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Synergy PFAS Water Treatment Technology

Provided to: PFAS Sub-Committee
Joint Standing Committee on Foreign Affairs, Defence and
Trade

Submitted by: Synergy Resource Management Pty Limited

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Revisions

Revision Number	Date	Prepared by	Checked by	Approved for issue	
				Name	Signature
0	Friday 10, July 2020	Chloe Smith (WTP Performance Specialist)	Leah Kaslar (WTP Performance Specialist)	Andrew Reardon (Synergy Chief Executive Officer)	

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1 Introduction

Synergy Resource Management Pty Ltd (Synergy) has been operational for over 14 years with the vision of delivering a range of services and solving complex projects via cutting edge technology, bespoke design and practical solutions. As a total contracting service provider, Synergy combines civil expertise with demolition and environmental capabilities under one company banner, to provide a comprehensive skillset and holistic approach to achieve project objectives. One area which has been extremely successfully for Synergy is our Water Treatment Plants (WTPs) which are robust and modular in design and employ practical technology specific to the water matrix for each project site.

At Synergy we aim to continually improve our WTP technology and treatment processes through research, development, experience, and innovation. Synergy have a dedicated team of environmental scientists, chemists and engineers that work in collaboration with the Queensland University of Technology to test and design new remediation techniques and strategies. Learning also happens during works and over the past twelve years our operational team have improved the way that we utilise our systems resulting in smarter more efficient treatment with lower resource use and waste output.

The word Synergy means 'the interaction or cooperation of two or more agents to produce a combined effect greater than the sum of their separate effects' and we employ our namesake in our system design. All of our systems are modular and can be adjusted with different complimentary configurations of technologies to suit an influent matrix and achieve project objectives.

1.1 Scope

Synergy have been treating water on Defence bases since 2016 with a variety of systems depending on the influent, contaminants of concern and discharge criteria. Our system capacity has ranged from flowrates of 2L/s up to 70L/s. The treatment requirements have primarily been targeted to PFAS and precursor removal, with additional treatment methods incorporated for co-contaminants which includes but is not limited to metals, nutrients, hydrocarbons, and organics.

Synergy have been requested by the Sub-committee of the Joint Standing Committee on Foreign Affairs, Defence and Trade (JSCFADT's) to provide a submission as part of the inquiry into work being carried out by Department of Defence under its National PFAS Investigation and Management Program. The purpose of this submission is to:

- ✦ detail the current methods being used to reduce per- and poly-fluoroalkyl substances (PFAS) in the environment
- ✦ provide an update of the works Synergy have been undertaking for Defence, in particular the Lake Cochran Water Treatment Plant
- ✦ provide details about Synergy's NSW EPA Mobile Wastewater Treatment License
- ✦ discuss any further insights

2 Synergy PFAS Water Treatment Projects

Synergy Water Treatment Plant Statistics <input type="checkbox"/>	Defence Lake Cochran WTP	Defence Construction WTP	Orora Petrie WTP	Moorebank East and West WTP	Defence HMAS Cerberus WTP	CPB Orchid Hills WTP	Defence NACC Tindal WTP
Operational dates	30/11/2016 - Current	31/01/2016 - 31/03/2018	1/11/2018 - Current	29/11/2018 - Current	11/10/2018 - Current	6/9/2019 - 24/09/2019	1/6/2020 - Current
Type of Influent	Surface and Groundwater	Surface and Groundwater	Surface and Groundwater	Surface and Groundwater	Surface and Groundwater	Surface and Groundwater	AFFF Wastewater
Size of WTP	Large	Large	Large	Medium	Medium	Medium	Small
Type of WTP Technology	Carbon & Resin	Carbon & Resin	Carbon & Resin	Carbon Only	Carbon Only	Carbon Only	Carbon & Resin
Max Flowrate	Up to 70L/s	Up to 25L/s	Up to 15L/s	Up to 10L/s	Up to 15L/s	Up to 10L/s	Up to 5L/s
Total volume of water treated	1,160,026,000 litres	612,527,000 litres	185,347,000 litres	38,665,000 litres	53,510,561 litres	5,347,000 litres	176,000 litres
Mean Total PFAS untreated water	6.61 ug/L	24.53 ug/L	1.19 ug/L	1.79 ug/L	6.69 ug/L	1.59 ug/L	12,946 ug/kg (TOPA)
Maximum Total PFAS untreated water	3010 ug/L	3799.2 ug/L	3.37 ug/L	5.81 ug/L	114.50 ug/L	2.42 ug/L	13,840 ug/kg (TOPA)
Mean Total PFAS treated water	< 0.01 ug/L	0.15 ug/L	0.018 ug/L	< 0.01 ug/L	<0.01 ug/L	< 0.01 ug/L	0.014 ug/L (TOPA)
Maximum Total PFAS treated water	0.08 ug/L	8.69 ug/L	0.223 ug/L	< 0.01 ug/L	0.69 ug/L	< 0.01 ug/L	0.019 ug/L (TOPA)
Treated water % compliance with criteria	100%	99%	99%	100%	100%	100%	100%
Treated water discharge criteria	Sum of PFOS + PFHxS < 0.07 ug/L	PFOS < 0.2 ug/L	EA Maximum Criteria each PFAS < 0.05 ug/L + Sum of PFOS + PFHxS < 0.07 ug/L	Sum of PFOS + PFHxS < 0.07 ug/L	Sum of PFOS + PFHxS < 0.01 ug/L	Sum of PFOS + PFHxS < 0.07 ug/L	TOPA Individual PFAS analytes < 0.01 ug/L
	PFOA < 0.56 ug/L	PFOA < 0.4 ug/L	80th Percentile Criteria each PFAS < standard level LOR (i.e. PFOS < 0.01 ug/L) except PFBA, PFPeA, PFHxA, & Fluorotelomer Sulfonic Acids	PFOA < 0.56 ug/L	PFOA < 0.01 ug/L	PFOA < 0.56 ug/L	-
	Target Criteria PFOS < 0.02 ug/L, PFOA < 0.02 ug/L, PFHxS < 0.02 ug/L, 6:2 FTS < 0.05 ug/L	Target Criteria PFOS < 0.02 ug/L, PFOA < 0.04 ug/L, PFHxS < 0.02 ug/L, 6:2 FTS < 0.05 ug/L	EA 50th Percentile Criteria each PFAS < trace level LOR (i.e. PFOS < 0.001 ug/L) except PFBA (<0.02 ug/L), PFPeA (<0.01 ug/L) & PFHxA (<0.01 ug/L)	Target Sum of PFAS < 0.01 ug/L	Target Sum of PFAS < 0.1 ug/L	Target Sum of PFAS < 0.01 ug/L	Target TOPA Sum of PFAS < 0.01 ug/L
<i>Analytical Data current to June 2020 and volume data current to July 2020 for all current projects</i>							

See **Attachment A for Project Profiles** containing additional information.

3 Overview of Synergy's Water Treatment Technologies

3.1 Pre-treatment

Synergy have various pre-treatment methods which are utilised either individually or in sequence, which include:

- ✦ Lamella plate separators (LPS) - LPS are a well-established sedimentation technology designed to remove heavy non-colloidal solids. The LPS designed by Synergy have been enhanced to reduce space requirements by up to 90% compared with conventional clarifiers or settling ponds.
- ✦ Powdered Activated Carbon Slurry Injection - Activated carbon has been proven to be an economical and efficient method for reducing heavy metals contamination as well as organic and inorganic pollution from contaminated waters (Bhatnagar et al., 2013; Deliyanni et al., 2015; Karnib et al., 2014).

3.2 Primary Settlement

The purpose of the primary treatment stage is to provide suspension and mixing time for the various constituents injected into the process stream (e.g. PAC, pH correction, coagulation and flocculation) and increase the settlement period, to help optimise the suspended solids removal process with a key focus on metals removal, dissolved hydrocarbons and organics, including PFAS (Tang et al., 2014); (Johnson et al., 2008); (Gunatilake, 2015). It is important to remove organics and solids prior to treatment with PFAS specific anion exchange resin due to their affinity to become fouled with organics.

