NEW ZEALAND
Trade & Industrial
WATERS FORUM

NZ Trade & Industrial Waters Forum

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Wastewater Treatment Plant Solutions

- Presentation by:
- **Marno Raath** – RAA, Director
- 13 August 2024
- New Zealand Trade & Industrial Waters Forum

Who we are

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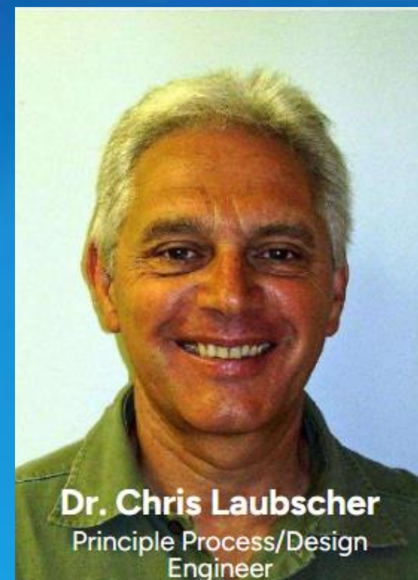

Who we are

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OUR ASSOCIATES

Parkinson & Holland

Evers Engineering

Dreenan Civil

aquAero New Zealand

NZ Trade & Industrial Waters Forum

Blue Planet Labs

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Why are our services needed?

