



Sustainable PFAS Resin Technology Applied at Multiple Locations for Military Base Aquifer Remediation



Montrose Environmental Group

RemTech 2021 Symposium
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Presentation Outline

- Background and Objectives
- Treatment process
- Multiple PFAS removal systems
 - Surface water remediation
 - Groundwater remediation at two locations
 - System performance
- Centralized regeneration
 - Concept and benefits
- Key takeaways

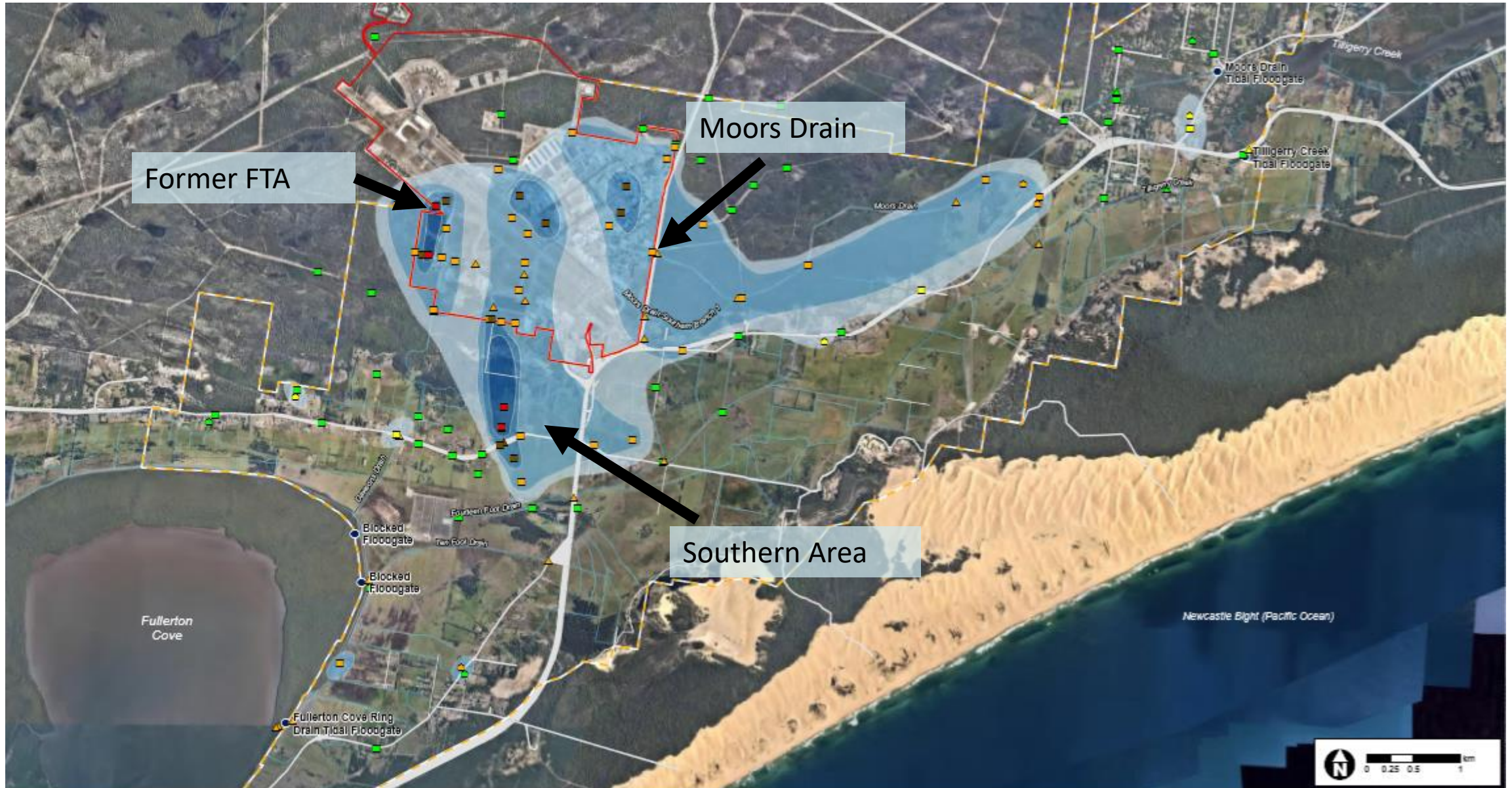


Background

- RAAF Base Williamtown (WLM): Historical use of aqueous film forming foam (AFFF)
- Resulted in PFAS impacts to the surface and groundwater
- Both have vectors to migrate off base
- Defence has defined nature and extent of PFAS impact
- High profile site



