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Technology Options for Wastewater Treatment

Outline

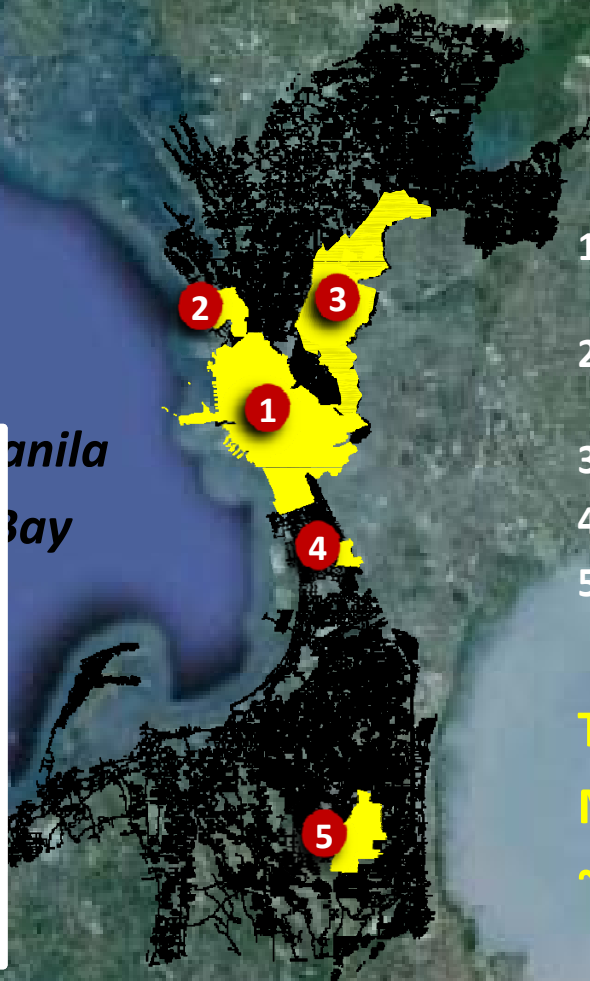
- Sewage Treatment Process
- Existing Facilities and Technology Used
- Technology Selection Criteria
- Technology Options



Sewage Treatment Proces

Preliminary (Physical)	Primary (Physical)	Secondary (Biological)	Sludge Management/ Disposal
• Screening • Grit Removal • Oil and Grease	• Flow Equalization • Aeration • Sedimentation	✓ Suspended Growth Process ✓ Attached Growth Process ✓ Integrated Fixed-film Activated Sludge	• Sludge Stabilization • Digestion • Sludge Dewatering ✓ Decanter ✓ Filter Press ✓ Screw Press
TSS, Oil and Grease	TSS, BOD,	BOD, COD, Tertiary Treatment • Disinfection ✓ Chlorination • Nitrification and Phosphorus Removal	Sludge Disposal
		Options for Water Reuse/Recycle	Options for Waste to Energy

Existing Wastewater Facilities



1. Central Manila Sewerage System - *(ISO 9001&14001; OHSAS 18001)*
2. Dagat-dagatan Sewerage System - *(ISO 9001 &14001; OHSAS 18001)*
3. San Juan River Basin Project
4. Makati Isolated System
5. Alabang Sewerage System

Total capacity of 469,000 m³/day
More than 480 km sewerlines
~120,000 households served
Laguna de bay

Technology Currently Used



Screening/Grit Removal

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



Lagoon (Oxidation Pond)

- 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

- 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 Selection Criteria



Technical

- Process robustness
- Process efficiency
- Compact footprint
- Ease of operation and maintenance
- Potential for expansion
- Potential for upgrading
 - New requirements for nutrient removal and lower BOD/COD influent