Each system size can be designed based on the flowrate and expected contaminant concentrations, ensuring increased residence time of the process water in the primary system to encourage settlement.

3.3 Secondary Filtration

Synergy have learnt that it is beneficial for post primary settlement water to be physically filtered to remove any remaining semi-agglomerated solids. Secondary filtration can incorporate a number of different medias including gravel, sand and zeolite.

3.4 Tertiary Filtration – Anion Exchange (AIX) Resin

There's a wide variety of AIX Resins, all with differing capabilities and downfalls. Because of this, various AIX Resins in succession can be used within our water treatment systems to complement each other. Synergy have utilised both macroporous and gel type resins in differing scenarios depending on the required outcome of the works.

Synergy uses high quality AIX resins and activate them with techniques developed in-house specifically to enhance PFAS recovery. Any type of resin regeneration can be harmful to the resin integrity and therefore should only be performed when necessary. Synergy will determine the type of resin regeneration required by assessing the contaminant loading, organic fouling, current lifespan of the resin, and the desired works the resin will be required to perform. As the AIX resins can be regenerated as required this enables ongoing re-use in the WTP.

3.5 Tertiary filtration – Granular Activated Carbon

Synergy are able to utilise a number of different GAC's within our systems to optimise each carbons benefit and counteract negative attributes. The capacity for GAC to adsorb contaminants is dependent on a number of factors including the size, solubility and state of the molecule. It is therefore important to understand the contaminants onsite to determine what type of carbon system would be appropriate, or if other technologies are required. By using the carbons individually, or in succession, Synergy are able to tailor the WTP to suit to conditions of the site and exploit the advantages of each type of GAC. Synergy use both coal and coconut GAC within their water treatment process which is determined based on the influent and desired outcomes.

4 Overview of Synergy's Passive Barrier System Technologies

Synergy's ex-situ multi-barrier carbon/resin water treatment plant technology is known as P-FEND™. In addition to P-FEND™, Synergy have designed bespoke Passive Barrier Treatment Systems (PBTS) technology to provide effective in-situ Defence against PFAS migration in groundwater or surface water flow. Synergy's in-situ PBTS have been branded P-FORT™ and consist of multiple barriers of Defence known as Legion, Bastion, Cavalier, Palisade and Citadel each of which have differing designs and types of filtration media to sequentially reduce the concentration of PFAS to within acceptable environmental release limits. Synergy's PBTS technologies consisting of these five (5x) separate P-FORT™ categories can be used individually or collectively in succession depending upon each situation as follows:

- ✦ PBTS Type 1 – P-FORT™ Legion treatment is a simplistic modular scalable treatment system that creates a permeable barrier wall of through which the process water passes. This treatment system removes organics, larger molecular PFAS and clarifies the water. A variety of specialised proprietary porous filtration media is used in this application.
- ✦ PBTS Type 2 – P-FORT™ Bastion treatment is a simplistic modular scalable treatment system that creates a permeable barrier wall of through which the process water passes. This treatment system further removes organics, larger molecular PFAS and clarifies the water. A variety of specialised proprietary porous filtration media is used in this application.
- ✦ PBTS Type 3 - P-FORT™ Cavalier treatment is a bespoke gravity fed cartridge-style weir box filtration system tailored for each site. The system contains parallel lead-lag boxes with internal dimensions sufficient to contain various types of specialised proprietary porous filtration media depending on parameters. The adjustable weir box system includes sample locations for monitoring of the treatment process. A variety of specialised proprietary porous filtration media is used in this.
- ✦ PBTS Type 4 - P-FORT™ Palisade treatment is a media-filled geo-web structure that can be laid along the length of surface drains to reduce PFAS from the passing water. A variety of specialised proprietary porous filtration media is be used in this application.
- ✦ PBTS Type 5 - P-FORT™ Citadel is a proprietary blend of regents including Powdered Activated Carbon (PAC) and Modified Montmorillonite Clay (MMC) slurry can be dosed directly into a contaminated water body which could reduce overall background PFAS levels and support other PBTS elements.

In addition to ex-situ P-FEND™ and in-situ P-FORT™ water treatment technologies, Synergy also provides ex-situ PFAS contaminated soil and sludge treatment known as P-LOCK™ and in-situ PFAS contaminated soil and sludge treatment known as P-STOP™.



5 Lake Cochran PFAS Water Treatment Plant

Synergy developed a large-scale multi-barrier water treatment plant as an interim measure to treat the overflow of Lake Cochran where a large volume of low-level PFAS contaminated surface and ground water flows prior leaving the RAAF Base Williamstown. Synergy's bespoke WTP has been operational on the Lake Cochran (LC) project since December 2016 and has successfully treated over 1.1 billion litres of PFAS impacted water. In addition to Synergy's NACC Construction WTP we have successfully treated over 2 Billion litres of PFAS contaminated water at RAAF base Williamstown to compliance and discharged into the environment.

The Synergy LC WTP is achieving significant removal of PFAS contaminants to less than 0.01 µg/L, using a 3-stage multi-barrier process. The WTP consists of two systems in parallel to allow uninterrupted operation during maintenance with a flow range of 15 to 70 litres per second.

The Synergy LC WTP uses multi barrier technology which combines various water treatment techniques to reduce the concentration of contaminants. Synergy's treatment process at Lake Cochran consist of three main phases: Primary, Secondary and Tertiary treatment.

The water treatment process is summarised below:

- ✦ Primary: pre-treatment with adsorption to powdered activated carbon (PAC), chemical injection, coagulation, flocculation and settlement
- ✦ Secondary: 3 stage deep bed media filtration. Physical filtration using layered gravel/sand blends (for clarification)
- ✦ Tertiary: 3 stage deep bed media filtration. Chemical filtration using AIX Resin and adsorption to two types of GAC
- ✦ Senary: pH adjustment and continuous 24/7 inline monitoring; and
- ✦ Waste sludge dewatering: carried out as necessary.

The LC WTP has reduced PFAS contamination to achieve NSW EPA, Department of Health and Department of Defence approved criteria for 100% of results. 99% of results were below detection limits (<0.01 µg/L) for Total PFAS (450 samples). After full treatment, approximately 99.9% of PFAS is removed.

6 Synergy's NSW EPA Mobile Wastewater Treatment Licence

Synergy in collaboration with the NSW EPA have obtained an Environment Protection Licence (EPL) for Australian-made mobile wastewater processing Water Treatment Plants for multiple plants and multiple contaminants including PFAS. To obtain this license Synergy has proven its capabilities based on over 13 years wastewater treatment experience and successful treatment of over 7 billion litres of contaminated water over dozens of sites throughout Australia. The Synergy team worked hard in developing versatile mobile treatment systems that could be easily implemented on sites where an EPL is not currently in place. This EPL enables Synergy to attend a site to undertake treatment of contaminated water using our proven technology and remediation capability.

The licence includes 6 containerised flat-bed mobile water treatment plants with a maximum processing capacity for each system of 800 cubic meters per day, capable of treating contaminants for 15 different waste codes including PFAS, heavy metals, cyanide, nitriles, phenols, water containing petrochemical fuels, oils and lubricants. A full list of waste codes is shown below:

Waste Description	Waste Code
Arsenic; arsenic compounds	D130
Cadmium; cadmium compounds	D150
Chromium compounds (hexavalent and trivalent)	D140
Copper compounds	D190
Cyanides (inorganic)	A130
Cyanides (organic)	M210
Fire debris and fire wash waters	N140
Lead; lead compounds	D220
Nickel compounds	D210
Phenols, phenol compounds including chlorophenols	M150
Residues from industrial waste treatment/disposal operations/reducing agents	N205
Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials	M250
Vanadium compounds	D270
Waste oil/water, hydrocarbons/water mixes or emulsions	J120
Zinc compounds	D230

With this license Synergy allows us to attend site with PFAS contamination and undertake treatment under our own Environmental Authority which alleviates the stress for the client on obtaining their own.