Extent of PFAS Impact at RAAF Base WLM



Objectives

- ECT2's multi-stage approach to mitigate PFAS impacts
 - Stage 1: Moors Drain stormwater
 - Stage 2: Former fire training area
 - Stage 3: Groundwater flowing off base to the south
- Reduce PFAS migration offsite in surface and groundwater
- Remove PFAS mass from source areas
- Treated water criteria – Australian Health Based Guidance Values (HGBV)
 - PFOS + PFHxS: $< 0.07\mu\text{g}/\text{l}$
 - PFOA: $< 0.56\mu\text{g}/\text{l}$



SORBIX™ RePURE Full-Scale Hub and Spoke System

Williamstown Australia

Source water:	System 1: Surface water (stormwater) Systems 2&3: Groundwater
System flowrate:	System 1: 130 gpm Systems 2&3: 200 gpm each
Process train:	Pretreatment Regenerable IEX resin Polish IEX resin
System startup date:	System 1: June 2017 System 2: July 2018 System 3: April 2019
Target treated water criteria:	PFOS + PFHxS: < 0.07µg/l PFOA: < 0.56µg/l



Southern Area



Moors Drain



Moors Drain Plant



Former FTA



Regeneration Plant

Newcastle Airport

Southern Area Extraction

Southern Area Water Extraction

Fighter World

Meadowie Rd

Meadowie Rd

Meadowie Rd



Moors Drain

Newcastle Airport

Fighter World

Southern Area Water Extraction

Moors Drain Plant



Moors Drain Site

- Surface water treatment prior to water migrating offsite in extensive drainage network
- Commenced operation in June 2017
- Originally 50-gpm flow rate capacity - Demonstration
- Upgraded to 130-gpm in April 2019 to capture full flow
- First ECT2 treatment system installed in Australia
- Installed and operating within 4 months of contract award



