Operation and Maintenance of Decentralized Domestic Wastewater Facilities in Myanmar

presented by

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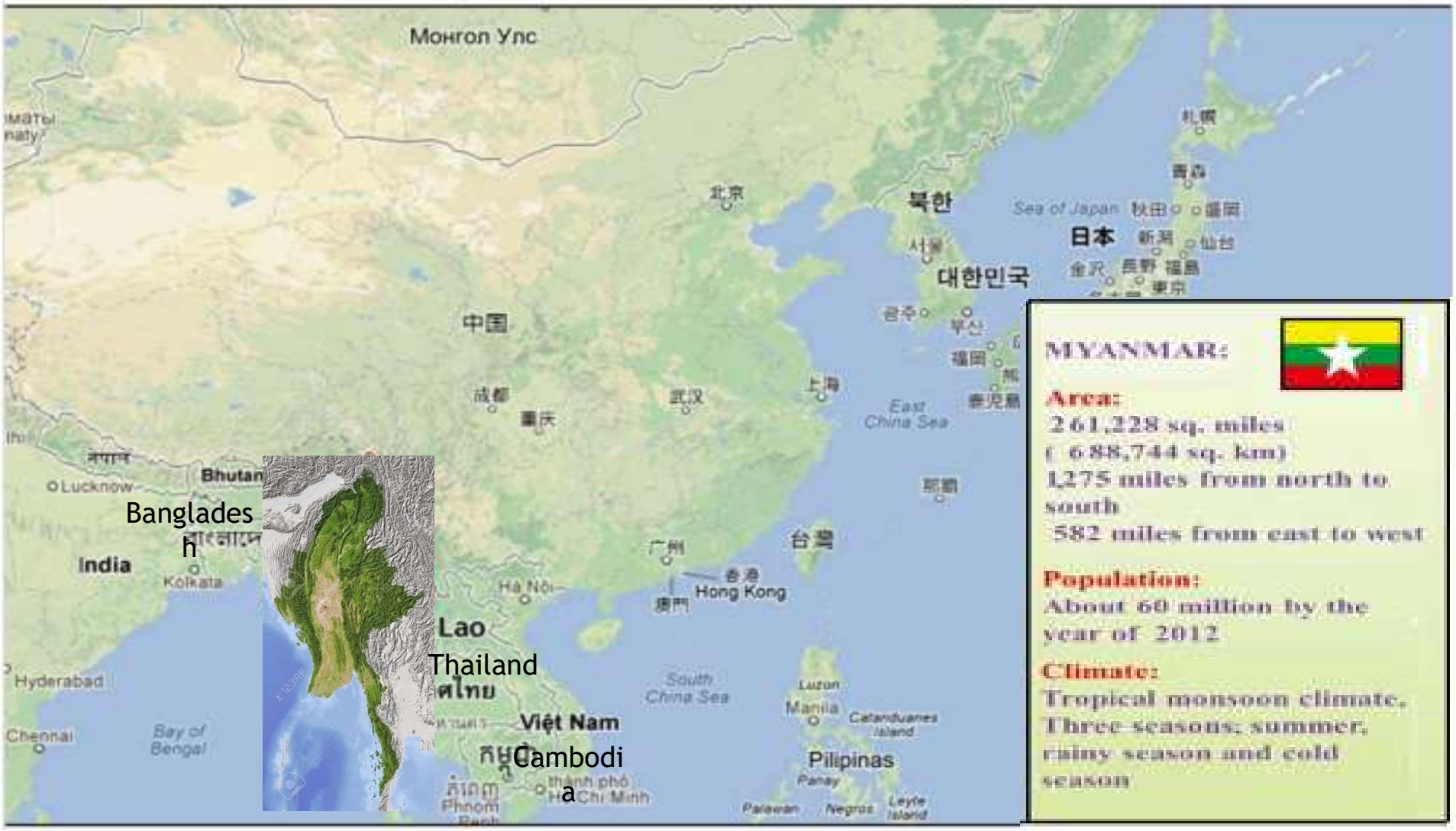
*Country Context

The Republic of the Union of Myanmar



MYANMAR:

Area:
261,228 sq. miles
(688,744 sq. km)
1,275 miles from north to south
582 miles from east to west

Population:
About 60 million by the year of 2012

Climate:
Tropical monsoon climate. Three seasons: summer, rainy season and cold season