7 Conclusion

As an Australian owned and operated company, Synergy offers PFAS water treatment solutions to our clients that benefit local communities and support industry to achieve PFAS contaminant remediation throughout the environment. Our water treatment approach integrates world class leading technologies which are proved to reduce waste by-products, enhance plant operation and optimise treatment efficiency for a range of contamination types across a diverse selection of projects throughout industry.

Our collaborative relationship with Defence, demonstrated through successful execution of multiple PFAS water treatment projects, continues to support the ongoing PFAS management program through the removal of PFAS contaminants from over 2 Billion litres of PFAS contaminated water at RAAF Williamtown alone. This volume of PFAS contaminated water includes, but not limited to, 1.2 billion litres treated by the Lake Cochran WTP to date and 612 Megalitres treated by the New Air Combat Capability (NACC) Construction WTP.

Synergy's water treatment technology is proven effective at removing all PFAS including: Perfluoroalkyl Sulfonic Acids; Perfluoroalkyl Carboxylic Acids; Perfluoroalkyl Sulfonamides; Fluorotelomer Sulfonic Acids; and Precursors.

To date Synergy's PFAS water treatment plant technology and proprietary processes are achieving performance well below Department of Health drinking water criteria as well as both Defence contractual and target water criteria. Supported by stringent sampling protocols, chain of custody and NATA accredited laboratory results, Synergy's water treatment technology presents low risk to Regulatory Authorities and increased client satisfaction with certainty of outcomes.

8 References

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Attachment A – Project Profiles



CONSTRUCTION WATER TREATMENT PLANT

CLIENT
LENDLEASE BUILDING PTY LTD

LOCATION
RAAF BASE WILLIAMTOWN | NEWCASTLE | NSW

ROLE
DE-WATERING & WATER TREATMENT

VALUE
16 MILLION

TIMELINE
JAN 2016 – MAR 2018



STATISTICS

- 612 MILLION LITRES OF WATER TREATED
- 98% SUCCESS RATE CONTRACTUAL CRITERIA
- 14 BILLION MICROGRAMS PFAS REMOVED
- UP TO 35 LITRES PER SECOND FLOW RATE
- 16 CONTAMINANTS TREATED

PROJECT SCOPE

Synergy provided de-watering and water treatment services for PFAS contaminated groundwater and surface water (runoff) generated from construction activities at RAAF Base Williamtown.

The WTP treated contaminated water for the New Air Combat Capability (NACC), Air Traffic Control (ATC) and Land 121 projects over a two-year period. Water generated from the construction activities was contaminated with range of pollutants including hydrocarbons, metals and PFAS.

Over 612 million litres of water was treated to meet NSW EPA, Department of Health and Department of Defence approved criteria for 98% of results. After full treatment 99.54% of PFAS was removed .

Water treatment is a dynamic undertaking requiring understanding of water chemistry, operational vigilance and technical aptitude. Our people are our greatest asset and their problem-solving skills and experience has resulted in a high degree of success in continually meeting lowering discharge criteria over the duration of the project.



INNOVATIONS

Synergy was the first company in the World to successfully develop and implement large-scale PFAS water treatment processes incorporating anion exchange (AIX) resin.

Synergy developed modular, mobile multi barrier WTP systems to sequentially reduce contaminants using AIX resin and specialised infrastructure for optimal performance for PFAS removal.

Through the Synergy Research and Design program, AIX resins were tested and specifically activated to optimise PFAS removal potential. To promote the longevity and PFAS removal function of the resin, Synergy developed pretreatment and clarification stages. Pretreatment with a proprietary blend of powdered activated carbon (PAC)

adsorbed up to 93% of total PFAS, protecting media downstream (increasing AIX resin lifespan) and reducing cost per kilogram of bulk contaminant removal. Selection and layering of gravel/sand media blends used post Primary settlement increased the clarity of the water and maintained integrity of AIX resin.

The approach taken provided a robust solution for contaminant removal for a complex influent with varying types and levels of contaminants.

"The Lendlease team are continually impressed with Synergy's commitment to the project and their delivery of top quality products and services. We are very appreciative of Synergy's spirit of collaboration as well as their proactive approach."

- James Cannon, NACC Environmental Manager Lendlease

LAKE COCHRAN WATER TREATMENT PLANT

CLIENT
DEPARTMENT OF DEFENCE

LOCATION
RAAF BASE WILLIAMTOWN | NEWCASTLE | NSW

ROLE
WATER TREATMENT

VALUE
22.4 MILLION

TIMELINE
NOV 2016 - MARCH 2021



STATISTICS

- 1.1 BILLION LITRES OF WATER TREATED
- 100% SUCCESS RATE CONTRACTUAL CRITERIA
- UP TO 70 LITRES PER SECOND FLOW RATE
- > 6 BILLION MICROGRAMS PFAS REMOVED
- 99% PFAS BELOW DETECTION LIMITS

PROJECT SCOPE

Synergy developed a large-scale multi-barrier water treatment plant to treat the overflow of Lake Cochran where a large volume of PFAS contaminated surface and ground water flows into prior leaving the RAAF Base Williamtown.

Synergy's bespoke WTP has been operational on the Lake Cochran (LC) project since December 2016 and has successfully treated over 1.1 billion litres of PFAS impacted water.

The WTP is achieving significant removal of PFAS contaminants to less than 0.01 µg/L, using a 3-stage multi-barrier process. The WTP consists of two systems in parallel to allow uninterrupted operation during maintenance with a flow range of 15 to 70 litres per second. After full treatment 99.83% of PFAS was removed

The WTP has reduced PFAS contamination to achieve NSW EPA, Department of Health and Department of Defence approved criteria for 100% of results. 99% of results were below detection limits (<0.01 µg/L) for Total PFAS (449 samples).



INNOVATIONS

Synergy have treated over 1.1 Billion litres of PFAS contaminated water with the LCWTP without disposal of any ion exchange resin by using robust pretreatment to extend filtration media lifespan and various regeneration techniques.

Pretreatment and effective primary treatment reduce the concentration of PFAS and other contaminants during the early stages of treatment allowing the resin to reduce PFAS concentrations to extremely low levels consistently for long durations of time. This also lengthens the resin lifespan which is important due to the high cost of replacement. AIX resin filtration is a highly successful method for PFAS removal, however it is known that after a resin becomes loaded with PFAS, regeneration is required to restore its functionality and anion exchange properties.

Synergy and associated partners have developed regeneration methods to avoid damaging the structure, and subsequently reducing the lifespan, of the resin. Regeneration of AIX resin may be done in a number of ways however some regeneration techniques are better suited to different scenarios.

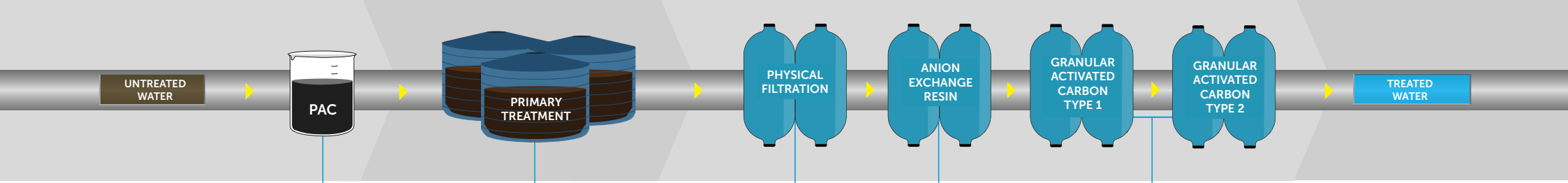
Development and optimisation of these resin techniques has allowed Synergy to maximise the lifespan of media within the WTP resulting in economic benefit to the client and environmental benefit through waste reduction.

