



Pahiatua WWTP Evidence of John Crawford

Pahiatua WWTP Consents Renewal
- May 2017

Overview of Presentation

- Description of PWWTP
- PWWTP Loading
- PWWTP Performance
- Proposed Effluent Quality
- Optimisation requirements

Pahiatua WWTP – Make Up



- Influent fine screen
- 1.3 ha Facultative Pond (P1)
- 10.5kW mechanical aeration
- 1.4 ha Secondary pond (P2)
- 3kW aeration
- 1.4 ha Maturation Pond (P3) also used for balancing storage
- Coagulant dosing
- Lamella clarifier
- Cloth filter
- UV disinfection

PWWTP - Loading

- Less than 2,500 persons
- ADWF = 408 m³/d [180 l/person/day (Good)]
- ADF = 780 m³/d (approx. 300 l/person/day)
- PWWF = 4,300 m³/d
- 230 kg BOD₅ /d
- 39 kg TN/d
- Pond 1: 177 kg BOD₅/ha/d cf 84 kg/ha/day
- P1 + P2: 85 kg BOD₅/ha/d
- P1 processing capacity approx. 260 kg BOD₅/day

PWWTP - 2016 Performance

Analyte	2016 Performance	
	Mean	95th %ile
Flow (m ³ /day)	780	
cBOD ₅ (mg/L)	23	31
Suspended Solids (mg/L)	41	65
Ammonia (mg/L)	2.5	6
Total Nitrogen (mg/l)	9	14
D.R phosphorus (mg/l)	1.4	2.2
Microbiological		
E.coli (MPN/100ml)	600	2340

EWWTP - 2016 Performance

	TN	DRP	cBOD₅
	kg/d	kg/d	kg/d
Influent	39	7	230
Effluent	7	1.3	18
% Removal	82%	81%	92%

Proposed Effluent Quality

	Following implementation of proposed upgrades	
	Median	95th %ile
scBOD ₅ (g/m ³)	≤5	≤8
Total suspended solids (g/m ³)	≤15	≤30
Ammoniacal nitrogen (g/m ³)	≤10	≤15
DRP (g/m ³)	≤0.5	≤1.0
	Median	95 th %ile.
E.coli (MPN/100ml)	260	1,000

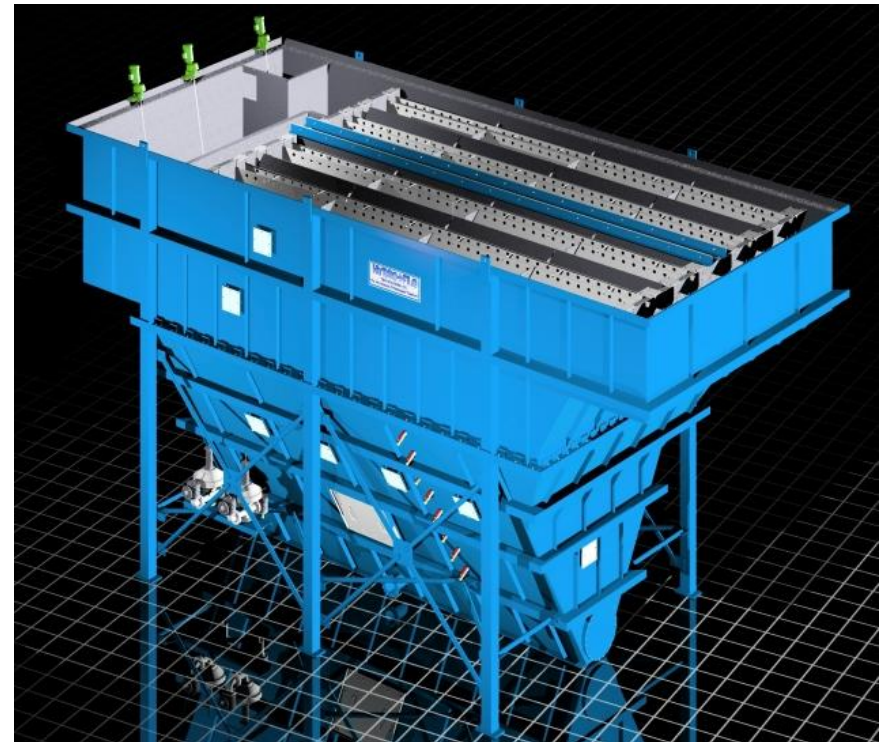
Tertiary Lamella Clarifier

- Target: TSS, DRP, Disinfection pre-cursor
- Incidental (Bonus): cBOD₅, organic N, pathogens direct removal
- Currently used:
 - Taihape, Hunterville, Woodville, Pahiatua &
 - In Actiflo configuration: Warkworth, Ngaruawahia, Gore