Improved sanitation facility

	Flush/pour flush to:					
	Piped sewer system	Septic tank	Ventilated Improved pit latrine	Pit latrine with slab	Composting toilet	Total
State/Region						
Kachin	0.0	31.6	5.7	53.9	0.9	92.10
Kayah	0.0	4.8	0.4	74.3	1.7	81.20
Kayin	0.0	2.2	1.2	69.4	0.7	73.50
Chin	0.0	0.3	5.6	76.8	4.2	86.90
Mon	0.0	2.9	12.9	75.0	0.4	91.20
Rakhine	0.0	1.0	1.6	41.6	3.9	48.10
Shan(North)	0.0	16.0	3.6	42.8	6.0	68.40
Shan(East)	0.0	71.0	0.4	20.6	0.1	92.10
Shan(South)	0.3	11.7	5.0	68.1	0.6	85.70
Ayeyarwaddy	0.0	3.7	0.9	77.1	1.4	83.10
Bago(East)	0.2	9.6	0.8	69.3	0.0	79.90
Bago(West)	0.0	0.6	1.3	85.8	0.8	88.50
Magwe	0.0	7.0	4.3	71.5	1.3	84.10
Mandalay	0.0	17.5	8.5	65.0	0.0	91.00
Sagaing	0.0	2.1	1.5	86.8	0.5	90.90
Tanintharyai	0.0	20.7	6.4	55.3	1.9	84.30
Yangon	7.3	38.8	0.9	46.7	0.2	93.90
Area						
Urban	3.6	32.3	4.8	53.5	0.3	94.50
Rural	0.0	6.0	3.1	69.8	1.4	80.30

Miltiple Indicator Cluster survey (DOH)(2009-2010)

Current Situation of Water and Sanitation in Myanmar

Because of the underinvestment in urban infrastructure and services such as water supply, sanitation, drainage, wastewater treatment facilities and solid waste management that resulted in significantly deficient urban services through out Myanmar.

Only 7% of Improved Water and Sanitation is available in Yangon and Naypidaw City.

Decentralized Wastewater Treatment Facilities in Myanmar

- Rural treatment facilities ~ Pit latrine/Septic Tank
- Satellite treatment facilities ~ Pit Latrine/Septic Tank
- Cluster treatment facilities ~ Not available
- Onsite treatment facilities~ Septic Tank/ Anaerobic Bio-filter/ MBBR/ MBR
- Small-scale WWTPs ~ CAS system/MBR/Johkasou/ Anaerobic Upflow Bio-filter

Related Organizations to Sewage & Sanitation in Myanmar

Organization Name	No. of Town ships	Estimated Population (Million)	% improved Sanitation	Type of Sanitation Facilities Used
Nay Pyi Taw Development Committee	8	0.924	1% (10000 capita)	Septic tank system, Pit Latrine A wastewater treatment plant
Yangon City Development Committee	33	5.5	7.0% (300000 capita)	A sewage system, Septic tank system, ABF, Johkasou, MBR, A waste water treatment plant, an industrial wastewater treatment plant
Mandalay City Development Committee	6	2.498	Nil	Septic tank system, Pit Latrine, Oxidation Pond System Future Plan of WWTP (ADB project)
Department of Development Affairs	283	49.455	Nil	Septic tank system, Pit Latrine with slab, others

