

TECHNICAL SPECIFICATIONS FOR IMPLEMENTING OP

1. OP Features

Compact type:

OP Will be accommodated in three 20' Modified shipping containers. Footprint of each container will be 20'X8'.

Two of the Containers can be staked one above the other, this means only 2 containers will be placed on the platform.

A stand-alone office cum storage modified shipping container will be supplied along with other three containers

The OP system can also be installed in 40' modified shipping container

Easy to transport:

Equipment in each container will not weigh more than 3 Tons, this means the gross weight of the container will be less than 6 Tons.

Containers are light enough to be moved or lifted using any pick and carry cranes, Flatbed trucks can be used to transport containers.

Installation:

Containers will be placed on concrete platforms. Equipment inside the containers will be pre-assembled and ready for plug and plug.

All the equipment inside the container will be pre-wired, containers will be provided with industrial connectors for the main power supply. All water and plumbing connections will be provided with Quick-Lock couplings.

Dismantling:

Easily dismantlable as removable connectors and couplings will be provided for all plumbing and electrical connections to the container.

Containerised Units:

Four 20' Modified shipping containers will house the equipment's or One 40' Modified shipping container and two 20' modified shipping container can be provided based on ease of transportation in Lebanon

2. Treated Outputs

Treated Solids

Solids generated by the process pass through a thermal digester where solids remain heated for 4hours at 70°C making it class A biosolids.

Treated solids can directly be used as a soil amendment. Treated Solids are bagged and sold for land application.

Treated Liquid

Wastewater treatment of filtrate obtained from dewatering involves aeration in which aeration is induced by an air blower and aerobic bacteria results in biological decomposition of organic matter. media inside the aeration zone increases the surface area forming a bio-film layer which enhances the removal of organic fractions

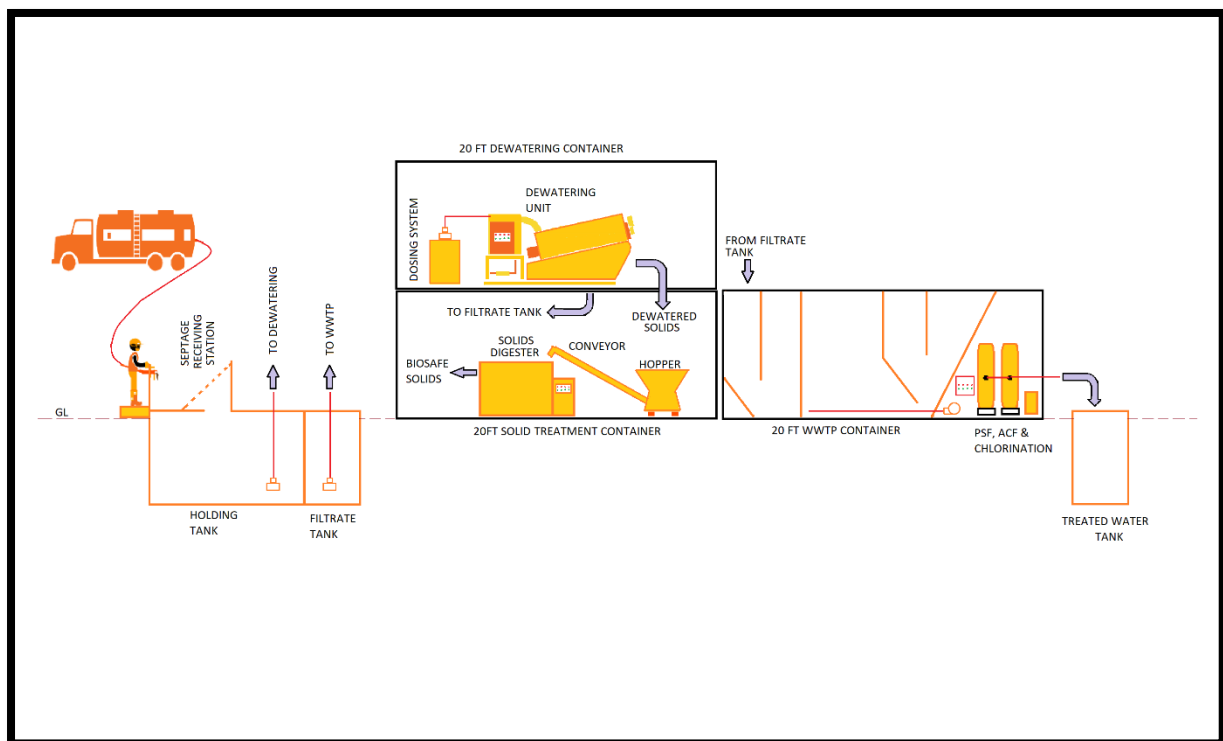
Tertiary treatment reduces suspended solids, color and odor the filtrate is passed through a pressure sand filter and activated carbon filter.

Disinfection methods like Ozonation or UV light can be used to destroy and render harmless disease-causing organisms, such as bacteria, viruses, etc.