Synergy are mitigating the migration of PFAS offsite through treating high volumes of water. From April 2018, Synergy began treating over 40 million litres of water per month through the LC WTP.



PRETREATMENT	PRIMARY TREATMENT	SECONDARY TREATMENT	TERTIARY TREATMENT	DISCHARGE
Injection of Powder Activated Carbon into process water	Bulk contaminant removal Coagulation, Flocculation & Settlement	Physical filtration using sand and gravel	Deep bed media filters containing a variety of proprietary media	Fully treated water discharged

PERCENTAGE OF PFAS REMOVED	88.13%	1.31%	10.4%	0.04%	0%	TOTAL = 99.9%
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Powdered Activated Carbon (PAC) is an extremely fine activated carbon which Synergy mix with clean water to create a 'slurry'. The PAC slurry is dosed into the treatment water at varying rates depending on contaminant and particulate loading.

Due to the high adsorption kinetics, PAC is able to adsorb a wide variety of contaminants, including heavy metals, PFAS, nutrients and inorganics.

Primary Treatment employs coagulation, flocculation and settlement to remove PAC, contaminants & particulates from the process water. PAC is the key driver of PFAS removal during this treatment phase.

Primary Treatment increases the lifespan of the filtration media downstream and enables removal of high concentrations of contaminants at high flowrates.

Secondary Treatment employs physical filtration to mechanically trap fine suspended particulates carried over from the Primary Stage using sand and various sizes of gravel.

Tertiary Treatment 1 – Anion Exchange (AIX) Resin. Synergy use a weak based macroporous resin for the Lake Cochran WTP which is selective for PFAS and is resistant to organic fouling. This is important due to the high content of organic material including tannins within the water.

The resin has a high capacity for PFAS recovery and can be easily regenerated and therefore is a long term solution for water treatment.

Tertiary Treatment 2 – Granular Activated Carbon. The final treatment stage uses multiple GAC filters to remove any low level concentrations of PFAS that possibly passed through the earlier treatment stages.

Coal-based GAC is selected to remove large chain PFAS or large molecular weight contaminants from the process water. Coconut-based GAC is used as a final polishing stage with micro, meso and macro pores to capture PFAS of varying chain length.

Analytical Data Current to: 29/06/2020		Volume Data Current to: 10/07/2020	
Dates of operation			
Date commissioned	30th November 2016		
Date decommissioned	Ongoing		
Number of days operational	1319 days		
Flowrates (L/s)			
Average flowrate to Dawsons Drain	13.17 L/s		
Maximum flowrate to Dawsons Drain	24.9 L/s		
Volumes			
Average treatment volume per month	6,527,746 L		
Total volume water treated	1,160,026,000 L		
PFAS removal (micrograms µg)			
Influent (untreated) maximum total PFAS	958 µg/L		
Influent (untreated) mean total PFAS	6.61 µg/L		
Effluent (treated) maximum total PFAS	0.08 µg/L		
Effluent (treated) mean total PFAS	< 0.01 µg/L		
Estimated total PFAS removed	6,837,779,526 µg		

1. Department of Health (DoH) 2016 Health Based Guidance Values for PFAS Food Standards Australia New Zealand
2. AIX regeneration fluid reprocessed through WTP and converted to solid waste

Discharge Criteria	
Number of samples	449 samples
% Passed contractual criteria DoH Health Based Guideline Values (Sum of PFOS + PFHxS 0.07 µg/L, PFOA 0.56 µg/L) ¹	100% pass
% Passed target criteria (PFOS < 0.02 µg/L, PFOA < 0.02 µg/L, PFHxS < 0.02 µg/L, 6:2 FTS < 0.05 µg/L)	99.83% pass
PFAS recovery through multi barrier WTP (%)	
Pretreatment adsorption to Powdered Activated Carbon (PAC)	82.94%
Settlement & clarification (pH correction, coagulation flocculation)	5.19%
Deep bed media filtration with Gravel and Sand	0%
Deep bed media filtration with Anion Exchange Resin (AIX)	11.71%
Deep bed media filtration with Granular Activated Carbon (GAC)	0.04%
PFAS removal after full treatment	99.88%
Waste generated (tonnes) - Current to 18th February 2020	
Liquid Waste (AIX regeneration fluid) ²	0 L
General Solid Waste (GSW) Landfill Disposal (Suez Raymond Terrace NSW) ³ Gravel and Sand	78.4 t
Restricted Solid Waste (RSW) Landfill Disposal (Suez Kemps Creek NSW) ³ Granular Activated Carbon (GAC)	0 t
Hazardous Solid Waste (HSW) Beneficially reused after thermal treatment (Renex Dandenong VIC) ⁴ Powdered Activated Carbon (PAC)	751.04 t
Total Waste (tonnes)	829.44 t
Total waste vs total volume water treated %	0.074%

3. Waste classified using NSW EPA 2016 Addendum to the Waste Classification Guidelines (2014) Part 1
4. Thermally destructed at Renex Dandenong VIC in accordance with the HEPA 2018 PFAS National Environmental Management Plan (NEMP)

HMAS CERBERUS REDEVELOPMENT PROJECT

CLIENT
LENDLEASE BUILDING PTY LTD

LOCATION
HMAS CERBERUS NAVAL BASE | VIC

ROLE
DEWATERING & WATER TREATMENT

VALUE
3.6 MILLION

TIMELINE
SEP 2018 - SEPT 2020



STATISTICS

100% SUCCESS RATE
CONTRACTUAL CRITERIA

100% PFAS BELOW
DETECTION LIMITS

53 MILLION
LITRES TREATED

MOBILE WTP
UP TO 5 L/s

LARGE WTP
UP TO 25 L/s

PROJECT SCOPE

Synergy provided mobile and fixed water treatment plants to manage contaminated groundwater and surface water generated from construction activities on the HMAS Cerberus (HC) Redevelopment Project.

The HC Redevelopment Project includes works to upgrade training, support and accommodation facilities. Historically Aqueous Film Forming Foam (AFFF) containing Per- & Polyfluoroalkyl substances (PFAS) was used onsite during naval training exercises.

To support numerous construction activities across the base, Synergy designed two Water Treatment Plants (WTP/s). Synergy's small Mobile WTP utilises a combination of activated carbons and specialised ion exchange resin and has the ability to move around site as required. The large Fixed WTP incorporates chemical precipitation and settlement stages along with a combination of activated carbons and is utilised for its high flowrate capacity.

All PFAS impacted water treated through Synergy's WTPs have successfully achieved discharge criteria (Sum of PFAS <0.1 ug/L) for 100% of analytical results.



INNOVATIONS

Synergy have provided agile mobile dewatering, water collection and treatment solutions to support construction activities across the site.

There are numerous construction works at HMAS Cerberus being undertaken whilst the facility is still in operation. The Base is the largest national facility for naval training with an average of 1,100 trainees at any one time throughout the year. For this reason, Synergy were required to provide an agile dewatering, water collection and treatment regime.

Synergy's small Mobile WTP was designed with a small footprint and can be moved with a utility vehicle as required to support works.

Water collection tanks are continuously moved around site to where dewatering and digging activities are occurring. The water is then treated through the Mobile WTP to ensure that there aren't any delays in the construction program.

The Fixed WTP was designed to provide a high flowrate solution for the larger works. Strategically placed water collection stations with transfer pumps are set up onsite which can be moved depending on treatment requirements, enabling the Fixed WTP receive water from multiple areas at once.

Synergy designed and constructed a bespoke mobile WTP specifically for the project incorporating a variety of filtration media allowing water treatment to remove multiple types of PFAS and co-contaminants.