The Importance of Pretreatment



Influent stormwater



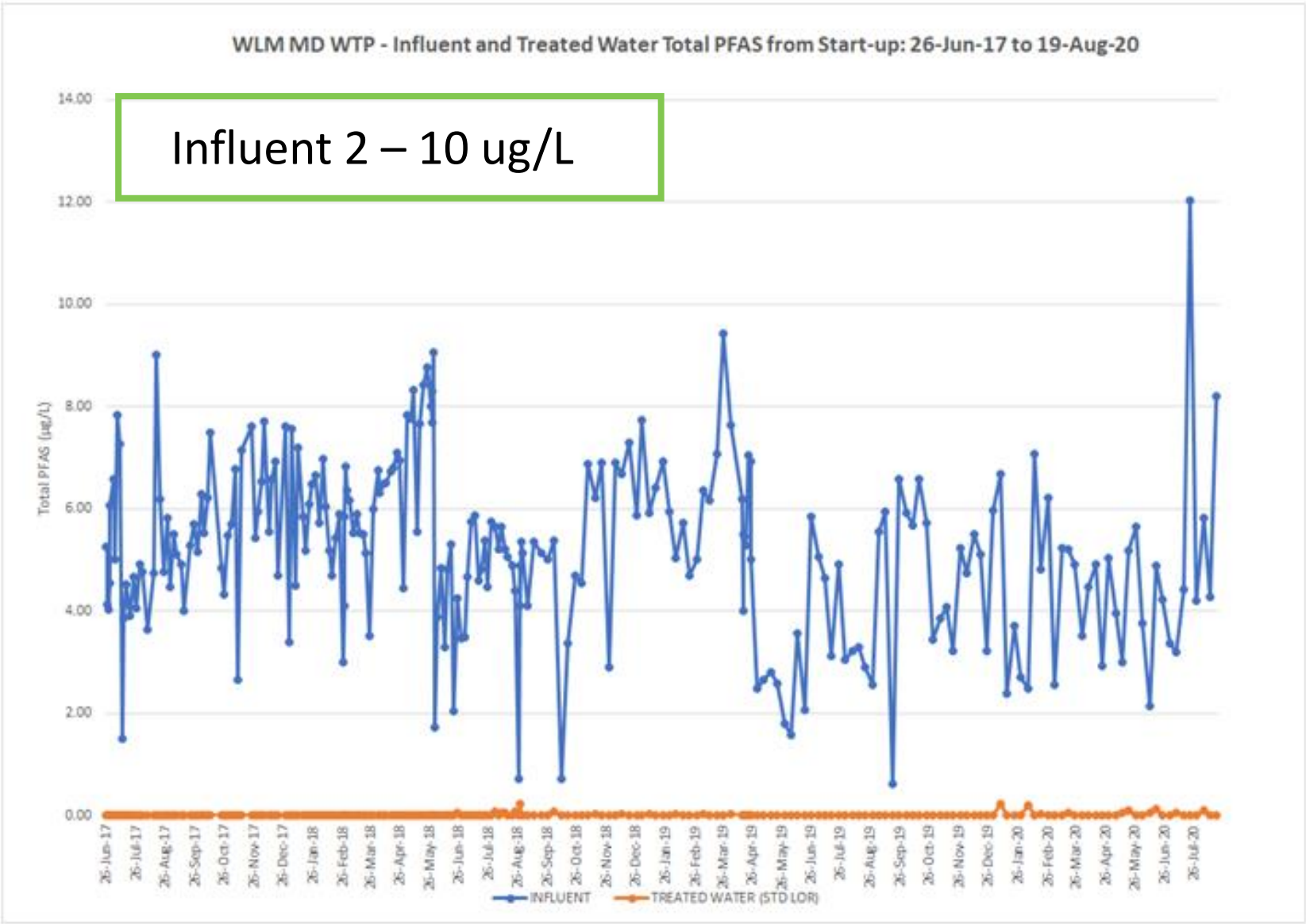
Influent bag filter



Influent pipe



Moors Drain Performance Data





Former FTA

Moors Drain Plant

Newcastle Airport

Fighter World

Southern Area Water Extraction



Meadowie Rd

Meadowie Rd

Meadowie Rd

Meadowie Rd

Former Fire Training Area (FTA)

- Significant source area from years of training
- Groundwater remediation
- Shallow groundwater table
- PFAS removal system commenced operation in July 2018
- PFAS concentration design basis - 10 to 500 $\mu\text{g}/\text{L}$
- Operates at 200-gpm capacity
- Treated water returned to ground via sprinkler system

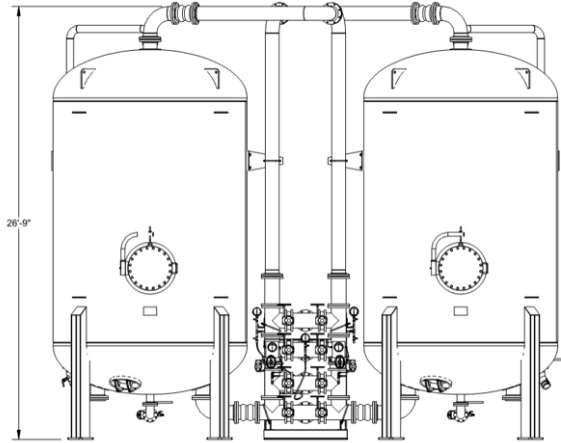


Former FTA Treatment System

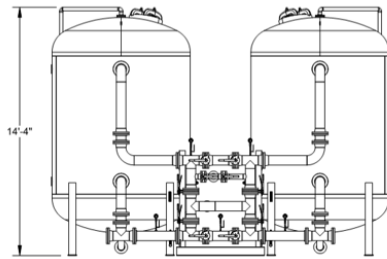


GAC vs. Regenerable Ion Exchange Footprint

27 ft.



14 ft.



Plant Layout (200 GPM)



Source:	Surface water
Flow rate:	190 <u>gpm</u>
PFAS Influent:	6.6 $\mu\text{g/l}$
Waste Generated:	914 tons
Treatment Criteria:	0.07 $\mu\text{g/l}$