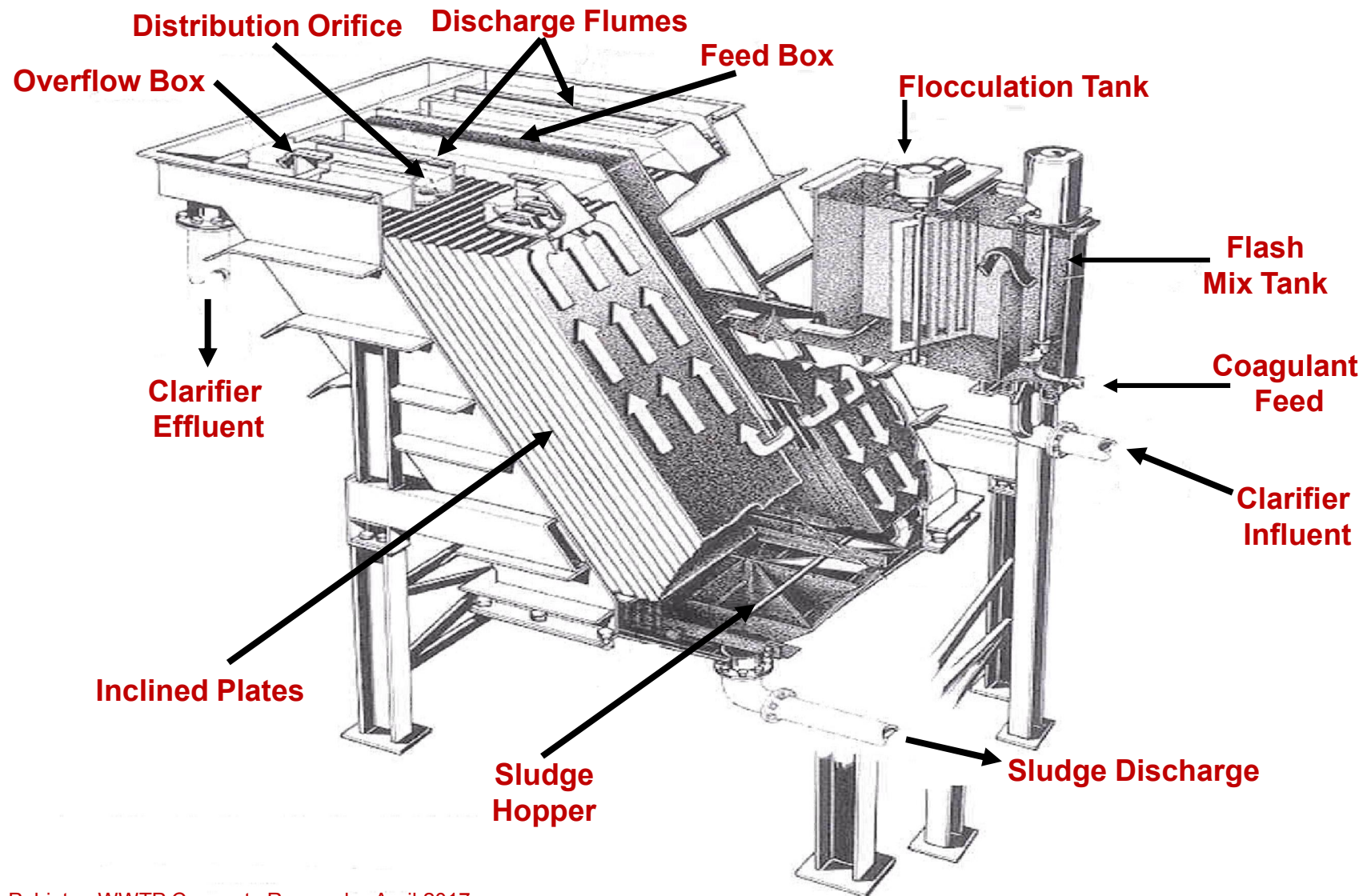
Inclined Plate (Lamella) Clarifier

Increased settling efficiency due to increased surface area

Smaller Area Needed for Installation



Lamella Clarifier



▸ Example Lamella

- Lamellas at Gore WW
Oxidation ponds



Tertiary Cloth Filter

- Target: TSS – mop up what goes through clarifier.
- Incidental (Bonus): cBOD₅, DRP, organic N, pathogens direct removal
- Currently used:
 - Pahiatua, Te Awamutu
 - Similar at Feilding, Whangarei, Whitianga, Pauanui, Whangamata