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Presentation Points

1. How the Combined Works (CW) system works
2. Performance parameters
3. Benefits to users
4. Open discussion

1. How the CW system works

1. Containerized CW System
2. Retrofit CW System
3. Permanent CW System

Exterior

600 KL/day WWTP

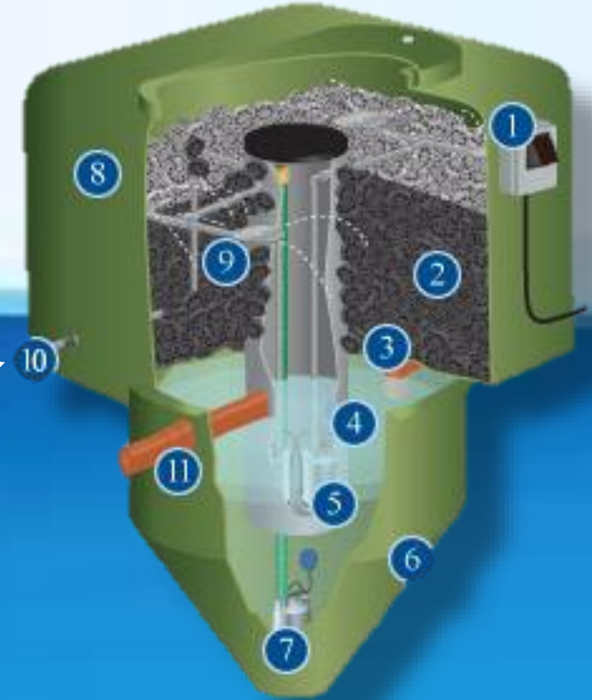
Exterior

25 ML/day WWTP in Krasnodar Territory

Interior

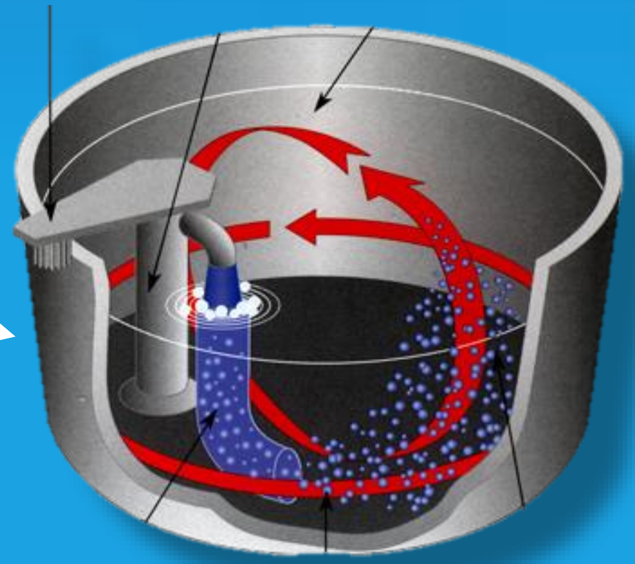
Componentry Involved

Biofilter



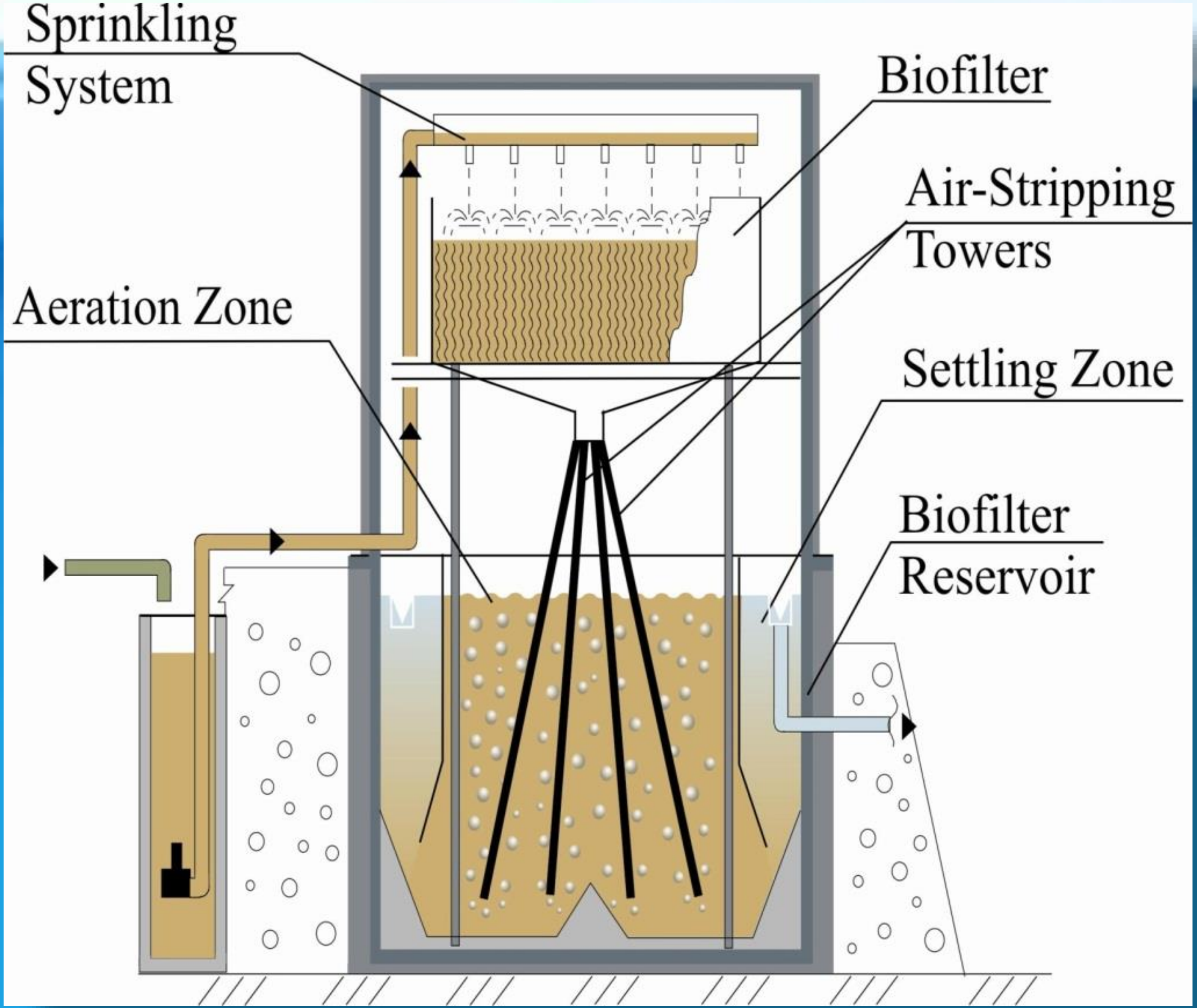
plus

Aeration Tank



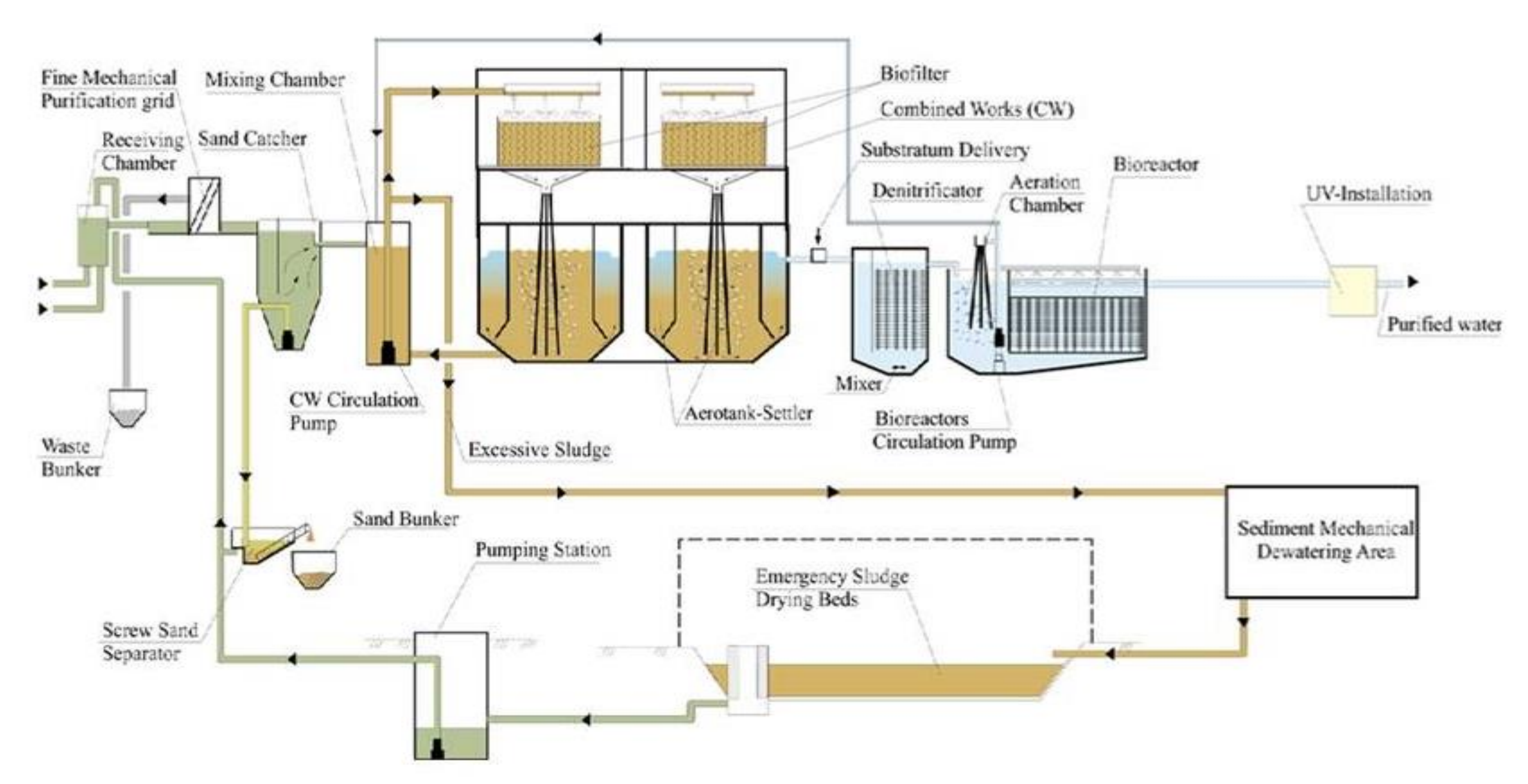
Working together

How this combination works



- **International Patent Consignee**
- **Perpetual Self-Sufficient Maintenance Free Wastewater Treatment System**

General Process Flow



2. How the CW system Performs

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Appendix 6: Typical effluent quality following various levels of treatment

Treatment	BOD mg/l	Total Suspended Solids mg/l	Total Nitrogen mg/l	Total Phosphorus mg/l	*E coil* org/100 ml	Anionic Surfactants mg/l	Oil and Grease mg/l
Raw Wastewater	150-500	150-450	35-60	6-16	10^7-10^8	5-10	50-100
A	140-350	140-350					
B	120-250	80-200	30-55	6-14	10^6-10^7		30-70
C	20-30	25-40	20-50	6-12	10^5-10^6	<5	< 10
D	5-20	5-20	10-20	<2			< 5
E					$< 10^3$		
F	2-5	2-5	< 10	< 1	$< 10^2$		< 5

Table 7: Typical effluent quality for variouse levels of tr

Yes, we can achieve a Median 3mg/L for TN by increasing Anaerobic Reactor, which reduces incoming N to achieve effluent TN.