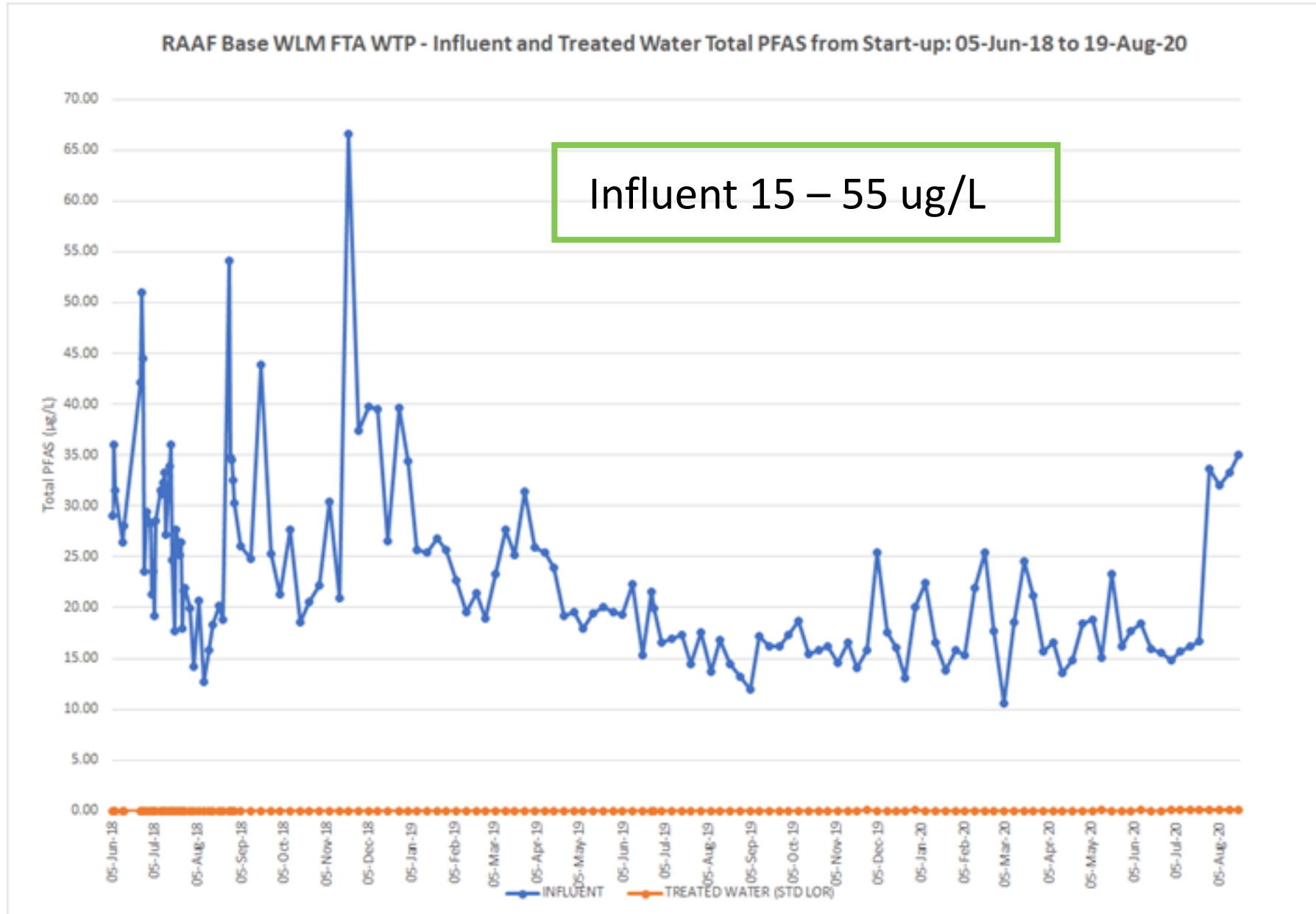


Source:	Groundwater
Flow rate:	180 <u>gpm</u>
PFAS Influent:	23 $\mu\text{g/l}$
Waste Generated:	7 tons
Treatment Criteria:	0.07 $\mu\text{g/l}$

