Comparing Technologies

The Case of Maynilad Water

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Technology Currently Used (19)

Screening/Grit Removal(1)

- preliminary treatment (physical)
- treatment Process in **Central Manila Sewerage System (CMSS)**

Lagoon (Oxidation Pond(1)

- a man-made lake or body of water in which organic wastes are consumed or oxidized by bacteria.
- treatment process in **Dagat-Dagatan Sewage Treatment Plant (DDSTP)**

Extended Aeration(1)

- a type of activated sludge process with no primary settling and long aerobic detention time to generate less excess sludge overall
- treatment process in **Alabang STP (ASTP)(**

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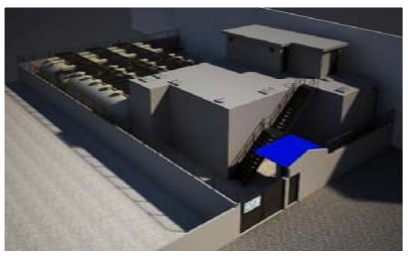
Technology Currently Used

Sequencing Batch Reactor (5)

- a fill-and draw activated sludge system designed to operate under non-steady state conditions

Moving Bed Biofilm Reactor(4)

- is an integrated fixed film activated sludge (IFAS) process and essentially a hybrid between a suspended growth (ASP) and a fixed film system.



Membrane Bioreactor(1)

- a combination of an activated sludge process and membrane separation

Technology Currently Used

Conventional Activated Sludge(2)

- consists essentially of an aerated biological reactor followed by a secondary clarifier.

STM Aerotor (3)

- activated sludge and fixed film technology as part of a process that provides biological nutrient removal for municipal wastewater treatment

1. 1 septage treatment plant
2. 1 sewage and septage treatment plant

Cost Comparison

Type of Technology	Capital Cost (Php) per m^3 (excluding cost of land)	Operational Cost (Php) per m^3	Land Area (m^2) per Volume (m^3)
STM Aerotor	**38,500** (29,600 – 48,900)	**7.9** (6.2 – 9.8)	**0.518** (0.335 – 0.736)
MBBR	**49,700** (37,000 – 58,400)	**4.9** (4.4 – 5.3)	**0.19** (0.164 – 0.223)
Modified Activated Sludge	**19,200**	**2.5**	**0.308**
SBR	**40,900** (22,100 – 66,500)	**10.4** (6.3 – 14.5)	**0.654** (0.255 – 1.122)

- The choice of technology was dependent on the land availability
- The actual operating cost cannot be determined yet since the projects are in various stages of operation (i.e. probing, commissioning, under construction)
- The water that is being treated is combined and basically storm water and the technology used was based on sewage

STP Facility	Year Constructed	Capacity (m3/day)	Technology	Cost of Construction	Cost of Operation (Php) / m3	Php 1,000 Cost per m3 ($)	Land Area (m2)
Baesa STP	2012	390	STM Aerotor	11,571,359	6.2	29.6 ($ 700)	287
Tandang Sora STP	2012	1,200	STM Aerotor	58,731,371.	9.8	48.9 ($ 1,200)	402
A.Samson 2 STP	2012	1,900	STM Aerotor	70,470,283	7.8	37.0 ($ 900)	917
San Antonio STP	2012	3,310	MBBR	193,443,263.	5.3	58.4 ($ 1,400)	605
Del Monte STP	2012	3,510	MBBR	193,636,526.	5.0	55.1 ($ 1,300)	574
Paltok STP	2012	4,900	MBBR	175,833,728	4.4	35.8 ($ 600)	1,091

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STP Facility	Year Constructed	Capacity (m3/day)	Technology	Cost of Construction (Php)	Cost of Operation (Php) / m3	Php 1,000 per m3 ($)	Land Area (m2)
Bahay Toro STP	2012	13,400	Modified Activated Sludge Process	257,639,073.	2.5	19.2 ($ 400)	4,128
Bagbag STP	2012	10,400	SBR	229,909,954	6.3	22.1 ($ 500)	3,516
Tatalon STP	2012	8,100	SBR	200,914,287	7.2	24.8 ($ 600)	2,065
Congressional	2012	570	SBR	23,226,121	10.6	40.7 ($ 1,000)	620
Legal	2012	410	SBR	27,297,300	14.5	66.5 ($ 1,600)	460
Grant	2012	620	SBR	31,268,429	13.4	50.4 ($ 1,200)	290
Paco	2012	410	MBBR Jokasu	28,000,000	-	68.2 ($ 1,700)	500