NOTES: PLANT TYPE - TYPICAL TREATMENT PROCESSES

Treatment Process Category	Parameters to be removed	
A Pre Treatment	Gross solids, some of the readily settleable s	
B Primary Treatment	plus readily settleable solids	Primary sedimentation
C Secondary Treatment	Most solids and BOD	
D Nutrient removal	Nutrients after removal of solids	
E Disinfection	Bacteria and viruses	
F Advanced wastewater treatment	Treatment to further reduce selected parameters	

ABBREVIATIONS

BOD = Biochemical Oxygen Demand

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National Water Quality Management Strategy
Australian Guidelines for Sewage Systems
Effluent Management, 1997
Table 7, Pg 42

Operating Climate Temp

High Temperatures 49°C

Climate data for Turkestan													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	18.7 (65.7)	26.4 (79.5)	30.7 (87.3)	36.3 (97.3)	40.5 (104.9)	46.9 (116.4)	49.1 (120.4)	46.5 (115.7)	41.9 (107.4)	35.3 (95.5)	27.9 (82.2)	21.6 (70.9)	49.1 (120.4)
Average high °C (°F)	1.6 (34.9)	5.3 (41.5)	13.5 (56.3)	21.9 (71.4)	28.3 (82.9)	34.3 (93.7)	36.3 (97.3)	35.0 (95)	28.8 (83.8)	20.3 (68.5)	11.4 (52.5)	3.4 (38.1)	20.0 (68)
Daily mean °C (°F)	−3.1 (26.4)	−0.2 (31.6)	6.9 (44.4)	14.8 (58.6)	21.0 (69.8)	26.8 (80.2)	28.7 (83.7)	27.0 (80.6)	20.4 (68.7)	11.9 (53.4)	4.9 (40.8)	−1.7 (28.9)	13.1 (55.6)
Average low °C (°F)	−7.2 (19)	−4.6 (23.7)	1.3 (34.3)	8.1 (46.6)	13.6 (56.5)	18.2 (64.8)	20.1 (68.2)	18.2 (64.8)	11.7 (53.1)	4.4 (39.9)	−0.4 (31.3)	−5.7 (21.7)	6.5 (43.7)
Record low °C (°F)	−33.6 (−28.5)	−38.6 (−37.5)	−28.3 (−18.9)	−8.4 (16.9)	−4.3 (24.3)	3.1 (37.6)	6.4 (43.5)	3.4 (38.1)	−5.5 (22.1)	−14.3 (6.3)	−31.8 (−25.2)	−33.0 (−27.4)	−38.6 (−37.5)
Average precipitation mm (inches)	22 (0.87)	26 (1.02)	28 (1.1)	23 (0.91)	24 (0.94)	5 (0.2)	6 (0.24)	3 (0.12)	3 (0.12)	10 (0.39)	26 (1.02)	27 (1.06)	203 (7.99)
Average rainy days	5	6	8	8	7	4	2	1	2	4	7	6	60
Average snowy days	7	6	2	0.3	0	0	0	0	0	0.3	2	5	23
Average relative humidity (%)	79	73	63	50	43	33	34	32	36	51	69	79	54
Mean monthly sunshine hours	138	155	199	247	337	382	401	383	315	248	167	122	3,094

[hide]

Source #1: Погода и Климат (Weather and Climate)[9]

Source #2: NOAA (sun, 1961–1990)[10]

79% Relative Humidity

Building Standards & Codes

Approved International Standards

Australian New Zealand
Building Codes:

- AS/NZS 1547:2012
- AS15463:2017

International Publications

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1) V.P Kolesnikov, E.V Vilson “Modern development processes of sewage treatment plants in combined works” publishing house "South", Rostov-on-Don, Russia, 2005.

2) Modern development of operation processes of sewage purification at combined installations, by Vladimir Kolesnikov & Elena Vilson, 28 Sept 2004.

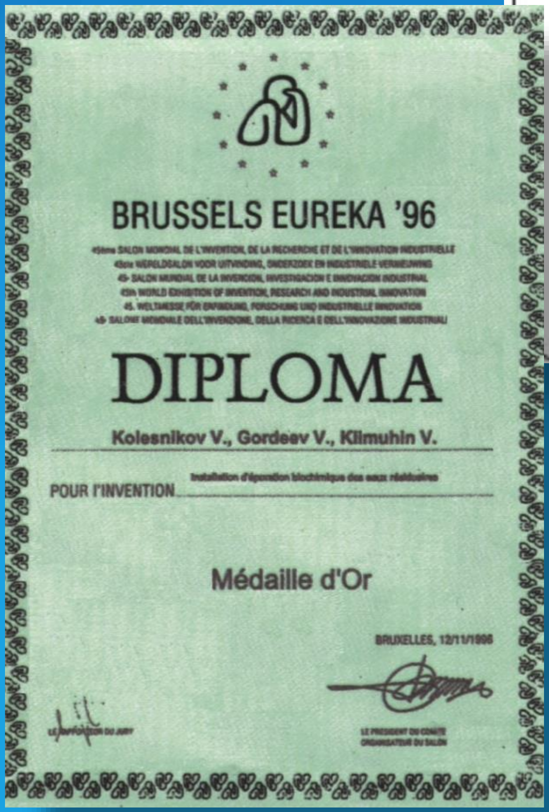
3) V.P Kolesnikov, E.V Vilson, V.K Gordeev-Gavrikov “Combined works with biofilters and aerotanks”, magazine “ZHKH” № 12, Part I., Moscow,Russia, 2003.