Yes – these are the same scale



Former FTA Performance Data



Southern Area



Newcastle Airport

Moors Drain Plant

Fighter World

Southern Area Water Extraction

Southern Area Extraction Area



Southern Area Treatment System

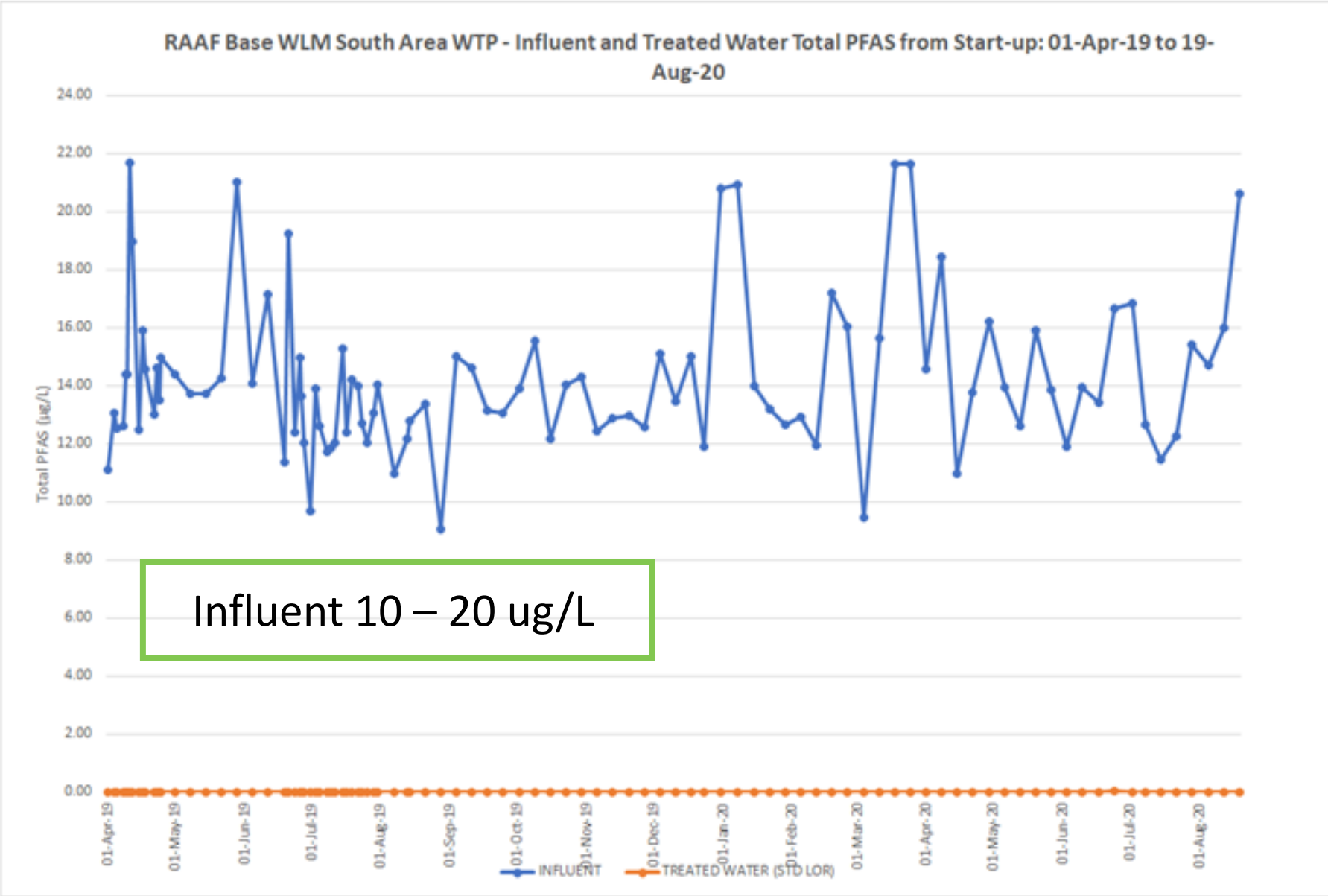


Southern Area

- Groundwater remediation
- Installed to cut off plume that could migrate to the South of the site
- Commenced operation in April 2019
- PFAS concentration design basis - 10 to 500 $\mu\text{g/L}$
- 200-gpm capacity
- Located adjacent to former Fire Training Area treatment system
 - Optimize shared capabilities and utilities
 - Minimize footprint, capital and operating costs
- Treated water returned via sprinkler system