Technology Selection Criteria

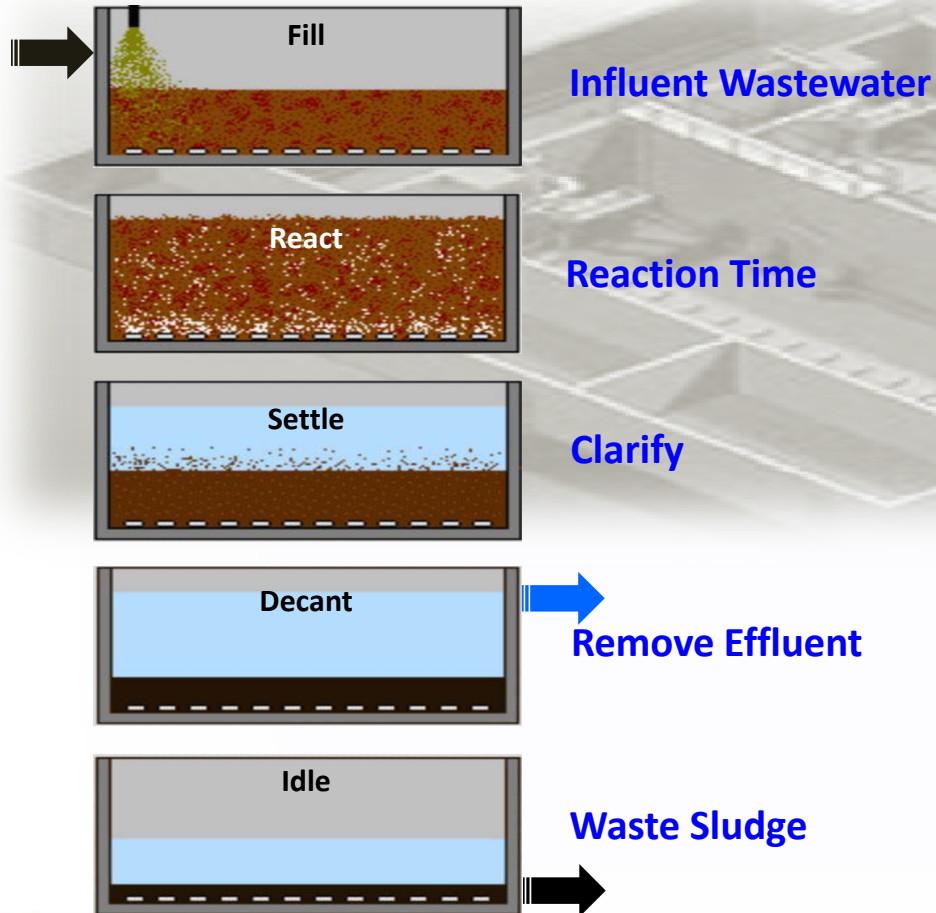


-  Environmental/Health
 - Sludge management
 - Odor treatment requirement
 - Noise
-  Statutory Requirements
-  Economics
 - Cost efficiency

Technology Options

- Sequencing Batch Reactor (SBR)
- Moving Bed Biofilm Reactor (MBBR)
- STM Aerotor
- Conventional Activated Sludge (CAS)

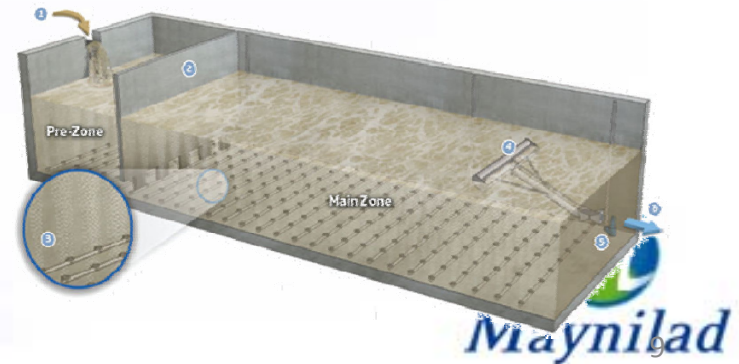
Sequencing Batch Reactor (SBR)



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

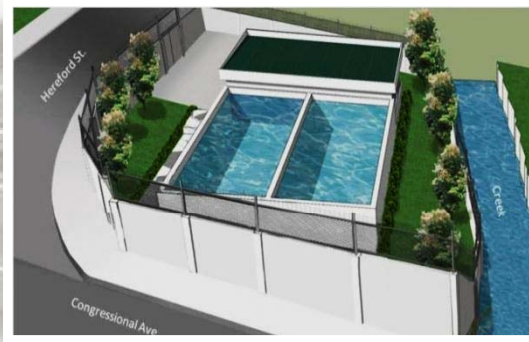
Features:

- Smaller footprint because of absence of primary, secondary clarifiers and digester
- Biological nutrient (N&P) removal
- High degree of coliform removal
- Less chlorine dosing required for post disinfection
- Ability to withstand hydraulic and organic shock loads