• Example Cloth Filter

- Cloth Filter at Te Awamutu WWTP



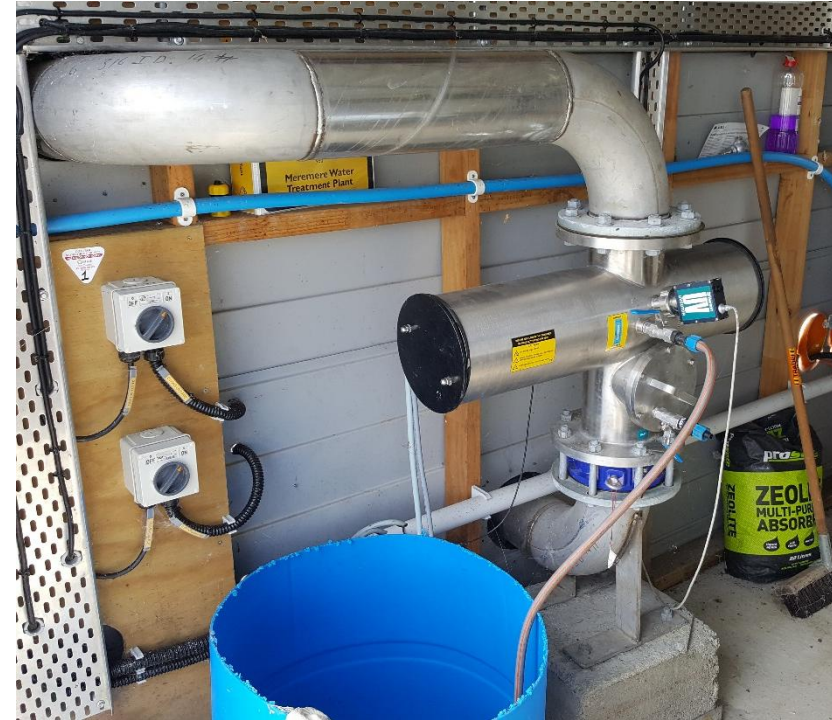
UV Disinfection

- Requires good clarity effluent and low TSS
- Targets Pathogens: Coliform bacteria, Viruses, Protozoa
- Dose rates affected by: Flow rate, Clarity, Solids
- Currently used: Most NZ WWTPs