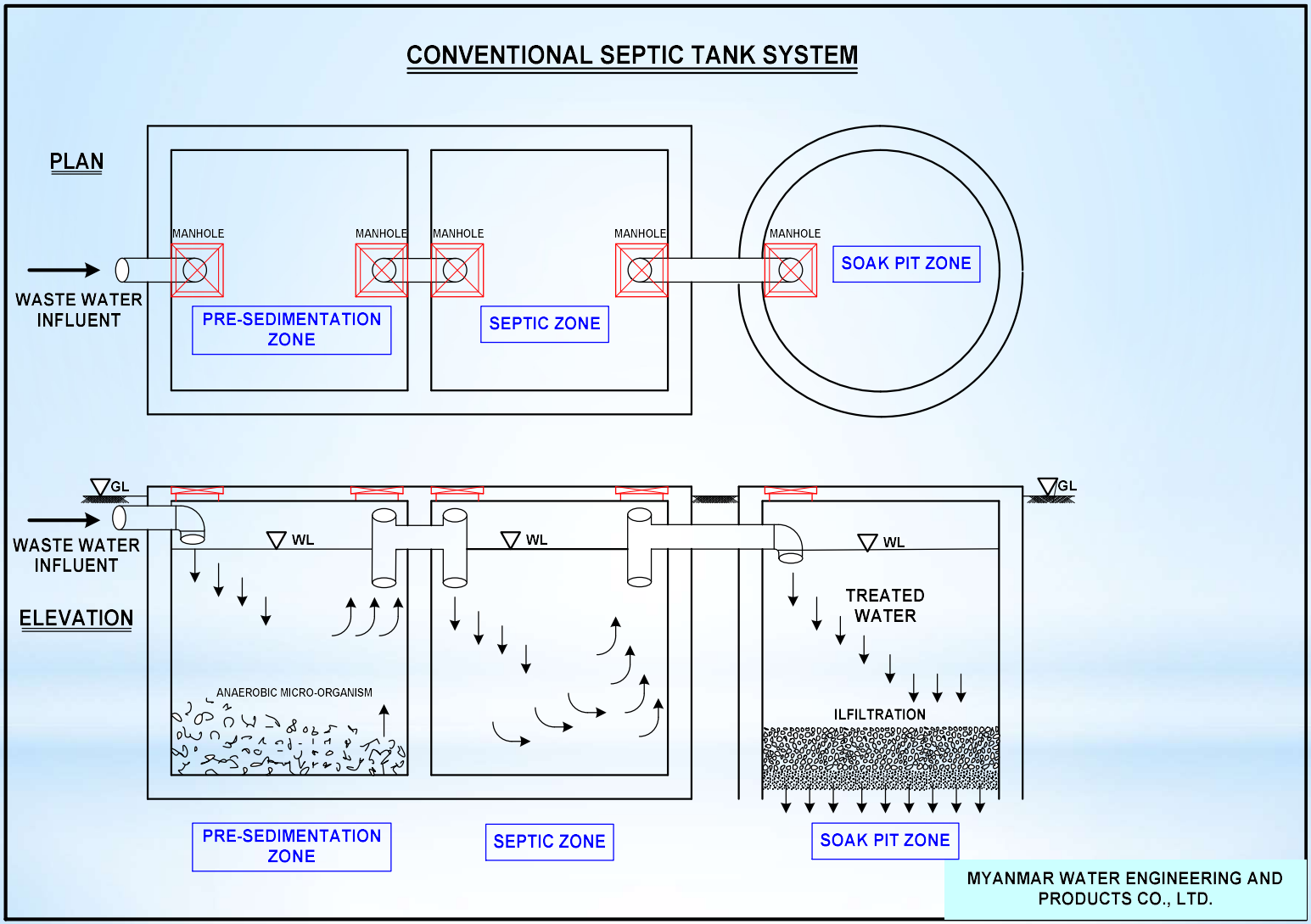
In some Suburban and Outskirts of Town Areas

- Individual Septic Tank alone are constructed for homes in accordance with the YCDC requirement.
- Soak pits used for the disposal of Septic Tank effluent and located at the required distance from the surface wells and some are overflow to public drain.
- Digested sludge accumulated in the tank is desludged by vacuum tanks and disposed at CDB Wastewater Treatment Plant.