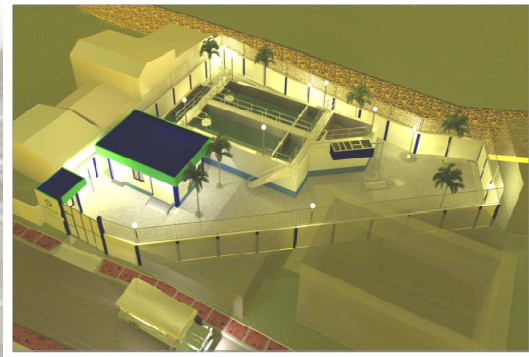


Maynilad's SBR Treatment Plants

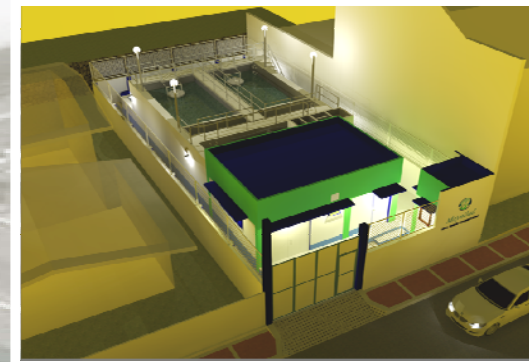
**Congressional STP
(567 cmd)**



**Grant STP
(4,800 cmd)**

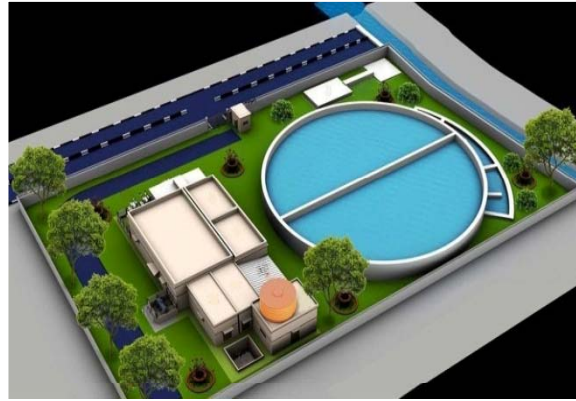


**Legal STP
(4,800 cmd)**



Maynilad's SBR Treatment Plants

**Bagbag STP
(10,400 cmd)**



**Tatalon STP
(8,100 cmd)**



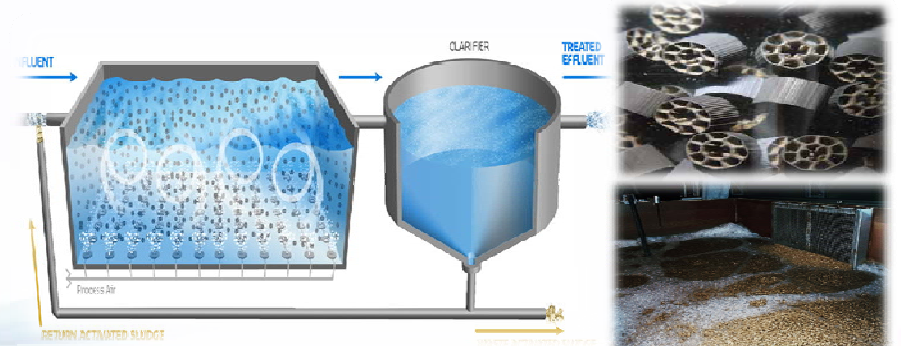
Moving Bed Biofilm Reactor (MBBR)



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

Features:

- Flexible design that allows for increased capacity
- Stable under large load variations
- Smaller foot print
- Single pass treatment
- Extremely compact and simple biological treatment system