Southern Area Performance Data



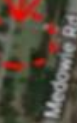
Newcastle Airport

Moors Drain Plant

Fighter World

Regeneration Plant

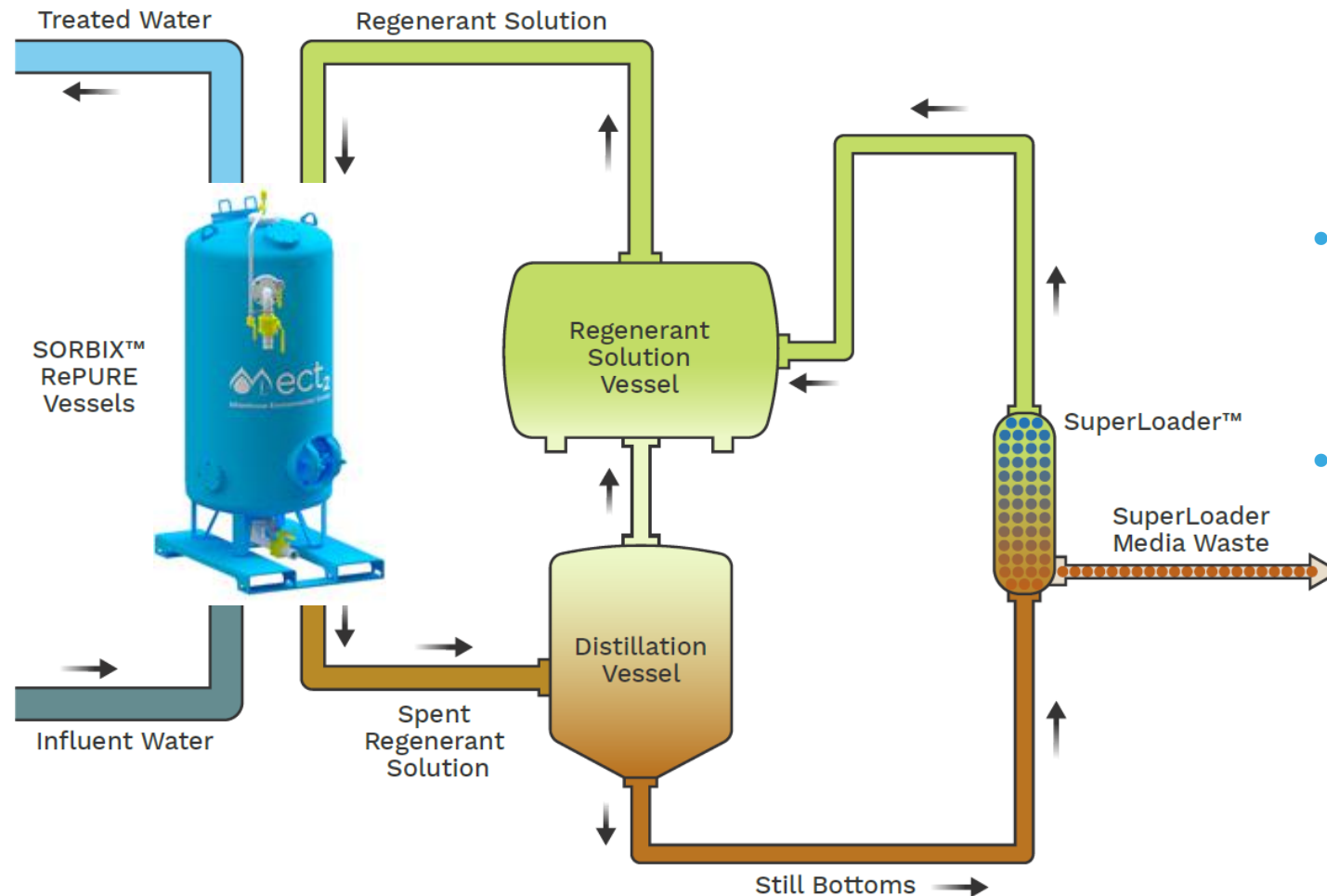
Southern Area Water Extraction



Resin Regeneration - Central Regen System



SORBIX™ RePURE Regenerable IX PFAS Treatment



Benefits of the technology

- Patented Industry leading **waste reduction** technology
- Efficient removal with High Concentration PFAS

Applications

- Total PFAS > 10 ppb
- Multiple “hotspot” sites in one region/client

Disposal Options

- Incineration
- Landfill - SuperLoading
- **Destruction** - Plasma, Electrochemical, others