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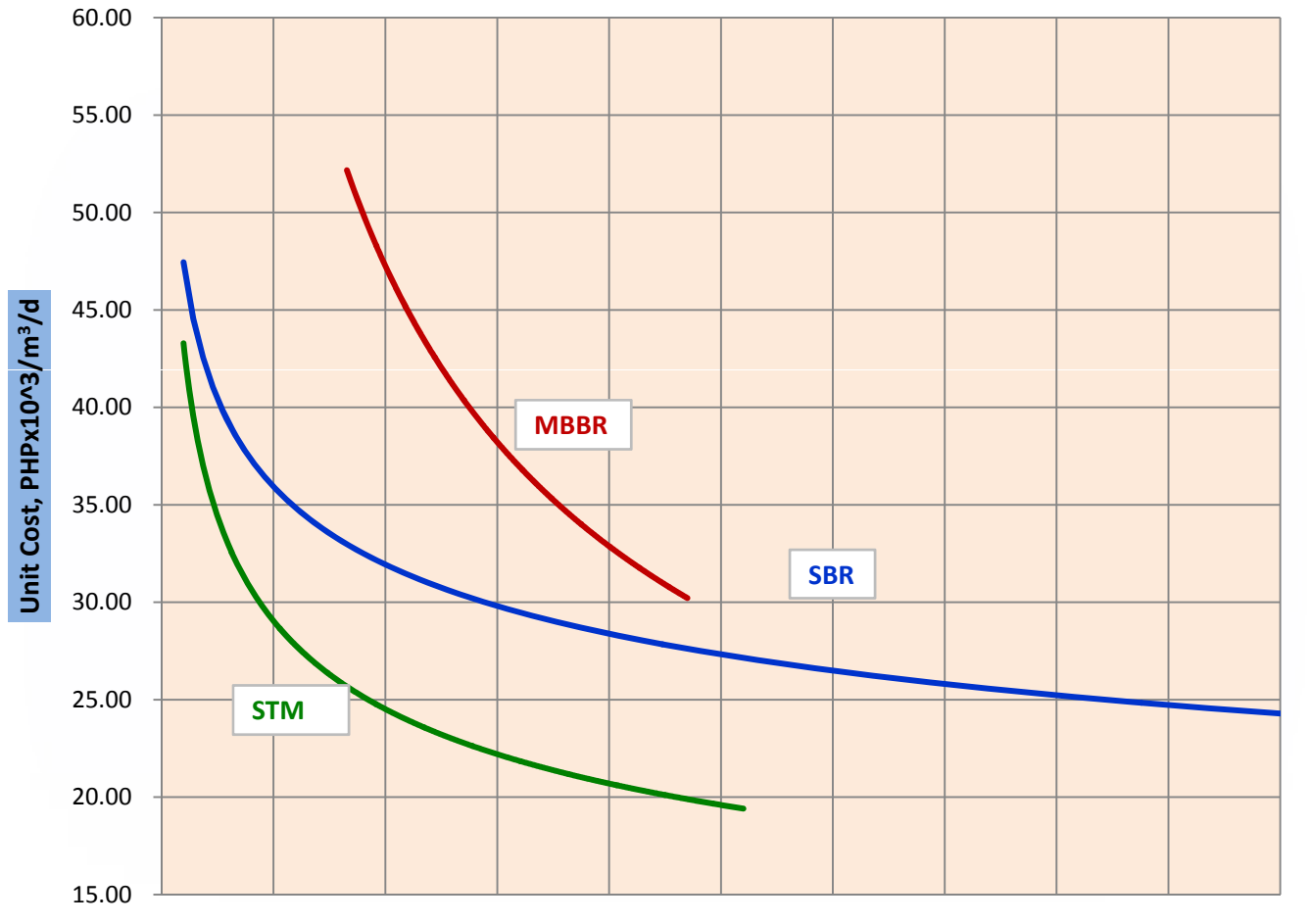
Old Facilities

Existing Facilities	Process	Operational Cost (Php) per m^3
Alabang Sewage Treatment Plant (ASTP)	Conventional Activated Sludge	3.8
Dagat-dagatan Sewage Treatment Plant (DDSTP)	Oxidation Pond / Aerated Lagoon	1.1
Central Manila Sewage Treatment Plant (CMSS)	Primary Treatment	0.7
Dagat-dagatan Septage Treatment Plant (DDSpTP)	Coagulation & Filter Press	134.0