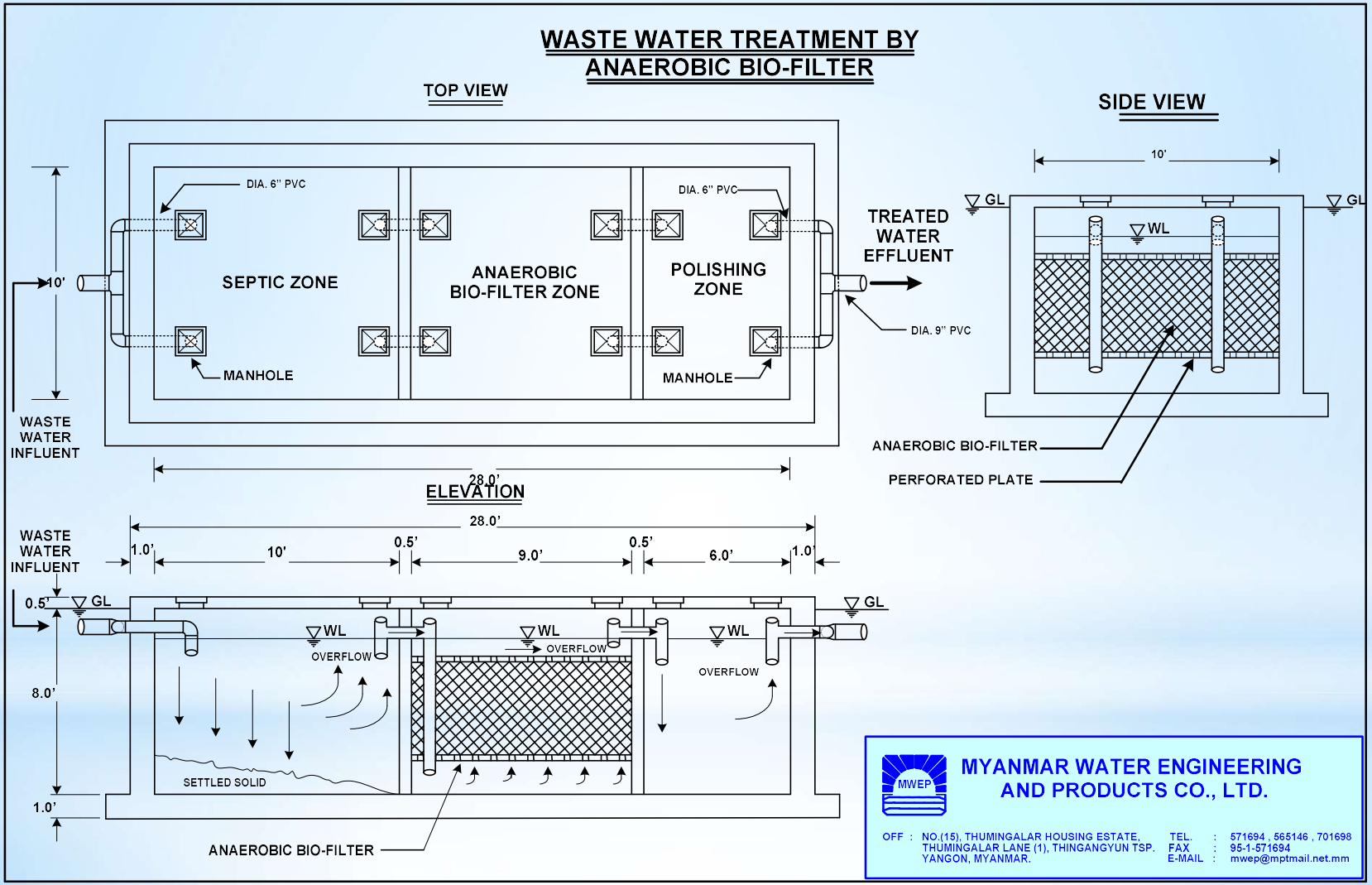
Wastewater Treatment System

- High rise building, multi-storey buildings, hotels, condominium multiple or single unit residential Building use “Activated Sludge Treatment System such as CAS, MBBR, MBR and JOHKASOU.
- For on-site treatment of its wastewater before discharging the effluent into the YCDC public drains
- Measure taken by YCDC to control the polluting load of wastewater which is finally discharged into Yangon River

(A)Septic Tank System

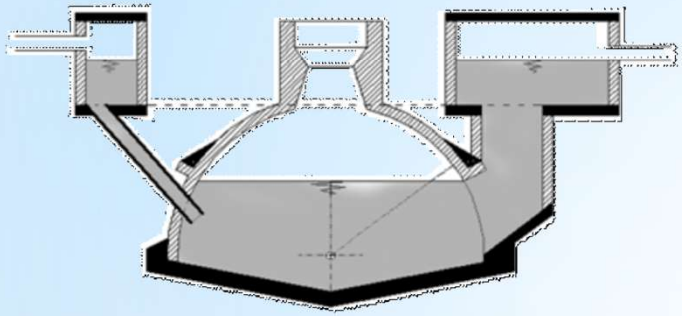


(B) Septic Tank with Up-flow Anaerobic Bio-Filter System

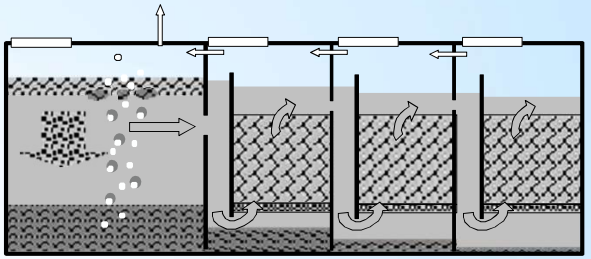


(C) DEWATS system (BORDA)