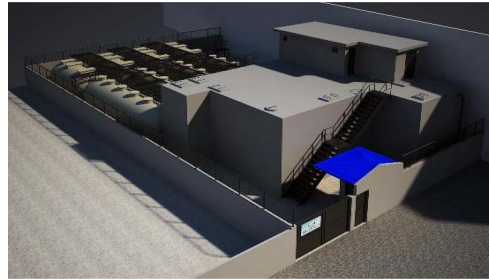


Maynilad's MBBR Treatment Plants

**San Antonio STP
(3,310 cmd)**



**Paco STP
(410 cmd)**



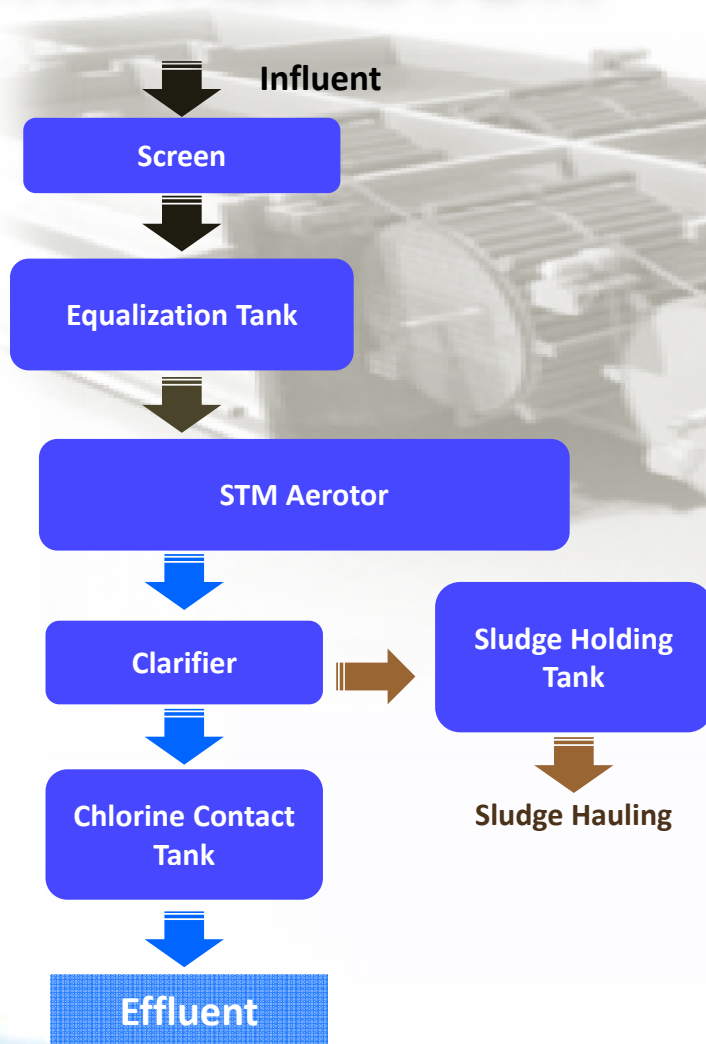
**Del Monte STP
(3,510 cmd)**



**Paltok STP
(4,900 cmd)**



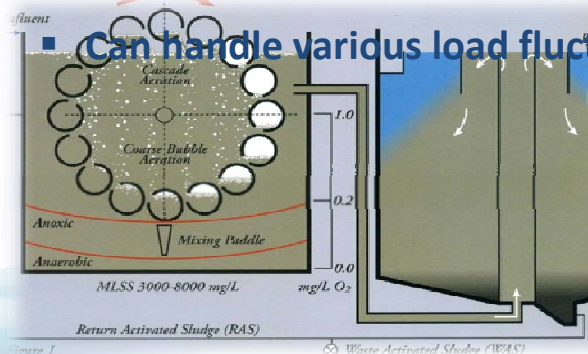
STM AEROTOR



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

Features:

- Low energy requirement
- Small footprint
- Improved sludge settling and quality
- Low capital
- Advance biological nutrient removal
- Stable process
- No odors
- Can handle various load fluctuations