STP/CAPEX



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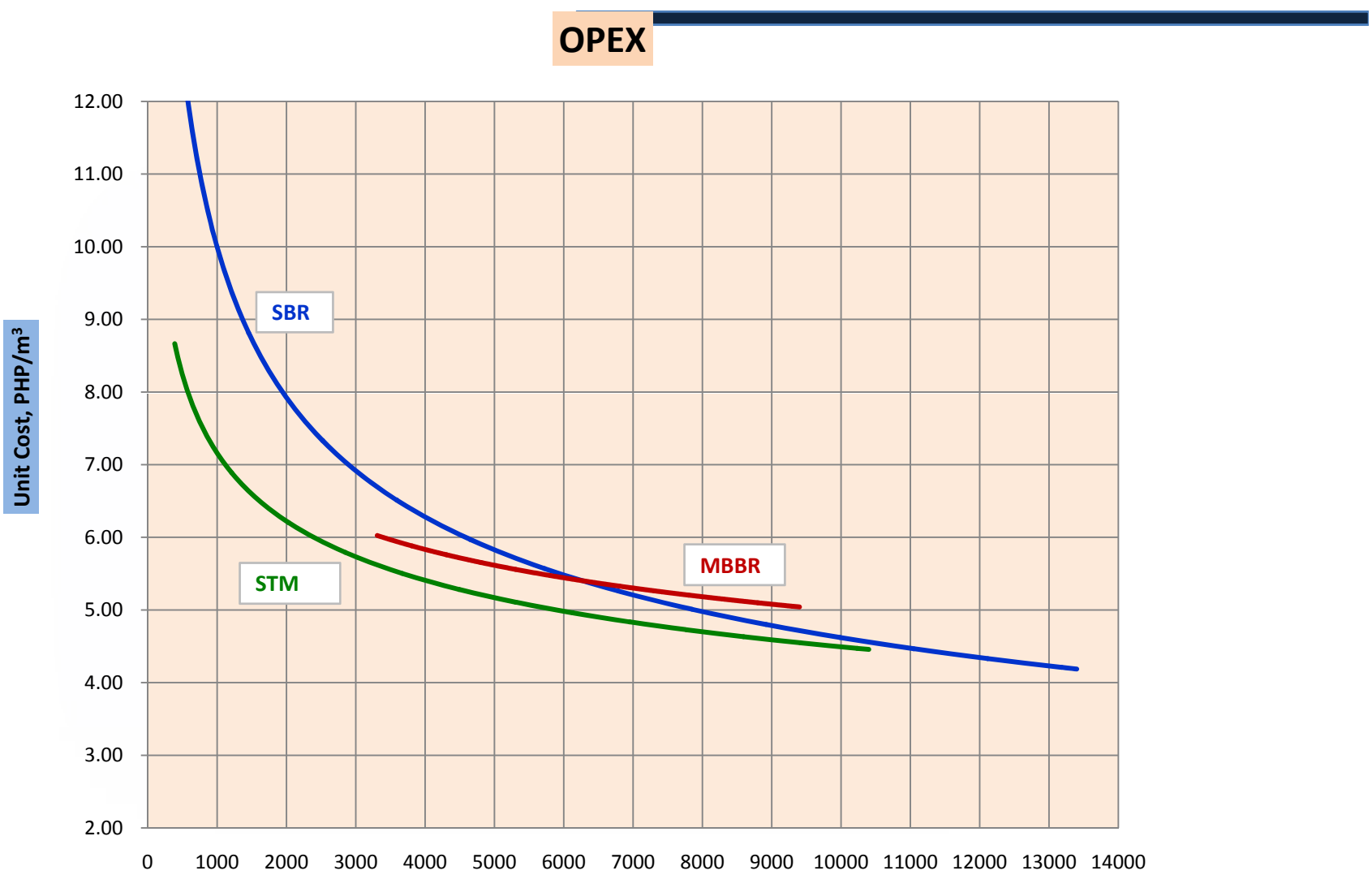

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Comparison of Technologies

Type of Technology	Efficiency	Power	Reliability
STM Aerotor	6	2	*
Sequencing Batch Reactor (SBR)	2	5	1
Conventional Activated Sludge (CAS)	1	6	*
Moving Bed Biofilm Reactor (MBBR)	4	4	*
Membrane Bio Reactor (MBR)	5	3	*
Oxidation Pond	3	1	2

- CAS is an extended aeration process explaining the high cost of power
- Oxidation pond gives good BOD results but produces high Total Suspended Solids (TSS) and during summer, high pH
- Since Maynilad is treating storm water, the variability inflow is a problem and SBR being a batch process is more effective than any continuous process
- SBR has added advantage on biological nitrogen removal
- CAS, while most efficient, produces the highest volume of sludge
- During spikes of flow or sudden storm surge, the required retention time for continuous process is not met and the mixed liquor suspended solids are carried in the overflow

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Thank you.