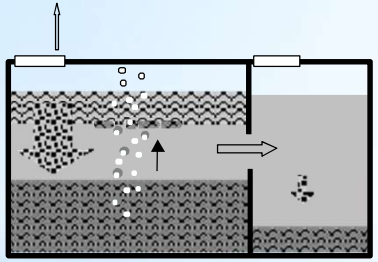
DEWATS Modules



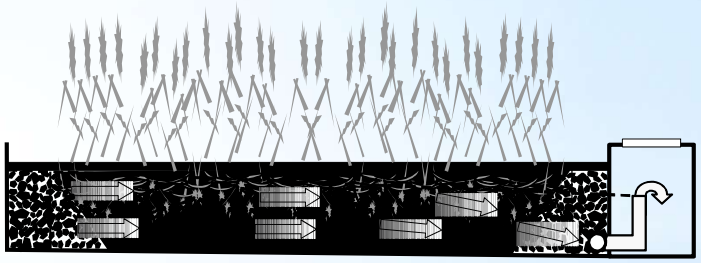
Biogas digester



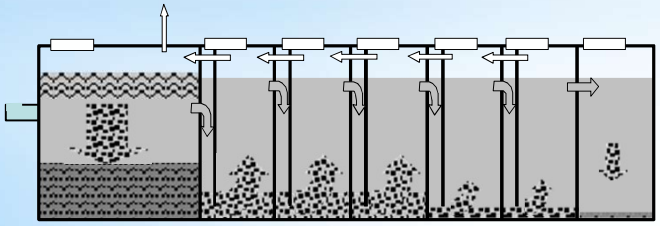
Anaerobic Filter



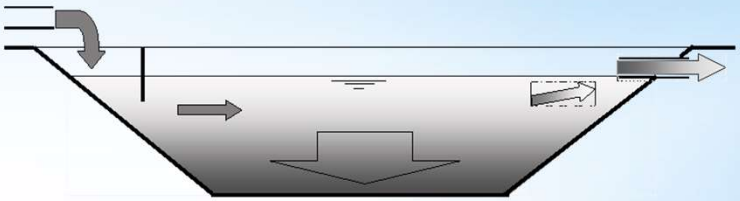
Settler



Planted Gravel Filter



Anaerobic Baffled Reactor



Pond Systems

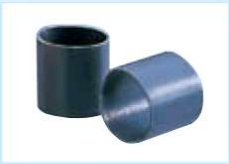
(C) DEWATS system (B0RDA)

* Johkasou system (K-HC-T)

Kitchen
Toilet
Bath
Laundry

BOD 200mg/L

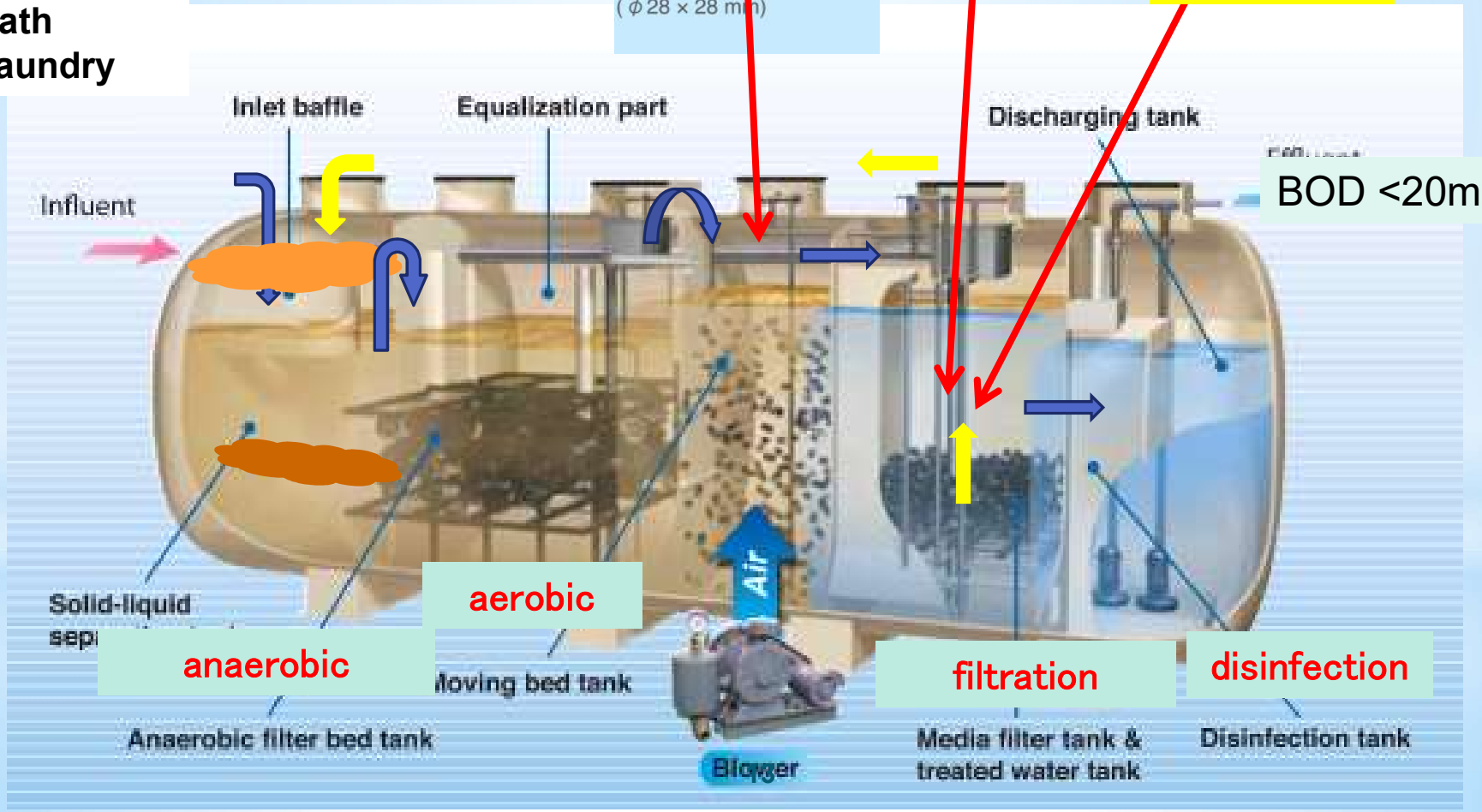
Moving bed media
(ϕ 28 × 28 mm)