PETRIE MILL WATER TREATMENT PLANT

CLIENT
ORORA LIMITED

LOCATION
PETRIE | BRISBANE | QLD

ROLE
DEWATERING, WATER & SLUDGE TREATMENT

VALUE
2.4 MILLION

TIMELINE
OCT 2019 - DEC 2020



STATISTICS

- 185 MILLION LITRES OF WATER TREATED
- 99% SUCCESS RATE DISCHARGE CRITERIA
- 28 PFAS TO BELOW ULTRA TRACE (<0.001-0.005 ug/L)
- 32 OTHER POLLUTANTS
- 60 CONTAMINANTS TREATED IN TOTAL

PROJECT SCOPE

Synergy were engaged by Orora Limited to treat surface water and stabilise accumulated sludge within 20 legacy processing ponds following 60 years of Waste Water Treatment Plant (WWTP) operations on a former carton board paper mill located in Petrie QLD.

Remediation of the former Petrie Paper Mill is a challenging environmental project. Synergy's activities are part of progressive site redevelopment by Morton Bay Regional Council.

Synergy overcame significant technical challenges to successfully treat up to 200 Million litres of contaminated surface water containing an extensive range of organic and inorganic pollutants including PFAS, metals and hydrocarbons.

Synergy developed an up to 15 l/sec Water Treatment Plant (WTP) capable of achieving water quality for all 60 pollutants including compliance to the most conservative PFAS criteria ever assigned in the Commonwealth of Australia by an Environmental Authority (EA) issued by the QLD DES allowing treated water to be discharged continuously into a sensitive marine environment.



INNOVATIONS

Synergy designed and constructed a bespoke, six-stage multi barrier WTP with integrated sludge conditioning system.

Initially the WTP was developed to achieve the PFAS NEMP drinking water criteria (i.e. PFOS + PFHxS < 0.07 ug/L & PFOA < 0.56 ug/L) which was achieved for 100% of samples. QLD DES then amended the EA to include all 28 PFAS, making it the most stringent discharge criteria in Australia with the inclusion of ultra-trace criteria.

In addition to 28 PFAS analytes, the QLD DES specified criteria for 32 other contaminants including AOX, phthalates, PCBs, heavy metals, hydrocarbons and organics many of which the EA requested lower results than detection limits offered by NATA laboratories. To address this Synergy worked with the labs to have the limits of reporting reduced.

WTP performance during commissioning was 98% compliant with EA criteria. To further enhance performance key process modifications were made to improve removal of short chain PFAS including PFBA, PFHxA and PFPeA that although still being removed were marginally over discharge criteria. Afterwards the WTP was recommissioned and the EA criteria was achieved for 100% of samples since.

Synergy undertook trials to demonstrate PFAS and Metals could be immobilised within 80,000m³ of pond sludge allowing disposal within an onsite landfill.

“Orora are very impressed with Synergy’s water treatment ability especially their responsiveness to overcome many technical challenges.”

- Kevina Beaumont, Former Petrie Paper Mill Environmental Manager

Synergy WTP Performance at Petrie Paper Mill Wastewater Treatment Ponds					
Data Current to: Analytical 23/06/2020 Volume 10/07/2020			QLD DES EA Discharge Criteria		Compliance
Mean flowrate	12 L/s	Each PFAS analyte < 0.05 ug/L & NEMP Drinking Water EA Maximum Criteria		99.69%	
Maximum flowrate	29 L/s	Standard PFAS (i.e. <0.01 ug/L) EA 80th Percentile Criteria*		99.53%	
Mean volume treated per day	771,945 L	Trace PFAS (i.e. <0.001 ug/L) EA 50th Percentile Criteria*		97.99%	
Total volume water treated	185,347,000 L	EA Criteria for other 32 other contaminants		100.00%	
Contaminant Removal Statistics					
Analytes	% Reduction	Influent (ug/L)		Effluent (ug/L)	
		Mean	Maximum	Mean	Maximum
PFAS (28)	98.47	1.19	3.37	0.02	0.223
Vanadium	23.65	6	21	5 (ND)	5 (ND)
TRH C6-C40	16.82	319	720	260 (ND)	260 (ND)
Phthalates (4)	96.83	31	200	1 (ND)	5 (ND)
TSS	95.86	58	300	2	10
BOD	69.16	16	48	5	6
TOC	76.98	37	210	9	30
<p>*PFBA, PFHxA & PFPeA have 50th Percentile Criteria at 0.02 ug/L, 0.01 ug/L & 0.01 ug/L ND = No Detection of analyte in sample</p>					

MOOREBANK PRECINCT INTERMODAL WORKS

CLIENT
FULTON HOGAN & QUBE

LOCATION
MOOREBANK | SYDNEY | NSW

ROLE
WATER TREATMENT & MANAGEMENT

VALUE
2 MILLION

TIMELINE
NOV 2018 - DEC 2021



STATISTICS

100% SUCCESS RATE
CONTRACTUAL CRITERIA

100% PFAS BELOW
DETECTION LIMITS

38 MILLION
LITRES TREATED

CUSTOMISED WATER
TRANSFER SYSTEM

CONTAINERISED
MOBILE PLANT

PROJECT SCOPE

Synergy were elected to provide water management and treatment services to assist in managing PFAS contaminated surface and groundwater in the site catchment basins for the Moorebank Precinct works.

The Moorebank Precinct Intermodal Works is underway to construct one of the most important freight infrastructure projects being developed in Australia.

The precinct will be made up of a rail yard, trucking and warehouses which will allow shipping containers to be transferred between rail and road.

Previous assessment of the site identified historical Per- & Polyfluoroalkyl substances (PFAS) contamination within the surface water storage basins. Synergy were contracted to assist construction activities by treating the contaminated water within the storage basins to allow for capacity for rainfall events. The water treatment plant (WTP) consists of natural settlement tanks and filters where two different types of granular activated carbon (GAC) are used.



INNOVATIONS

Synergy take a wholistic approach when designing water transfer and treatment systems to ensure site requirements and changing environments can be catered to.

Prior to works commencing, Synergy were aware that there were construction works occurring on both the East and West Precincts. Sensing that treatment would be required on both Precincts, Synergy developed an innovative treatment system which was easily relocated when required by creating a simplistic and efficient design allowing for demobilisation and remobilisation to occur promptly. This ensured construction works weren't delayed as a result of contaminated water hindering areas onsite.

One of the main challenges on the site was the widespread nature of the water storage basins across the construction area. To remove the need to frequently change the location of the water treatment system which would have been more costly for the client, Synergy were able to develop a customised water transfer system. Various pipework was strategically laid out across the site enabling the transfer of contaminated water to one main basin adjacent to the WTP. Synergy's WTP then collects the water from the main basin for treatment.

Synergy's mobile design of the water treatment system provided an agile water treatment solution to support these major infrastructure works.



TOTAL
CONTRACTING
SERVICES

**Attachment B – Synergy’s NSW EPA Mobile
Wastewater Treatment Licence**



✦ NSW EPA MOBILE WASTEWATER TREATMENT LICENSE

Synergy have recently obtained an Environment Protection Licence (EPL) for adaptable and practical Australian-made mobile wastewater processing plants, with treatment of PFAS being a focus.

To obtain this license Synergy has proven its capabilities based on 10 years' experience and successful treatment of over 7 billion litres of contaminated water. This EPL allows us to attend your site to undertake treatment of contaminated water using our proven technology and remediation capability. The licence includes 6 containerised flat-bed mobile water treatment plants with a maximum processing capacity for each system of 800 cubic meters per day, capable of treating contaminants for 15 different waste codes including PFAS, heavy metals, cyanide, nitriles, phenols, water containing petrochemical fuels, oils and lubricants.