UV Reactor Types



Open Channel Reactor - Katikati



In-Pipe Reactor - Meremere

UV Dose Rates

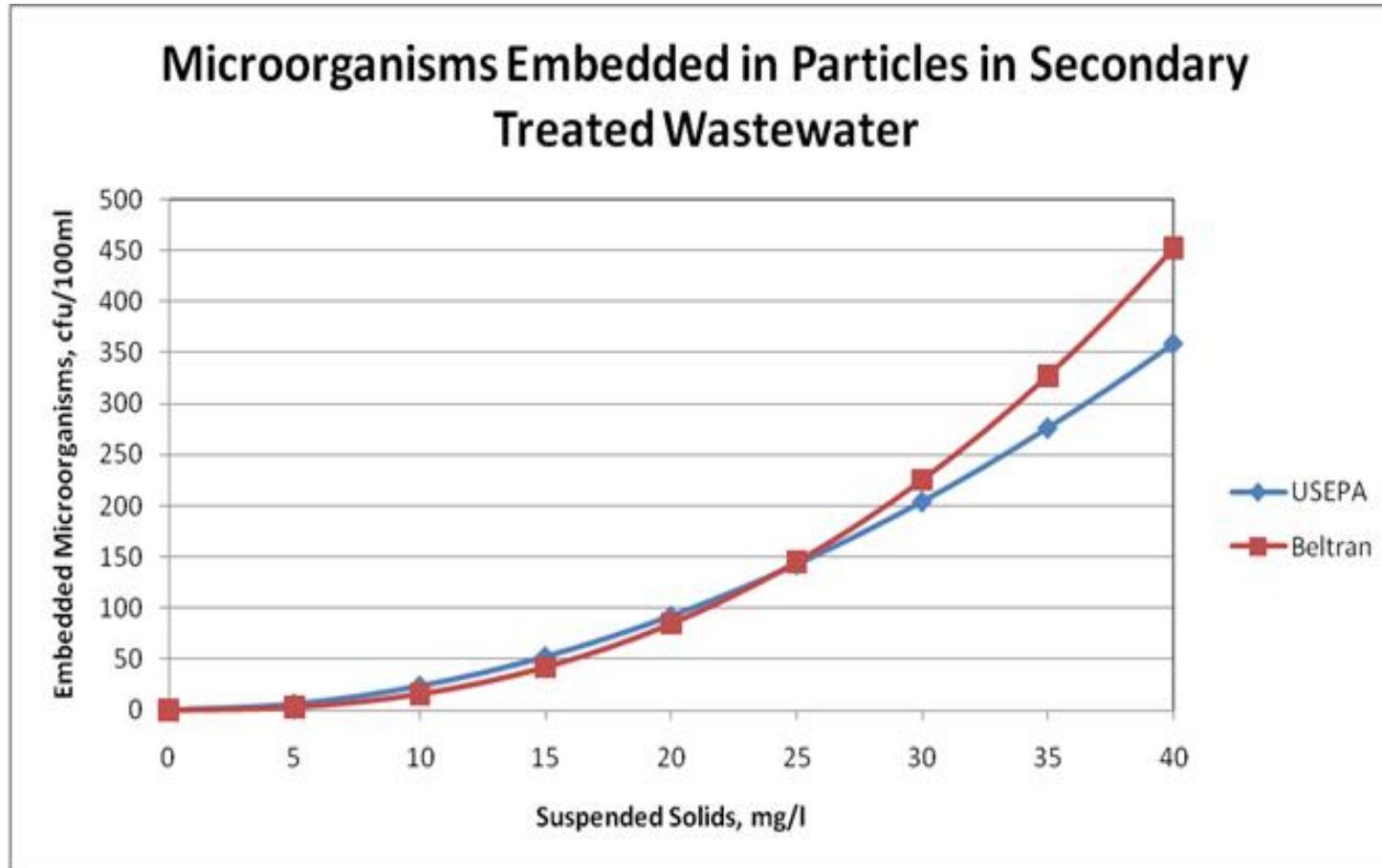
Pathogen	Average UV Dose (mJ/cm ²) Required to Inactivate			
	1log	2log	3log	4log
Cryptosporidium parvum	3.0	4.9	6.4	7.9
Giardia lamblia cysts	NA	<5	<10	<10
Giardia muris cysts	1.2	4.7	NA	NA
Vibrio cholerae	0.8	1.4	2.2	2.9
Shigella dysenteriae	0.5	1.2	2.0	3.0
Escherichia coli O157:H7	1.5	2.8	4.1	5.6
Salmonella typhi	1.8-2.7	4.1-4.8	5.5-6.4	7.1-8.2
Shigella sonnei	3.2	4.9	6.5	8.2
Salmonella enteritidis	5	7	9	10
Legionella pneumophila	3.1	5	6.9	9.4
Hepatitis A virus	4.1-5.5	8.2-14	12-22	16-30
Poliovirus Type 1	4-6	8.7-14	14-23	21-30
Coxsackie B5 virus	6.9	14	22	30
Rotavirus SA11	7.1-9.1	15-19	23-26	31-36

NA – Data Not Available

Data summarized from the US EPA Workshop on UV Disinfection of Drinking Water, April 28-29, 1999, Arlington, VA

Target 30 – 40 mJ/cm²

Why Clarification? - UV Shielding



Effect of residual solid particles on ability to disinfect

Required Optimisation

- Hydraulic tests
- Short list coagulants – ‘Jar’ Testing
- Continued trialling
- Optimise flash mixer operation
- Optimise flocculator operation
- Adjust and optimise Feed Box baffles
- Seasonal testing with shortlisted coagulants
- Measure UVT, TSS, E.coli, DRP regularly
- Ensure UV control is optimised and dose is monitored

Example Constructed Aquifers



Te Awamutu



Te Rapa