Filter media
Smooth-surfaced cylinder
(ϕ14-16 × 15 mm)

Airlift Pump

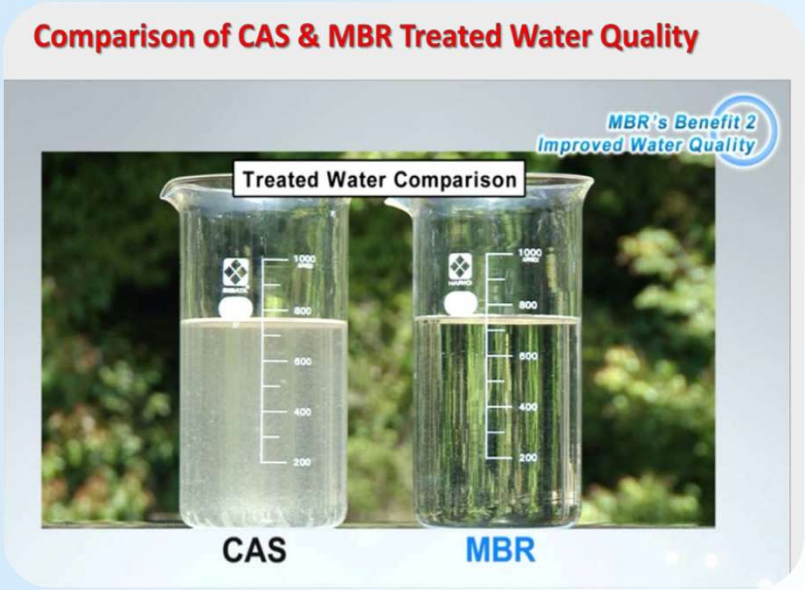
BOD <20mg/L



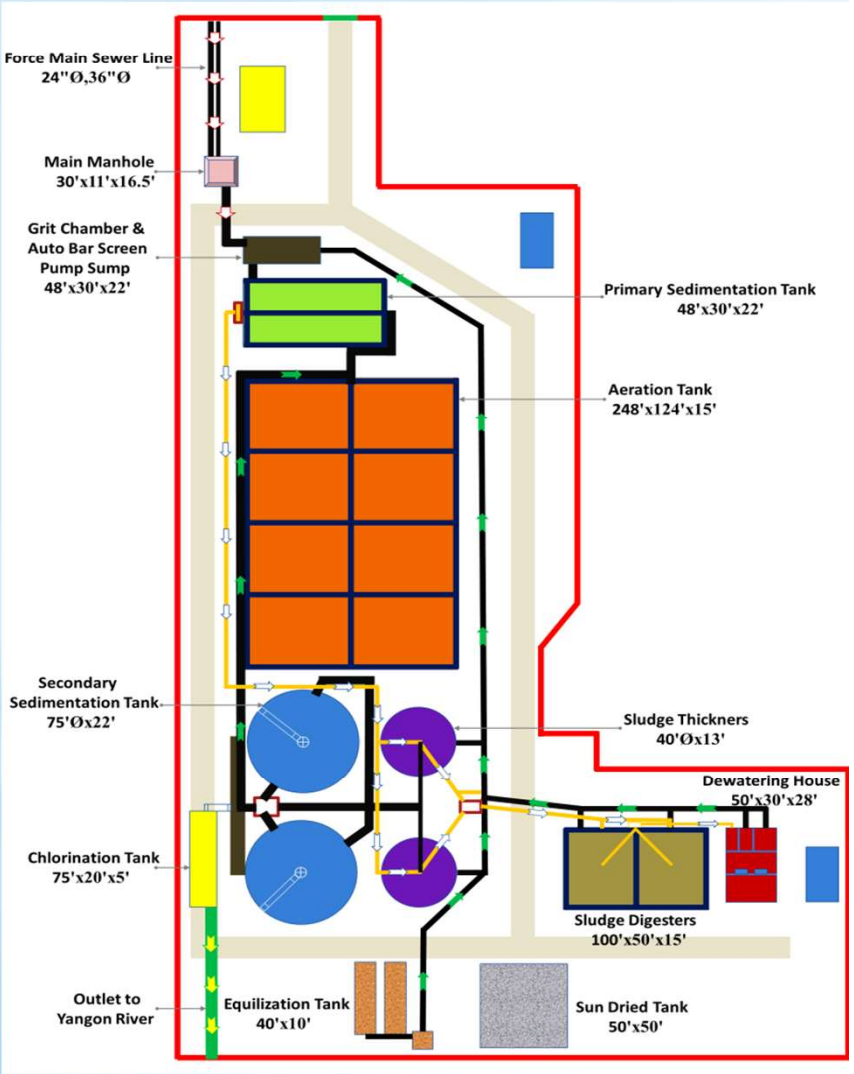
(D) Johkasou System

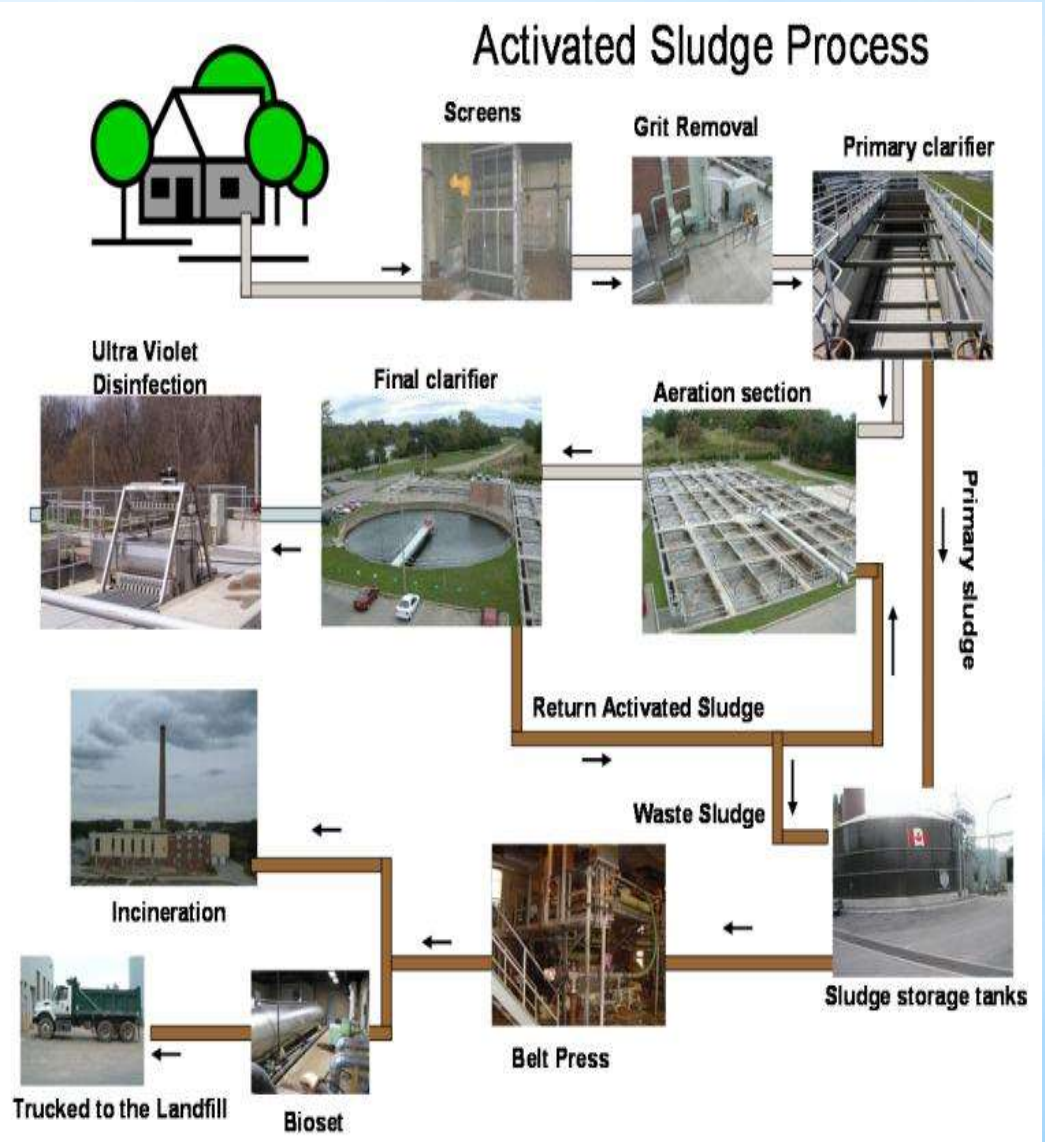
SUBMERSE MEMBRANE MODULE & ELEMENT

(E) Membrane Bio-Reactor System



(F) Activated Sludge Process





Night-Soil Disposal (Desludging Waste) from Septic Tank and Other Facilities

Total no. of Vacuum Trucks = 50

Capacity range = 200 ~ 1000 gal/truck

Minimum no. of disposal = two time/ truck

Daily Average Disposal = 40 ~ 90 time / day

Daily Night-Soil Volume = 50,000 ~ 70,000 gal/day

Quality of Night Soil :

pH = 5.5 ~ 7.5

BOD = 2500 ~ 3500 mg/l

COD = 6,000 ~ 10,000 mg/l

SS = 5000 ~ 10,000 mg/l

Note : Many foreign materials are included in night soil.