Synergy's mobile water treatment plants are designed, constructed and commissioned ready to be implemented at short notice. By engaging Synergy, you will receive a NSW EPA certified treatment solution for your site where an EPL is not currently in place, thereby alleviating approval processes and expediting your program. A full list of waste codes is shown below:

Waste Description	Waste Code
Arsenic; arsenic compounds	D130
Cadmium; cadmium compounds	D150
Chromium compounds (hexavalent and trivalent)	D140
Copper compounds	D190
Cyanides (inorganic)	A130
Cyanides (organic)	M210
Fire debris and fire wash waters	N140
Lead; lead compounds	D220
Nickel compounds	D210
Phenols, phenol compounds including chlorophenols	M150
Residues from industrial waste treatment/disposal operations/reducing agents	N205
Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials	M250
Vanadium compounds	D270
Waste oil/water, hydrocarbons/water mixes or emulsions	J120
Zinc compounds	D230





Environment Protection Licence

Licence - 21225

Licence Details	
Number:	21225
Anniversary Date:	10-October

Licensee
SYNERGY RESOURCE MANAGEMENT PTY LTD
LEVEL 8, CORPORATE CENTRE 1, 2 CORPORATE COURT, BU/802 2 CORPORATE COURT BUNDALL QLD 4217

Scheduled Activity
Mobile waste processing

Fee Based Activity	Scale
Mobile waste processing	Any activity

Region
Hazardous Materials, Chemicals & Radiation
59-61 Goulburn Street SYDNEY NSW 2000
Phone: (02) 9995 5000
Fax: (02) 9995 5999
PO Box A290 SYDNEY SOUTH NSW 1232



Environment Protection Licence

Licence - 21225

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

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The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

SYNERGY RESOURCE MANAGEMENT PTY LTD

LEVEL 8, CORPORATE CENTRE 1, 2 CORPORATE COURT, BU/802 2 CORPORATE COURT

BUNDALL QLD 4217

subject to the conditions which follow.

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1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the treatment, processing or reprocessing of wastes having the following codes, using the mobile plant specified below and described in more detail in A2:

Registration/Asset Number	Waste Code
SRM MWTP Alpha	A130, D130, D140, D150, D190, D210, D220, D230, D270, M150, M210, M250, N140, N205 and J120.
SRM MWTP Bravo	A130, D130, D140, D150, D190, D210, D220, D230, D270, M150, M210, M250, N140, N205 and J120.
SRM MWTP Charlie	A130, D130, D140, D150, D190, D210, D220, D230, D270, M150, M210, M250, N140, N205 and J120.
SRM MWTP Delta	A130, D130, D140, D150, D190, D210, D220, D230, D270, M150, M210, M250, N140, N205 and J120.
SRM MWTP Echo	A130, D130, D140, D150, D190, D210, D220, D230, D270, M150, M210, M250, N140, N205 and J120.
SRM MWTP Foxtrot	A130, D130, D140, D150, D190, D210, D220, D230, D270, M150, M210, M250, N140, N205 and J120.

A1.2 The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Mobile waste processing	Mobile waste processing	Any activity

A2 Premises or plant to which this licence applies

A2.1 This licence applies to the following mobile plant:

Type of Mobile Plant	Registration or Chassis Numbers	Date of Manufacture	Manufacturer	Processing Capacity
Containerised Flat Bed Mobile WTP - up to 10L/s	As under Condition A1.1	2019	Synergy Resource Management Pty Limited	800 cubic metres per 24 hour day

A2.2 The licensee may apply in writing to the EPA for approval to increase the processing capacity of the mobile plant.

The application for approval under this condition must include the information described in Condition E6.



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- A2.3 The processing capacity listed in Condition A2.1 does not apply to proof of performance testing undertaken by the licensee for the purposes of Condition E6.

A3 Information supplied to the EPA

- A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

- A3.2 Works and activities must be carried out in accordance with the information provided by the licensee to the EPA to support the licence application and to assist the EPA in connection with the issuing of this licence.

A4 Other administrative conditions

- A4.1 The licensee must submit any information required by the licence to the Manager, Hazardous Materials via the EPA's Hazardous Materials Unit mailbox at hazardous.materials@epa.nsw.gov.au, where not otherwise specified in this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

- P1.1 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.
- P1.2 No monitoring/discharge points and areas have been specified in this licence.

3 Limit Conditions

L1 Pollution of waters

- L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

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L2 Waste

- L2.1 This licence applies to the processing, removal and disposal of liquids located where the licensed activity takes place.
- L2.2 This licence does not apply to the processing of liquids from offsite that are received at the location where the licensed activity takes place, unless:
- the mobile plant is located at a site or facility that can lawfully receive the waste; and
 - the liquid can be effectively and efficiently treated by the mobile plant.
- L2.3 The licensee must not cause, permit or allow any waste that is not referred to in the table below to be processed by the mobile plant subject to this licence.
Any waste at the site where the licensed activity takes place is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
D130	Arsenic; arsenic compounds	Water impacted with heavy metals	Mobile waste processing	N/A
D140	Chromium compounds (hexavalent and trivalent)	Water impacted with heavy metals	Mobile waste processing	N/A
D150	Cadmium; cadmium compounds	Water impacted with heavy metals	Mobile waste processing	N/A
D190	Copper compounds	Water impacted with heavy metals	Mobile waste processing	N/A
D210	Nickel compounds	Water impacted with heavy metals	Mobile waste processing	N/A
D220	Lead; lead compounds	Water impacted with heavy metals	Mobile waste processing	N/A
D230	Zinc compounds	Water impacted with heavy metals	Mobile waste processing	N/A
M250	Surfactants cnt principally organic constituents	Including PFAS (principally perfluorooctanoic acid and/or perfluorooctane sulfonate) contaminated waters	Mobile waste processing	N/A
N140	Fire debris and fire washwaters	Including PFAS (principally perfluorooctanoic acid and/or perfluorooctane sulfonate) contaminated waters	Mobile waste processing	N/A
J120	Waste oil/water, hydrocarbons/water mixtures or emulsions	Water containing petrochemical fuels, oils & lubricants	Mobile waste processing	N/A

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A130	Cyanide (inorganic)	Water impacted with inorganic cyanide or inorganic cyanide compounds	Mobile waste processing	N/A
D270	Vanadium compounds	Water impacted with vanadium compounds	Mobile waste processing	N/A
M150	Phenols, phenol compounds, including chlorophenols	Water impacted with phenols or phenol compounds	Mobile waste processing	N/A
M210	Cyanide (organic)/nitriles	Water impacted with organic cyanide or nitriles	Mobile waste processing	N/A
N205	Residues from industrial waste treatment/disposal operations	Including PFAS (principally perfluorooctanoic acid and/or perfluorooctane sulfonate) contaminated waters	Mobile waste processing	N/A

L2.4 Concentrated PFAS liquid wastes such as undiluted aqueous film forming foam concentrates are not permitted to be treated by the mobile plant subject to this licence.

L2.5 Proof of performance testing must be conducted to establish or confirm influent specifications which the plant can successfully treat.

For the purposes of this condition, previous proof of performance testing undertaken using the mobile plant subject to this licence may be considered in determining the need for additional testing.

L2.6 Supplementary proof of performance testing to establish new influent specifications and plant operating conditions must be conducted if:

- influent contaminants or concentrations differ to and exceed the established specifications; and
- the difference has the potential to interfere with or compromise the effectiveness and efficiency of the treatment process.

L3 Noise limits

L3.1 All operations and activities carried out in associated with the mobile plant must be conducted in a manner that will not cause or permit LAeq(15minutes) noise levels greater than background plus 5dB at the nearest sensitive receivers.

L4 Potentially offensive odour

L4.1 The licensee must not cause or permit the emission of offensive odour beyond the area where the licensed activity takes place.

For the purposes of this condition the area where the licensed activity takes place is the area described by the licensee under condition O7.5.

L4.2 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the

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Protection of the Environment Operations Act 1997.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 All plant and equipment used in connection with the licensed activity must be maintained in a condition which minimises or prevents the emission of dust from the plant and equipment.

