Note on reevaluating whether Grey Water Treatment and Network is the best option for water supply resilience

V1, Aug 2019

Referring various research papers and vendors, we believe that we should brainstorm once again on water resilience by discussing:

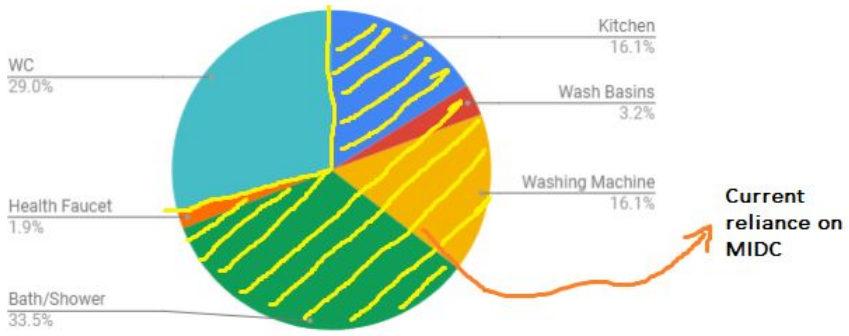
- the 'Grey water treatment ideology' and associated network deployment
vs.
- Black water treatment itself with (UF+RO+UV) in an Indirect Potable Re-use system (explained later)

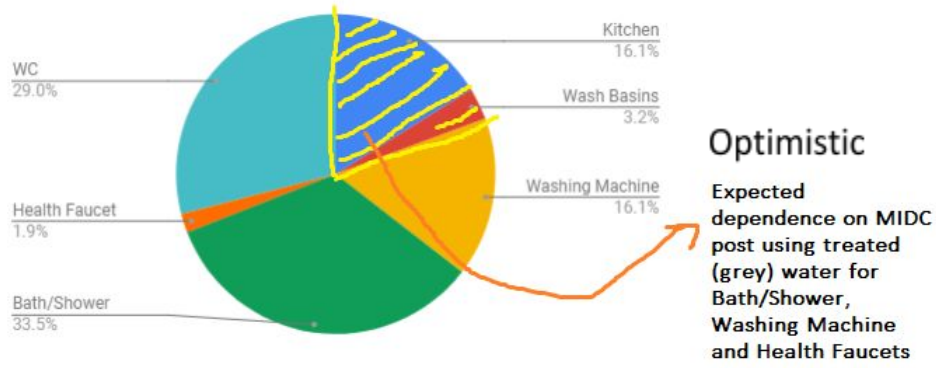
The challenges which we are encountering in establishing the 'Grey Water Network and Treatment' are enumerated in this note.

Background

We have high dependence on MIDC water (Potable) and the consistent trends of water cuts in the past few years forced us to think of alternate water sources.

One of the thoughts was that if we could reuse treated water for some primary (potable zone) uses we can reduce reliance on MIDC.





However using treated water for 'Potable' purposes need a strong regulatory push and customer acceptance. So it was thought that customers may accept Treated Grey Water easily as compared to using STP (mix) treated water.

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Observations

Sifting through a lot of resources we could not find one operational instance in India or Globally where the treated Grey Water is being used in this way.

Grey and Black treatment is done globally, and conventionally, for secondary uses like flushing, irrigation, etc., but not to supplement the primary uses.