4) GOST 17.4.3.07-2001 Nature Conservancy. Soils. Requirements for the properties of sewage sludge when used as fertilizer, GosStandart, 2001.

5) SanPiN 2.1.7.573-96 Hygienic requirements for the use of wastewater and rainfall for irrigation and fertilizers, Moscow, Russia, 1996.

Awards & Recognitions

- **Gold Medal for Best New Technology – Brussels, International Technology Conference, 2003.**



BRUSSELS EUREKA '96

45ème SALON MONDIAL DE L'INVENTION, DE LA RECHERCHE ET DE L'INNOVATION INDUSTRIELLE
45ste WERELDSALON VOOR UITVINDING, ONDERZOEK EN INDUSTRIELE VERNIEUWING
45º SALON MUNDIAL DE LA INVENCION, INVESTIGACION E INNOVACION INDUSTRIAL
45th WORLD EXHIBITION OF INVENTION, RESEARCH AND INDUSTRIAL INNOVATION
45. WELTMESSE FÜR ERFINDUNG, FORSCHUNG UND INDUSTRIELLE INNOVATION
45º SALONE MONDIALE DELL'INVENZIONE, DELLA RICERCA E DELL'INNOVAZIONE INDUSTRIALE

DIPLOMA

Kolesnikov V., Gordeev V., Klimuhin V.

POUR l'INVENTION Installation d'épuration biochimique des eaux résiduaires

Médaille d'Or

BRUXELLES, 12/11/1996

LE RAPPORTEUR DU JURY

LE PRESIDENT DU COMITE ORGANISATEUR DU SALON

SYRIAN ARAB REPUBLIC
COUNCIL OF HIGHER EDUCATION

وزارة التعليم العالي

CERTIFICATE

49th Science Week

Management of Solid and Liquid Wastes in Syria
Present Status and Prospects for Development

Hereby Confers upon

Dr. Kolesnikov Vladimir - RUSSIA

A certificate of participation in this Conference
Al-baath University Campus
9 -11 November 2009

Secretary General of Council of Higher Education
Prof. Dr. Watheq Rasoul-Agha

Minister of Higher Education
President of Council of Higher Education
Prof. Dr. Ghias Barakat

International Patents

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US patents 13/065,089 issued:

- Canada;
- Argentina 20110100172,
- Brazil PI1103172,
- China 201110069244.1;
- India MUMNP|2010;
- Australia AU2010224357,
- Israel 206218;
- Ukraine 201104106/1,

CIS countries 201100002 (Eurasian patent):

- Egypt 1497/2012;
- Turkey 2012/09197,
- Libya 2012/4532,
- South Africa 2012/04073,

186+ Worldwide Installations

Additional Advantages

1. 100% Natural Cleaning with No Chemicals.
2. 100% Fully Automated System.
3. Minimal Internal Moving Parts.
4. High Effluent Performance Results.
5. Scalable and Adaptable.
6. Small Footprint Size Requiring Less Land.
7. Small Sanitation Perimeter Zone 8-26m.
8. Enclosed & Odorless.
9. Minimal Operational Staff.
10. Low Electricity Costs.
11. Low Operations & Maintenance Costs.
12. Low Construction Costs.
13. An Investment that Makes Huge Net Profits $$$.