O3.2 All operations and activities occurring in connection with the licensed activity must be carried out in a manner that will minimise the emission of dust from where the licensed activity takes place.

O3.3 Trucks that are carrying loads in connection with the licensed activity must be covered at all times, except during loading and unloading.

O4 Emergency response

O4.1 The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) in relation to the activity to which this licence relates. The licensee must at all times keep the PIRMP at the location where the licensed activity takes place. The PIRMP must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur where the licensed activity takes place or that may be associated with activities that occur where the licensed activity takes place and which are likely to cause harm to the environment.

The licensee must, in relation to the PIRMP, comply with the requirements in Part 5.7A of the Act 1997 and Regulations made under the Act.

The licensee must develop and complete a PIRMP prior to construction of the mobile plant.

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The licensee must provide the EPA with a copy of the current PIRMP in relation to the activity to which this licence relates.

O5 Processes and management

- O5.1 The licensee shall manage and operate all operations and activities occurring in connection with the licensed activity using a sufficient number of competent persons and resources to ensure the effective and efficient treatment of liquid waste.
- O5.2 Solid waste substances and treatment reagents/materials must be kept and treated on an impermeable surface with sealed drainage system.
- O5.3 Liquid waste contaminated with per- and poly-fluoroalkyl substances (PFAS) (principally perfluorooctanoic acid and/or perfluorooctane sulfonate) must not be mixed or combined at any time, either with:
 1) different liquid waste containing PFAS, unless it is associated with contamination or the remediation process being managed or implemented at the location where the licenced activity takes place; or
 2) any other waste, substance or material that are not used as reagents in the treatment process.

The licensee may apply in writing to the EPA for approval to mix or combine liquid waste containing PFAS with different liquid waste containing PFAS, or any other waste, substances or materials that are not used as reagents in the treatment process.

The application for approval under this condition must include the information described in Condition E7.

- O5.4 The licensee must ensure that all liquid materials associated with the licensed activity including chemicals, fuels, oils, and wastes are stored in suitable storage receptacles in a designated impervious bund that has a net capacity of at least 110% of the net capacity of the largest container/tank contained within the bund.
- O5.5 The licensee must ensure that suitable measures to prevent the spillage of waste (such as high/low alarms, control valves with interlock control and one way valves) are installed on all tanks and associated pipes and hoses that are used in connection with the licensed activity.
- O5.6 There shall be no point source emissions to air, water or land from any plant and equipment used in connection with the licensed activity, other than point source emissions to air from any diesel generator used to power mobile plant operations, or those otherwise assessed under Condition E2 and approved by the EPA in writing or amendment to this Environment Protection Licence.
- O5.7 a) Discharge of treated liquid waste to the environment, trade waste, or reuse or recycling of treated liquid waste must be assessed in accordance with Condition E2 and approved in writing by the EPA.
 b) Processing of contaminated liquid may only commence after the EPA has reviewed the assessment required by Condition E2 and provided its written approval to the licensee to allow the commencement of processing at the location where the licensed activity will occur.
- O5.8 The licensee must identify the need for and secure approvals or agreements for treated water disposal to trade waste, recycling, discharge to the environment or other use, where required.

The licensee must obtain copies of any relevant approvals or agreements prior to the start of mobile plant

Environment Protection Licence



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operations.

- O5.9 Disposal, discharge or recycling of treated liquid waste must be performed in a lawful manner in accordance with any relevant approvals, licences, conditions or permits.
- O5.10 Treated liquid waste must be suitable for its intended purpose, such as for disposal to sewer, discharge to the environment, or for reuse or recycling.
- O5.11 The concentration of each PFAS compound and the sum of PFAS compounds in the treated water prior to disposal, discharge or other use must be:
- below 0.005 micrograms per litre, or below the disposal, discharge or treatment criteria if these are less than 0.005 micrograms per litre; and
 - consistent with the mobile plant being operated and maintained in a proper and efficient manner.

The licensee may apply in writing to the EPA for approval to increase the treated water concentration of certain PFAS compounds or the sum of PFAS compounds where the limit of reporting for these compounds or the sum of compounds is above 0.005 micrograms per litre, or can be otherwise justified.

For the purpose of this condition, the analytical suit used in the testing of PFAS must be fit for purpose to accurately and reliably characterise PFAS in the treated water. The minimum analytical suit used in the testing of PFAS must be the PFAS suit of approximately 30 PFAS compounds offered by commercial laboratories and include the compounds in the following table, unless otherwise justified by the licensee and agreed to by the EPA in writing.

Abbreviation	Compound name	Abbreviation	Compound name
PFOS	Perfluorooctane sulfonate	PFBS	Perfluorobutane sulfonate
PFOA	Perfluorooctanoic acid	PFBA	Perfluorobutanoic acid
6:2 FtS	6:2 Fluorotelomer sulfonate	PFHxA	Perfluorohexanoic acid
8:2 FtS	8:2 Fluorotelomer sulfonate	PFHxS	Perfluorohexane sulfonate
PFHpA	Perfluoroheptanoic acid	PFPeA	Perfluoropentanoic acid

O6 Waste management

- O6.1 Spent materials including spent adsorbent/absorbents, spent ion exchange resins and spent filter media contaminated with PFAS that are classified as hazardous waste must be transported to a facility where they can be lawfully received for thermal destruction.
- O6.2 When waste is transported from the mobile plant used in connection with the licenced activity, the licensee must ensure the waste is transported:
- by a waste transporter authorised to transport such waste; and
 - to a place that can lawfully be used as a waste facility for that waste.
- O6.3 The licensee must ensure that any waste, destined for disposal or further treatment must be assessed and classified in accordance with the EPA's Waste Classification Guidelines as in force from time to time before transporting it from the site where the licenced activity is occurring.

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O6.4 Following completion of mobile waste processing activities at any location, all reagents, adsorbents, ion-exchange resins and filter media used in connection with the licensed activity must be lawfully disposed, treated or stored.

O7 Other operating conditions

- O7.1 Activities occurring in connection with the licensed activity must be carried out using plant and equipment designed and manufactured for the intended purpose.
- O7.2 The licensee must assess and determine the need for, and obtain any required planning approval, development consent and any other approvals, consents or statutory requirements, prior to commencing works at any location.
- O7.3 The licensee must determine the need for and prepare any environmental assessment or other impact assessment required to meet any statutory requirements and secure all relevant approvals for each proposed liquid waste treatment site.
- O7.4 The licensee must ensure the mobilisation, construction, operation and decommissioning of the mobile plant to which the licence applies is undertaken in a lawful manner and location, and in accordance with any relevant planning consent or development approval.
- O7.5
1. At least two (2) working days prior to the intended start date of operations at each location involving the mobile plant used in connection with the licensed activity, the licensee must provide to the EPA in writing:
 - a) the intended start and finish dates of operations;
 - b) a description of the proposed location and place where the licensed activity will occur;
 - c) a description and map or diagram of the proposed location and siting of plant associated with the licensed activity;
 - d) a detailed description or diagram of the plant layout, components and process flow;
 - e) an itemised list of the equipment and plant that will make up the mobile plant subject to this licence;
 - f) the volume and details of contaminated liquids to be processed in connection with the licensed activity;
 - g) a detailed description of the contaminated liquids to be processed including contaminant types and concentrations;
 - h) the expected duration of mobile plant operations at the proposed location where the licensed activity will occur; and
 - i) a copy of any planning consent or development approval, or other relevant information, agreements or approvals, required to permit the operation of the mobile plant at the place where the licensed activity will occur.
 2. The licensee must notify the EPA in writing prior to mobile plant decommissioning how any used reagents, adsorbents, ion-exchange resins and filter media will be managed when mobile plant operations cease at each location where the licensed activity takes place.
 3. The licensee must notify the EPA in writing of the completion of operations at each location involving the mobile plant used in connection with the licensed activity, within fourteen (14) days of completing operations.