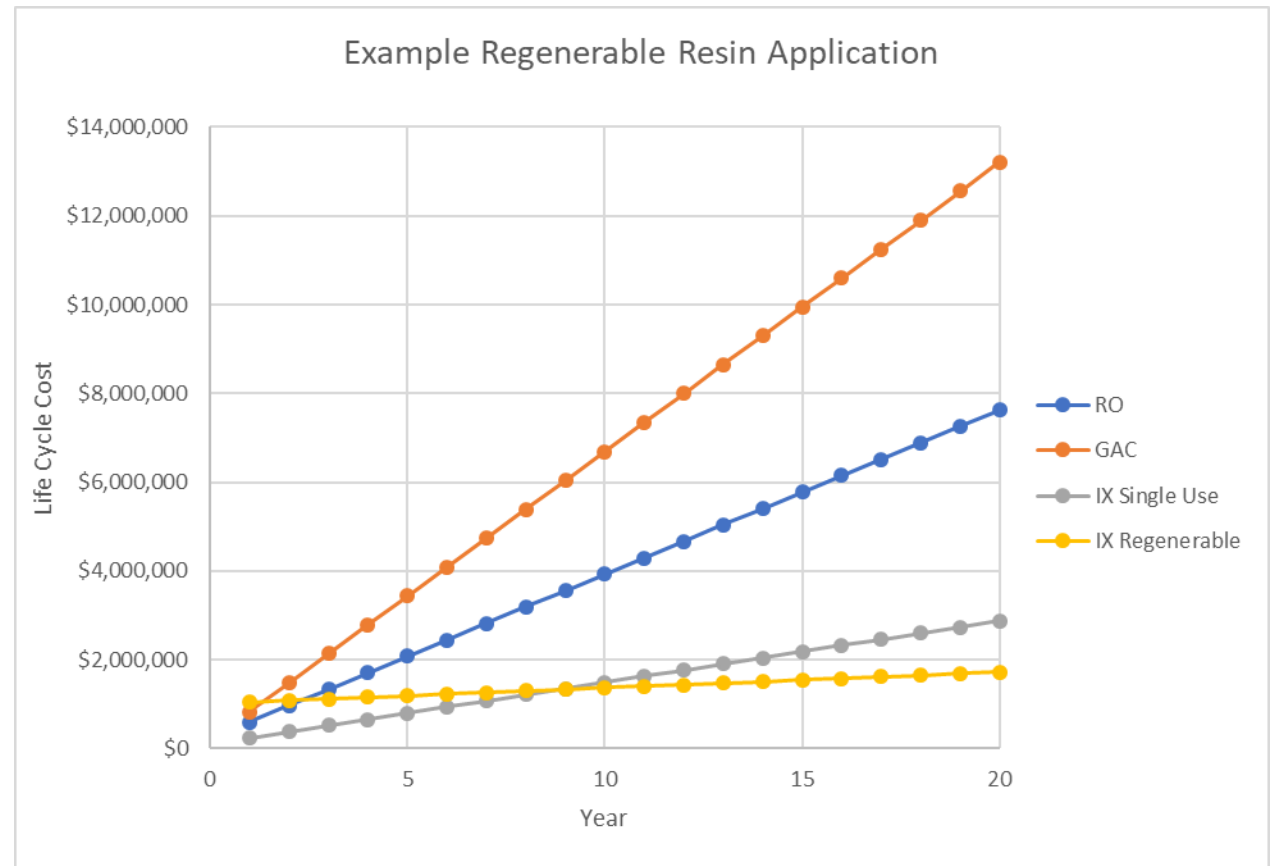
Central Regen System Benefits

- Services all 3 treatment systems on the WLM base
- Distillation and super-loading processes facilitate recovery/reuse of regen solution
- Waste minimization: process generates approximately **1 gallon of waste per million gallons of water treated**



Lifecycle Costs – Four Proven Technologies

- Groundwater remediation at former firefighting training area
- Total influent PFAS concentration = 50 µg/l
- Treatment objective: Total PFOS + PFOA < 70 ng/l
- Client wants to minimize waste transport off site



Note: economics become even more compelling at higher PFAS concentrations or when using central regeneration



Key Takeaways

- Regenerable IEX resin has both **high capacity and rapid kinetics**, e.g., small vessels and extended run time between regens (small footprint)
- Centralized IEX resin regeneration concept demonstrates capability to consistently meet performance standards **with very low waste production and reduced lifecycle cost**
- **Optimizing pretreatment has allowed our system to maintain > 98% uptime** across all three water treatment systems
- Robust treated water management system enables **on-site water reuse**



Questions?



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ECT2 delivers PFAS solutions...



*...and we'll put them in a plane if
you need us to.*