3. Benefits to End Users

1. Allows for control of timeframes and removes the constraints and delays of local government (Pre-Developer Engagement)

2. Insulates developments from unforeseen costs (such as IGC increases)

3. Small footprint, so keeps land costs low

4. Genuine Environmental benefits

5. Significant $$$ savings in construction and operation relative to available alternatives.

Competitive Advantage

[5 ML/day WWTP]

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Electricity Consumption Comparison

#	System Type	Electricity Usage (per ML kWh)	WWTP Capacity (ML)	Total Electricity Consumption (kWh/hr)	Daily Electricity Consumption (kWh/d)	Electricity Rate (per kWh)	Daily Electricity Costs (per day)	Annual Electricity Consumption (kWh)	Annual Electricity Costs (per year)	Total Savings (per year)
1	MBR	315	4	1,260	30,240.00	$0.24	$7,257.60	11,037,600	$2,649,024.00	**$0.00**
2	CWS	25.2	5	126	3,024.00	$0.24	$725.76	1,103,760	$264,902.40	**$2,384,121.60**
3	CWS with 40% Solar Energy	15.12	5	76	1,814.40	$0.24	$435.46	662,256	$158,941.44	**$2,490,082.56**

Notes:

Aeration takes up to 50% of the total energy consumption, 35%-90% of which is commonly used for membrane aeration or air scouring. [117,119,120] Bailey et al. [121] reported that the energy consumption of a 4,000 m 3 / day MBR was 1260 kWh/day with 300 kWh/day for air scouring alone. ...

https://www.researchgate.net/publication/221737301_Specific_energy_consumption_of_membrane_bioreactor_MBR_for_sewage_treatment

Minimal Annual Electricity Costs

REVENUE (SALES):							
#	Desciption	State Govt Bulk Water Charge (rate/kL)	City Council Water Charge (rate/kL)	City Council Customer Price (rate x 0.9) (rate/kL)	WWTP Capacity (ML/day)	Total Revenue (Per Day)	Total Revenue (Per Year)
1.1	Local City Council Revenue	$3.301	$1.181	$4.034	5	$20,169	**$7,361,685**

Annual Sales

INITIAL CAPITAL INVESTMENT (DESIGN & CONSTRUCTION COSTS):							
#	Desciption	MBR System			CWS System		
		WWTP Capacity (ML/day)	Price (Per ML)	Greenfield Turnkey Price	WWTP Capacity (ML/day)	Price (Per ML)	Greenfield Turnkey Price
Construction Costs:							
2.1	Design & Construction Costs	4	$10,927,500	$43,710,000	5	$5,394,000	$26,970,000
*figures are indicative based on site conditions.			**Subtotal**	**$43,710,000**		**Subtotal**	**$26,970,000**

Capital Investment Costs

RUNNING COSTS (O&M COSTS):							
#	Desciption	MBR System			CWS System		
		Quantity	Rate	Total	Quantity	Rate	Total
3.1	Electricity Consumption	1.0	$2,649,024	$2,649,024	1.0	$264,902	$264,902
3.2	Sludge Desiposal	1.0	$120,000	$120,000	1.0	$120,000	$120,000
3.3	Filter Maintenance	1.0	$465,000	$465,000	0.0	$465,000	$0
3.4	Blowers	1.0	$18,000	$18,000	0.0	$18,000	$0
3.5	Mechnical Equipment	1.0	$15,000	$15,000	0.5	$15,000	$7,500
3.6	Facility Maintenance	1.0	$5,000	$5,000	1.0	$5,000	$5,000
3.7	Grounds	1.0	$3,500	$3,500	1.0	$3,500	$3,500
3.8	Lab Tests	1.0	$20,000	$20,000	1.0	$20,000	$20,000
3.9	Operational Staff (FTE)	7.0	$80,000	$560,000	3.0	$80,000	$240,000
			Subtotal	**$3,855,524**		**Subtotal**	**$660,902**

Annual Running Costs

Timeframes

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Phase 1

Comprehensive Report:

- Prelim Design Dwgs & Calculations.
- Detail Costs.
- Estimate Time Sch.
- Plant & Equipment.

2 months

Phase 2

Construction Dwgs & Building Permit:

- Detailed Drawings and Specifications.
- Engineering Calculations.
- Consenting.

3-6 months

Phase 3

Construction & Commissioning:

- Earthworks.
- Civil Works.
- Drainage Works.
- Building Works.
- MEP Works.
- Commissioning.

6-10 months

Phase 4

Maintenance, Monitoring & Reporting:

- Maintenance Schedule.
- Performance Measures.
- Quarterly & Annual Reports.

Annually

Let's Look Through the Plant

Bioremediation

On-Site Brewing System

Sewage Ingress - Before Treatment

Bio-cells Installed

After Treatment

- NZ Patent Agent
- E. Coli controlled
- Sludge Separation
- Reduced ammonia, phosphates, nitrates & suspended solids
- Improved fauna & flora

Any Questions?

Thank you