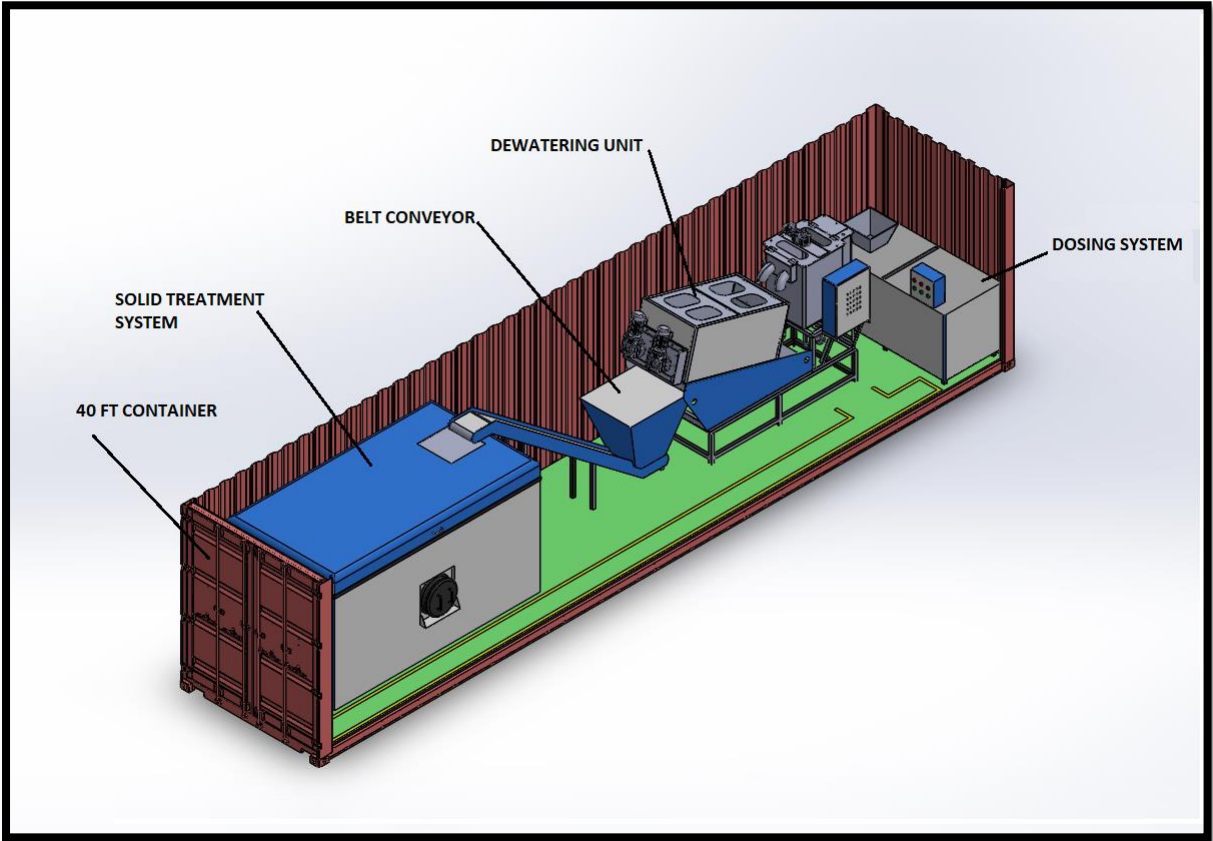
Treated water will be safe enough for release into inland water bodies or urban greenery.

Treated water will be in the Lebanon's Ministry of Environment (MoE) effluent criteria for safe disposal in surface water and/or to drinking water levels.

Process that will be adopted for treatment of Septage:

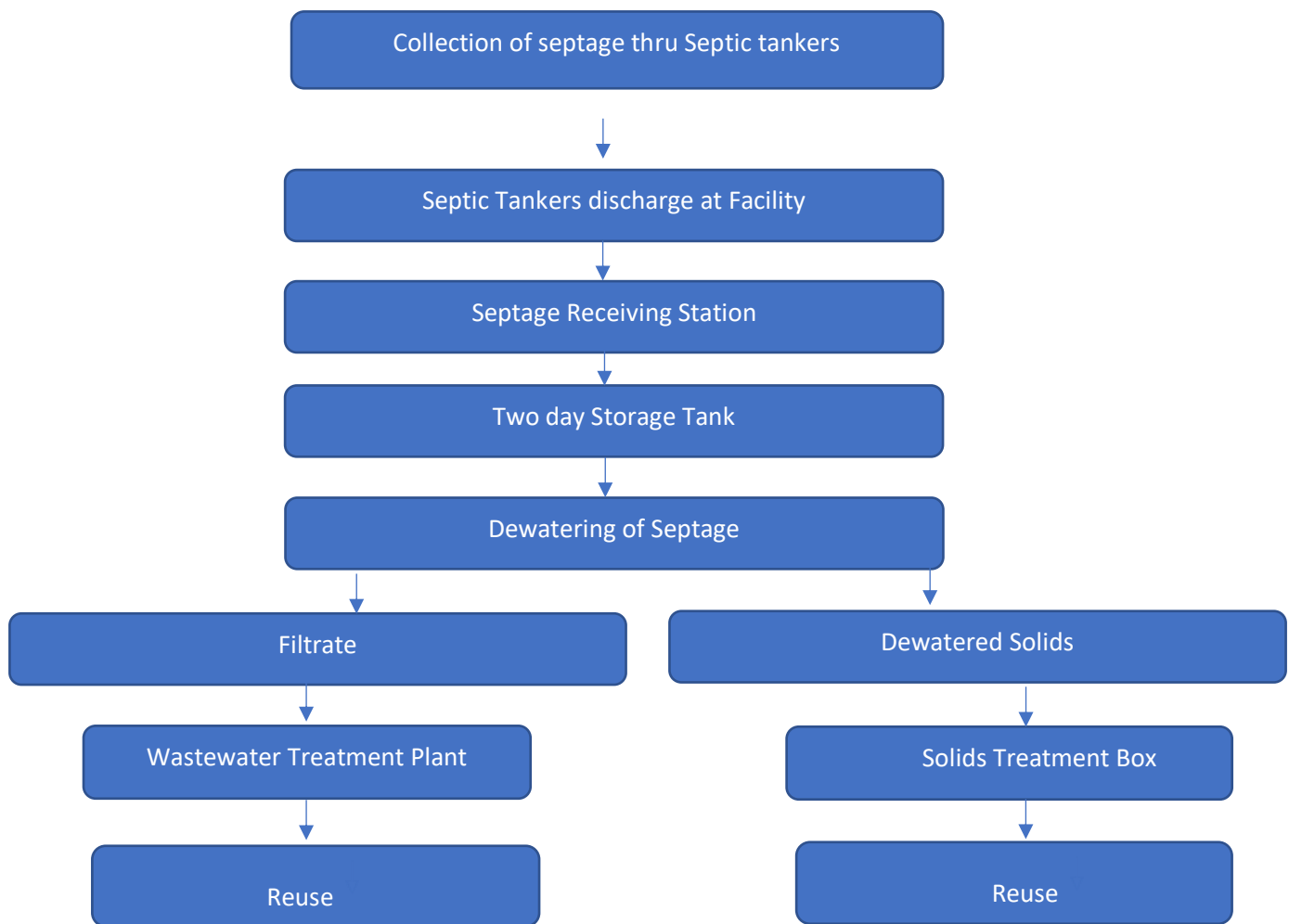


Process Flow Diagram



Dewatering Unit and Solid treatment in a 40' Modified Container

The design flow of the proposed system is given below.



The overall working process flow of the above scheme is described below:

Step 1: The septage is received in the septage receiving station via screen, where the floatables are separated from the septage. The grit settles in the SRS, and the septage flows to the storage tank.

Step 2: The septage storage tank. The 2-day retention time in the storage tank is designed to address the incoming fresh septage from community toilets and public toilets too.

Step 3: Submersible sludge pumps are placed in the storage tank, to pump the septage from the storage tank to the Dewatering unit. Two pumps are placed in the storage tank, and one pump as backup pump.

Step 4: The sludge from the sludge holding tank is pumped to the dewatering unit. The dewatering unit consists of:

- a. Polymer dosing system

b. Dewatering unit

Step 5: The dewatered solids fall into the Wet end Hopper placed on the ground and is feed into Biosafe where Dewatered Sludge would be heated up to 70 degrees for biosafety using external energy and then bagged.

The filtrate from the dewatering flows to filtrate tank and then pumped in controlled flowrate to wastewater treatment plant.

Step 6: The filtrate from dewatering is treated in the wastewater treatment plant, and post the tertiary treatment, stored for Reuse in the plant area or urban greenery.

The overall turn-around time for septage is 1-2 days, from the day of receipt into the FSTP.

Electricity:

Sl. No	Equipment	Connected Load	Operational hours/day	Unit consumption/day
1	Pumping system	3.0	8	24.0
2	Dewatering system	3.8	8	30.4
3	Solids treatment system	15.5	2	31.0
4	Wastewater treatment	1.8	24	43.2
5	Utility	1.0	4	4.0
<i>Total in kW per day</i>				132.6

***30 Kw of Solar power can be installed as an alternative.**

O&M:

SI No	Particulars	UOM	Quantity/month
1	Electricity	Units	4000
2	Polymer	Kg	45
3	Operator	Person	2

Sustainability Plan:

O&M:

SI No	Particulars	UOM	Quantity/month	Estimated Unit Rate(\$)	Amount per month (\$)
1	Electricity	Units	4000	0.14	571.43
2	Polymer	Kg	45	5.00	225.00
3	Operator	Person	2	357.14	714.29
Total					1510.71

Total expenditure incurred during O&M period will be \$1510

Revenue from treated Sludge

SI No	Particulars	UOM	Quantity/month	Estimated Unit Rate (\$)	Amount per month (\$)
1	Treated Solids	Kg	22500	0.029	642.86

Revenue from Treated solids will be \$642.86. So, additionally \$867 shall be spent monthly. From this half of the O&M Cost will be recovered by selling of treated solids.

If solar power is installed, then electricity cost can be saved on entirety.