Night-Soil / No. of Collection at Yangon City for 2017

Months	Eastern District	Western District	Southern District	Northern District	Total
January	521	414	324	898	2157
February	545	408	320	891	2164
March	544	376	318	923	2161
April	633	306	274	759	1972
May	849	364	389	1203	2805
June	646	356	349	1034	2385
July	362	261	259	772	1654
August	435	305	246	735	1721
September	275	284	223	656	1438
October	430	254	256	608	1548
November	464	291	274	711	1740
Total	5704	3619	3232	9190	21745

Night-Soil Disposal At CDB WWTP at Yangon

Night-Soil Disposal (Desludging Waste) from Septic Tank and Other Facilities

Foreign Material in Night-Soil


High Solid Content in Night-Soil
High solid content in Night-Soil

What is "Decentralized" Wastewater Treatment?

"A method of wastewater treatment that collects wastewater from the source, conveys it to a treatment system, and disperses the water near the point of origin."

Dividing our wastewater infrastructure into smaller, more manageable, pieces.

Current issue in Myanmar

Insufficient investment in preventive health care that also resulted in :

* severe health treats at many level,

*incidence of diarrhea among children under 5 years of age is higher than elsewhere in Southeast Asia

*the high prevalence of debilitating water related vector borne diseases

*significant in environmental and human health challenge

Identify Gaps and Key Challenges

*Need to promote public awareness on waste disposal and management

*Need strong policy effectiveness

*Need close and strong relationships among government institution and private sectors

*Need more financial support from both local and international institution

*Need active participation of all stakeholders in waste disposal and management

*Need technology transfer in waste treatment and management system

*What is Needed?

Improved management, including:

* Better planning and system clustering
* Improved owner awareness
* Licensed/certified practitioners
* Appropriate, risk-based application of technology to the receiving environment
* Long-term operation & maintenance
* Inspections based on system type, location and receiving environment
* Effective and affordable options for difficult sites, including clustered units
* Consideration of all options (decentralized and centralized)

Voluntary Management Guidelines

5 Suggested approaches to management

* Homeowner Awareness
* Maintenance Contracts
* Operating Permits
* RME Operation and Maintenance
* RME Ownership/Management

RME = Responsible Management Entity

*The Traditional Management Focus

- *Permitting: prescribed limits on acceptable sites; prescribed system designs
- *Installation: oversight of construction and installers and/or licensing, registration
- *O & M: homeowner booklets and brochures, tank pumping info
- *Corrective actions: repair or replacement required when complaints verified

Elements of a Comprehensive Management Program

- Public Involvement
- Planning
- Performance Req’ts
- Training/Certification/Licensing
- Site Evaluation
- Design
- Construction
- Operation & Maint.
- Residuals Management
- Inspections/Monitoring
- Corrective Actions
- Record-Keeping/Reporting
- Financing

Issues – Risk

- Largely based upon the selected collection and treatment options
- Risk of failure offset by homeowner's perception on impact to lifestyle
- Smaller systems = smaller problems
- Smaller problems = easier/cheaper fixes

Issues - Financial

- Emphasis on up-front costs, while long-term O&M costs are overlooked
- Most facilities cannot afford a full-time operator
- Build-out rates may create lack of funding
- Discharge permits do not account for "phase up" of system risk
- Accounting responsibility changes hands
  -

Issues - Maintenance

- Lack of **operators** trained in innovative technologies
- Current municipal operator examinations are not geared toward small-scale technologies
- Still no comprehensive database of small-scale WWTPs < 10,000 GPD

Issues – Regulatory Oversight

Collection System

- New connections – Who is responsible?
- Adherence to standards overlooked
- Every sewage treatment works subject to this part shall be under the supervision of a properly certified operator.
- Current permitting structure and administration is fragmented.

The Positives

1. Private sector service companies or PPP are growing.
2. No shortage of available and affordable Technologies
3. Manufacturer support/training is available
4. YCDC or ECD is open to reviewing affordable and sustainable management plans for these facilities
5. Very cost effective, by comparison

The Positives

6. Remote telemetry is extremely valuable and affordable for managing small-scale WWTPs
7. Management is now emphasized
8. Perception of “public sewer”
9. Effluent quality is exceptional