Maynilad's STM Aerotor Treatment Plants

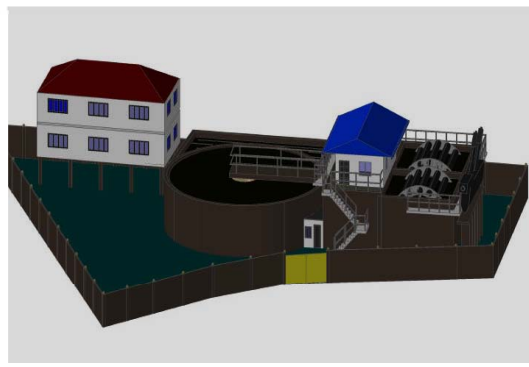
**Baesa STP
(390 cmd)**



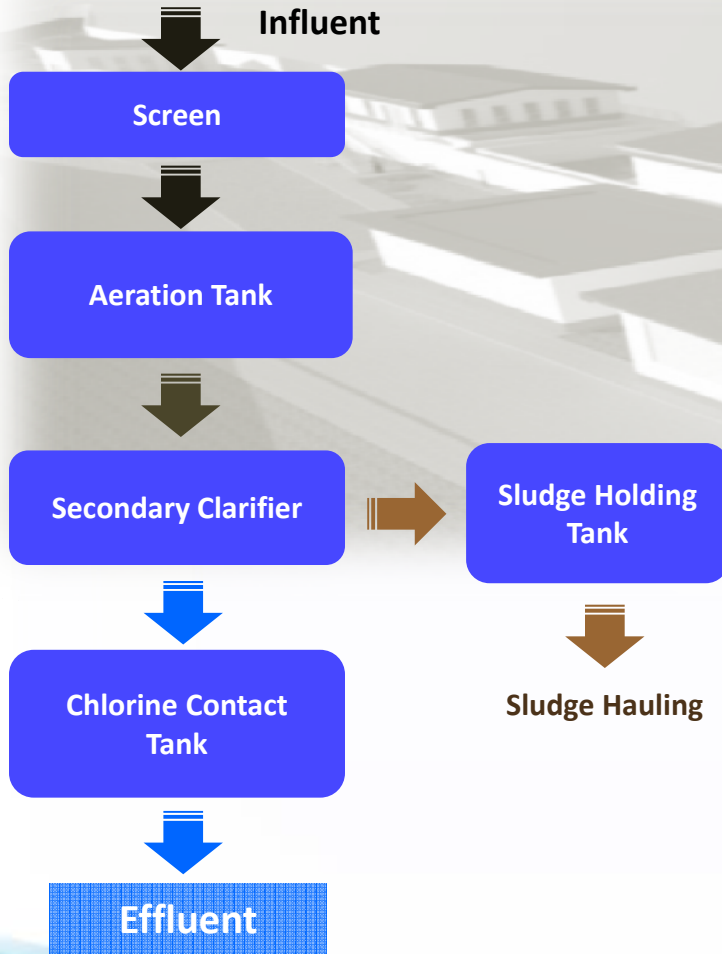
**Tandang Sora STP
(1,200 cmd)**



**Samson STP (3,510
cmd)**



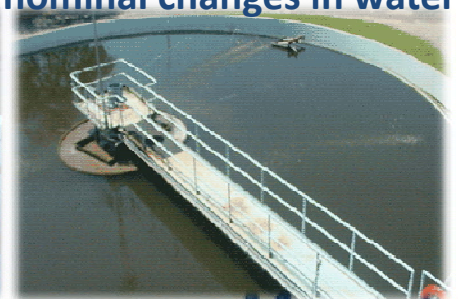
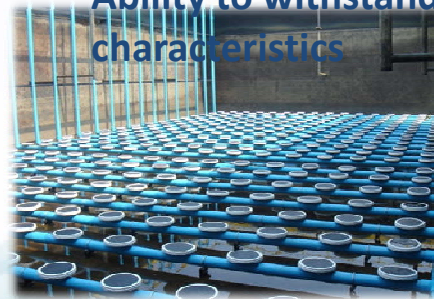
Conventional Activated Sludge (CAS)



CAS is the most common suspended growth process used for municipal wastewater treatment. It consists essentially of an aerated biological reactor followed by a secondary clarifier.

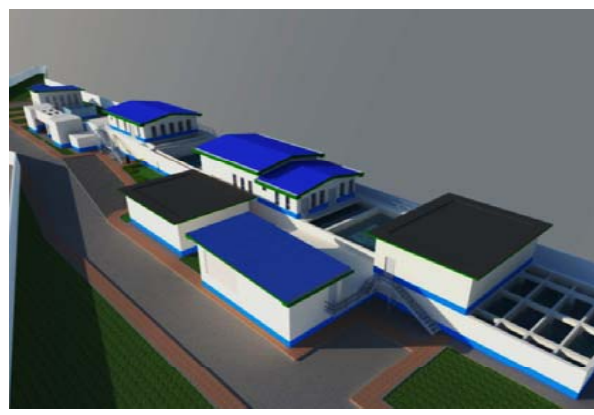
Features:

- Good process flexibility
- Reliable operation
- Proven track record in all plant sizes
- Low odor emission
- Energy production
- Ability to withstand nominal changes in water characteristics



Maynilad's CAS Treatment Plant

**Bahay Toro STP
(13,400 cmd)**



STP Facility	Year Constructed	Capacity (m3/day)	Technology	Cost of Construction	Cost per m3/treatment	Land Area (m2)
Baesa STP	2012	390	STM Aerotor	11,571,359	29,670	287
San Antonio STP	2012	3,310	MBBR	193,443,263.	58,442	605
Del Monte STP	2012	3,510	MBBR	193,636,526.	55,167	574
Tandang Sora STP	2012	1,200	STM Aerotor	58,731,371.	48,943	402
Bahay Toro STP	2012	13,400	Modified Activated Sludge Process	257,639,073.	19,227	4,128
A.Samson 2 STP	2012	1,900	STM Aerotor	70,470,283	37,090	917
Bagbag STP	2012	10,400	SBR	229,909,954	22,107	3,516
Paltok STP	2012	4,900	Moving Bed Bioreactor	175,833,728	35,884	1,091
Tatalon STP	2012	8,100	SBR	200,914,287	24,804	2,065
Congressional	2012	570	SBR	23,226,121	40,748	620
Legal	2012	410	SBR	27,297,300	66,579	460
Grant	2012	620	SBR	31,268,429	50,433	290



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Thank you.