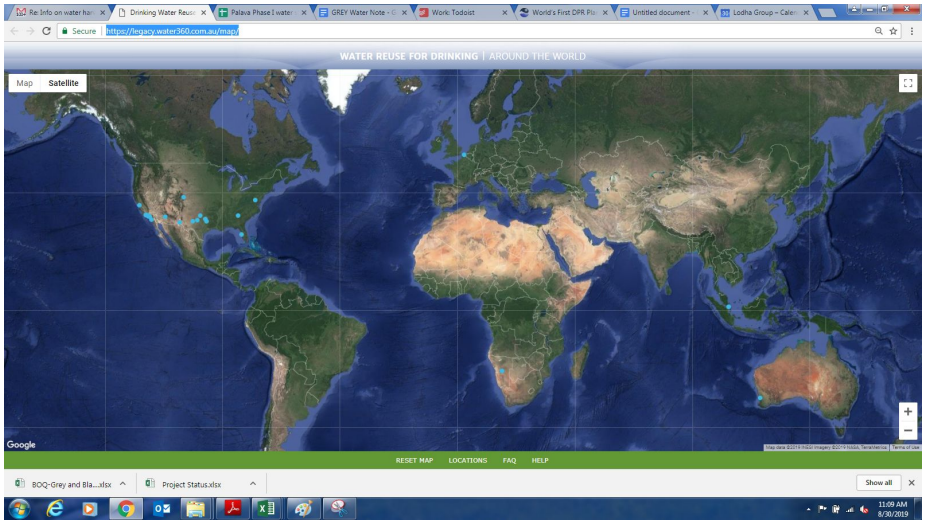
Exceptionally when treated water is used for potable purposes it is classified[1] as follows:

- DPR: Direct Potable Reuse - Treated water directly supplied through the domestic water pipelines
- IPR: Indirect Potable Reuse - Treated water mixed with a buffer like:
    - natural water sources (surface reservoir or ground water)
    - engineered storage buffer (tank)

DPR is being done in true essence only in Windhoek, Namibia[2] , all other instances are mainly pilots and while they showcase their water quality they are not supplying it to the homes.

IPR is however done internationally at many locations, it is also acceptable to the users because it helps in altering *water's identity*. Many instances of such deployments can be seen by visiting the following link:

https://legacy.water360.com.au/map/



[1] Direct potable reuse: Harold L. Leverenz, George Tchobanoglous and Takashi Asano (Journal of Water Reuse and Desalination | 01.0 | 2011)
[2] Direct potable reclamation in Windhoek: P. du Pisani and J. G. Menge (Journal- Water Science & Technology | 13.2 | 2013)

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Challenges

We enlist the challenges faced in the process of reaching a firm selection of technology and infrastructure updates.

Philosophy

- People may accept grey treated water easily vs. stp treated water (+UF+RO+UV) remains unsubstantiated, as we could not find any global reference
- DPR itself is challenging, so if we alternatively go with IPR with an engineered or environmental buffer mixing then we might as well use our STP water (+UF+RO+UV) and go on without changing much of infra and ROWs.
    - Our natural water resources like river, ground water and quarries are not sufficient perennially so we may go for Engineered Reservoirs
- DPR and IPR also have a lot of resistance in various countries which have robust water technology and infrastructure
- Having common black and grey drainage chambers also ease our ROWs/Service Corridors

Vendors

- No reference cases
- Very arbitrary costs (can't be easily benchmarked)
- Can confirm quality but cant unequivocally state that the water is potable
- Suez is still working on a proposal for us, however it still remains unbenchmarked
- Due to the above mentioned peculiarities of DPR it is difficult to engage an expert, however for IPR we can get expert consultants on board as well.

Costs

- The cost of treating grey water to potable standards is not cheaper than treating STP water itself
- The costs from vendors vary quite a bit based on technology
- The cost advantages are further reduced due to smaller sizes of the plants.
- The overall impact of doing this is as follows; of which the red costs can be avoided/lowered by considering STP+UF+RO+UV and IPR (Engineered Buffer) approach.

Infra Costs	**Cost/sqft Rs.**
Cluster Infra	8
UGT Pumps	2
Main Infra	15
Treatment Plant	15

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Recommendation

We should go for regular MBR STPs (UF+RO+UV) as usual and work on and Engineered Storage Buffer (ESB) approach.

- UF+RO+UV or similar additional treatment can be done by federations at a later date when they believe it is the right time; we can leave space for the same
- The treated UGTs and water pipelines for primary supplementation can still be laid by us (As we were doing in Grey water scheme); i.e.
    - The current grey water tanks act as ESBs, and
    - The current grey water pipeline acts as the line which will carry the +UF+RO+UV water.
- We can carry on with our STP BOO models with MBR tech.

By doing so we may end up somewhere mid way between the current and the very optimistic dependence (that we had earlier considered with grey water treatment).

We can have a meeting to brainstorm this further.