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5 Monitoring and Recording Conditions

M1 Monitoring records

- M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.
- M1.2 All records required to be kept by this licence must be:
- a) in a legible form, or in a form that can readily be reduced to a legible form;
 - b) kept for at least 4 years after the monitoring or event to which they relate took place; and
 - c) produced in a legible form to any authorised officer of the EPA who asks to see them.
- M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
- a) the date(s) on which the sample was taken;
 - b) the time(s) at which the sample was collected;
 - c) the point at which the sample was taken; and
 - d) the name of the person who collected the sample.

M2 Recording of pollution complaints

- M2.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.
- M2.2 The record must include details of the following:
- a) the date and time of the complaint;
 - b) the method by which the complaint was made;
 - c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - d) the nature of the complaint;
 - e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - f) if no action was taken by the licensee, the reasons why no action was taken.
- M2.3 The record of a complaint must be kept for at least 4 years after the complaint was made.
- M2.4 The record must be produced to any authorised officer of the EPA who asks to see them.
- M2.5 The licensee must keep a legible record of all complaints made to the licensee of any employee or agent of the licensee in relation to matters other than pollution arising from any activity to which this licence applies.

M3 Telephone complaints line

- M3.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

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M3.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M3.3 The preceding two conditions do not apply until 3 months after the date of the issue of this licence.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:

- a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
- b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:

- a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
- b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a

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transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

- R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.
- R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
- a) the licence holder; or
 - b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R2 Notification of environmental harm

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- a) where this licence applies to premises, an event has occurred at the premises; or
 - b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
- a) the cause, time and duration of the event;
 - b) the type, volume and concentration of every pollutant discharged as a result of the event;
 - c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
 - d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
 - e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
 - f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
 - g) any other relevant matters.

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- R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

7 General Conditions

G1 Copy of licence kept at the premises or plant

- G1.1 A copy of this licence must be kept at the mobile plant to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee operating the mobile plant.

8 Special Conditions

E1 Project Staging Condition

- E1.1 The licensee must ensure all practical measures are undertaken to prevent and minimise harm to the environment and human health as a result of mobilisation, construction, operation, maintenance and decommissioning of the mobile plant subject to this licence.

E2 Project Assessment Conditions

- E2.1 The conditions hereunder relate to requirements for the site specific assessment of project impacts and risk.
1. The licensee must identify and assess all impacts and risk in relation to the licensed activity at each location where the mobile plant will operate.
 2. The assessment must include a site specific discharge impact assessment consistent with of any of the matters in section 45 of the Act that are relevant.
 - 2a. The discharge impact assessment must also address matters referred to in any guidance provided to the licensee by the EPA to assist with satisfying this requirement.
 3. The assessment must justify the:
 - a) influent and treated water specifications for each contaminant and physical and chemical properties;
 - b) discharge methods, parameters and criteria, including where appropriate, for disposal to trade waste, for recycling, or discharge to the environment; and
 - c) plant design, configuration, siting and operation.

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4. The licensee must ensure identified potential adverse impacts and risk in relation to the licenced activity are managed to prevent any significant impact on the environment or human health.

5. The licensee must provide the EPA with a written report that includes details of the assessment for the EPA's review, comment and approval.

E3 Project Management Plans

E3.1 The conditions hereunder relate to any project where the mobile plant subject to this Environment Protection Licence is used to treat contaminated water.

1. The licensee must design and implement detailed and site specific management plans in relation to the licenced activity at each location where the mobile plant will operate.

2. The management plans must address all activities and potential impacts to the environment and human health, associated with the licenced activity.

3. The management plans must address all stages of the project including plant commissioning, construction, operation, maintenance and decommissioning.

4. The management plans must include details of monitoring strategies to be implemented which will ensure and demonstrate plant and associated emission controls are operating efficiently and effectively.

5. The licensee must regularly review each management plan and update any plan as required and as operations and activities change, so they are accurate, current and suitable.

6. The licensee must implement all requirements specified in each management plan as they apply at any point in time.

7. The conditions of this licence and the Act may include requirements that differ from or are additional to the requirements of the management plans. Where any inconsistency arises between the requirements of this licence and the Act and the requirements of the management plans, the licensee must meet the more stringent of the applicable requirements.

8. The licensee must meet all requirements in this licence and the Act that are additional to the requirements of the management plans.

E4 Commissioning, Proof of Performance (PoP) and Supplementary PoP Reporting

E4.1 The conditions hereunder relate to reporting requirements for commissioning, proof of performance testing and supplementary proof of performance testing.

1. The licensee must prepare and provide the EPA with a System Commissioning Report for water treatment operations at each location where the mobile plant operates, or as otherwise agreed to by the EPA in writing.

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2. The System Commissioning Report must include all relevant information and results obtained:
 - a) from proof of performance tests;
 - b) to satisfy the requirements of the commissioning plan/s; and
 - c) to demonstrate to the EPA that the mobile plant can effectively and efficiently treat PFAS and other contaminants present, at the chosen treatment flow rates and at the concentrations present, in the contaminated liquid to be treated where the licenced activity is being undertaken.

3. The System Commissioning Report must be provided to the EPA within seven (7) days of the completion of mobile plant commissioning.

E5 System Performance Reporting

- E5.1
1. Following commissioning of the mobile plant the licensee must prepare and provide the EPA with ongoing System Performance Reports every three (3) months where the plant has operated during that period, or at a frequency agreed to by the EPA in writing.

 2. The System Performance Report should include the following information for each location the plant has operated during the reporting period:
 - a) Operational Period;
 - b) Volume and type of water treated;
 - c) Where the contaminated water was generated;
 - d) Any site observations made during operation, such as the: presence of other new contaminants, site operations that may impact the performance of the mobile plant, and any potential spills/releases that may have occurred;
 - e) Summary of raw water and treated water analytical results;
 - f) Results of any supplementary proof of performance tests;
 - g) Volume and details of treated water disposed, discharged or reused;
 - h) Details of disposal of solid or liquid waste generated or associated with liquid treatment operations; and
 - i) Details of any non-compliance and proposed corrective actions.

E6 Requirements for increasing mobile plant processing capacity

- E6.1
- The conditions hereunder relate to any application by the licensee to increase the processing capacity of the mobile plant.
1. The licensee must provide the EPA with detailed information to support any proposed increase in processing capacity.

 2. The information to be provided to the EPA must include:
 - a) where applicable, results from proof of performance (PoP) and any other testing used to demonstrate the effective treatment of liquid waste at the proposed processing capacity; and
 - b) information to demonstrate the increased in processing capacity will not result in any adverse impacts to the environment and human health.

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3. The licensee must notify the EPA in writing prior to undertaking any PoP testing for the purpose of increasing processing capacity.

E7 Requirements for mixing liquid waste with other waste, substances or materials

E7.1 The conditions hereunder relate to any application by the licensee to mix or combine liquid waste containing PFAS with different liquid waste containing PFAS, or any other waste, substances or materials that are not used as reagents in the treatment process.

1. The licensee must provide the EPA with detailed information to justify and support any proposal to mix liquid waste with other waste, substances or materials.

2. The information to be provided to the EPA must include information on:

- a) the purpose, need and justification for the mixing;
- b) the composition and volume of materials to be mixed;
- c) the method of mixing;
- d) the duration and timing of the proposal; and
- e) likely or potential hazards and impacts associated with the mixing, and control methods to be applied to mitigate identified impacts.

3. The information provide to the EPA should consider and address:

- a) the treatability of any mixed liquid waste and the potential to generate a waste the mobile plant cannot effectively or efficiently treat, or cannot be readily disposed of;
- b) potential chemical reactions that might take place and associated safety aspects; and
- c) the need to treat PFAS containing wastes in a timely manner, and minimise the storage of PFAS containing liquids and other waste.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr Erwin Benker

Environment Protection Authority

(By Delegation)

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End Notes



TOTAL
CONTRACTING
SERVICES

