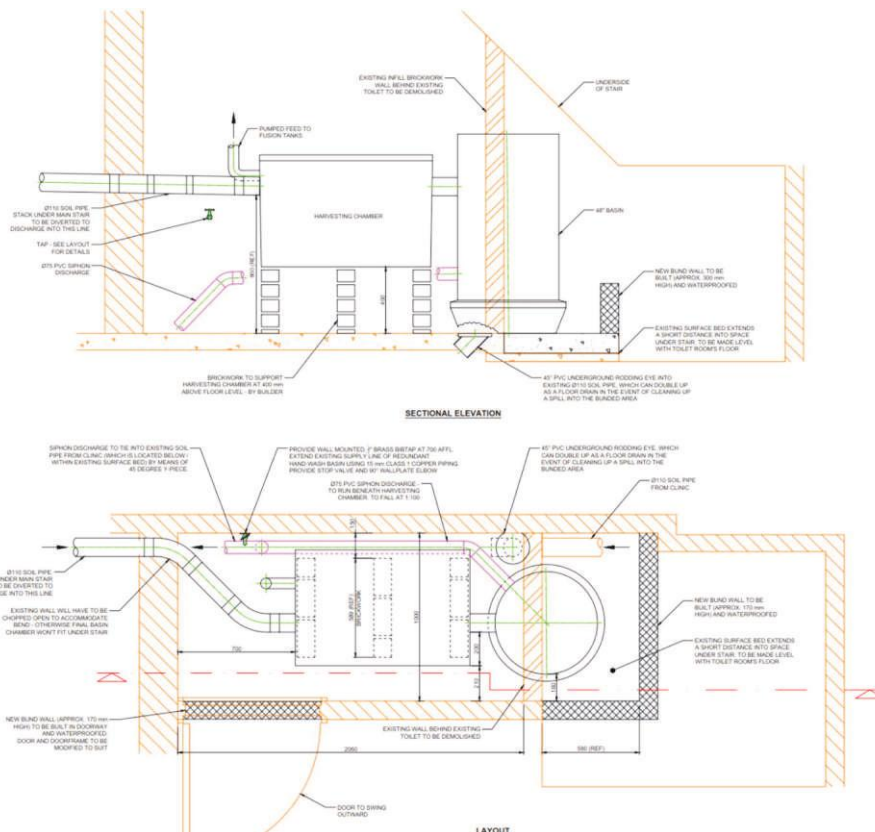
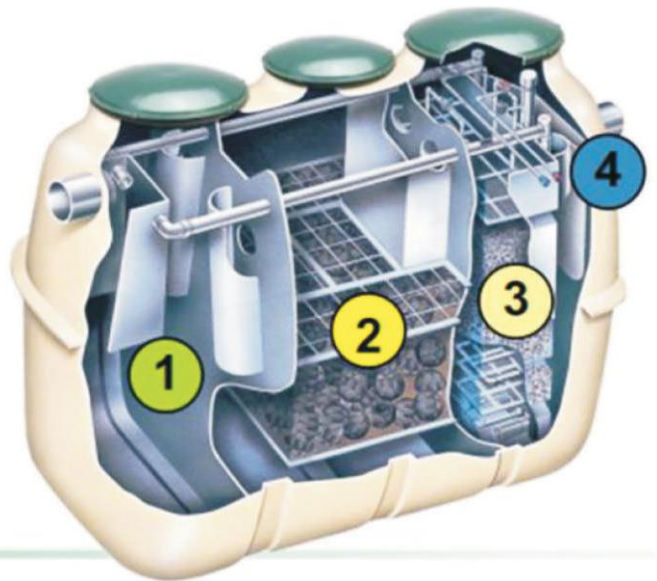
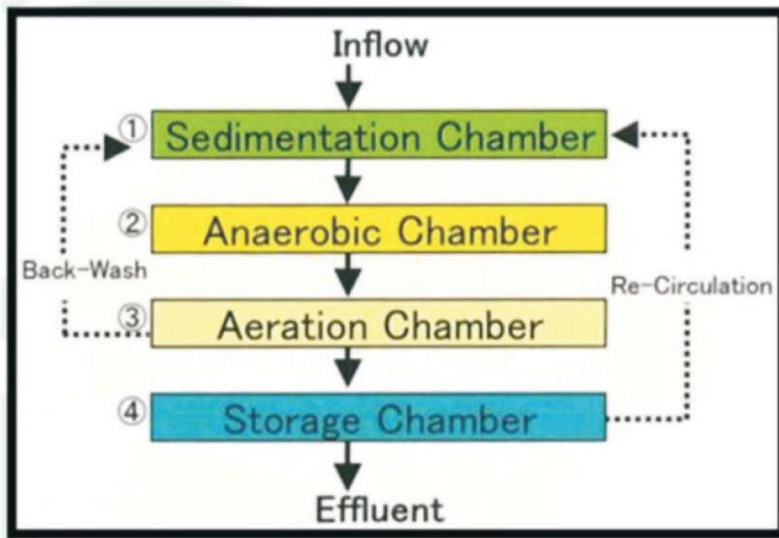
This option is to have an alternative potable water supply to the new/existing building and alleviating the total dependency on the municipal potable water supply main.

Waste water (Black Water) is combined domestic effluent that contains sewage whereas grey water does not include the waste from toilets, urinals or bidets. Wastewater is sometimes referred to as black water which contains high levels of pathogenic organisms and solids.

The above definitions are based on World Health Organization guidelines WHO 2006a, for the suitability of different grades of water.

The proposed system operates on a three existing stages Activated sludge treatment process for COD (Chemical Oxygen Demand) and BOD. (Biological Oxygen Demand) reduction as well as Nutrient removal to conform to the General discharge water quality standards and that the effluent can be discharged to a natural stream or be suitable for irrigation or recycle as grey water and reuse.

The total system will be powered by a single Diaphragm aeration pump which controls the Aeration in the Aerobic chamber as well as the recycling of water and sludge for Nitrification and Denitrification in the plant. The recycling rate for water and sludge will be fully adjustable by means of easy valve operation.



S-PRO

CONSULTING ENGINEERS
(PTY) LTD

 **S-PRO Consulting Engineers (Pty) Ltd**
Reg: 2012/04730/07

 Unit F15, 3 Heron Crescent, Century City,
Cape Town, South Africa

 +27 (0) 21 671 0713

 info@s-proconsulting.co.za

 s-proconsulting.co.za

For any enquiries please call: 021 671 0713



Electrical, Mechanical, Fire Protection Engineers & Facilities Management