Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph +61 8 9317 2505
lab@mpl.com.au
www.mpl.com.au

Certificate of Analysis PFB1068

Client Details

Client	Modit
Contact	Ben Forknall
Address	PO Box 2273, Malaga, 6944

Sample Details

Your Reference	RO Filter System
Number of Samples	1 Water
Date Samples Received	19/02/2024
Date Instructions Received	19/02/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	22/02/2024
Date of Issue	22/02/2024

Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Andrew Townsend, Microbiological Analyst Ben Carpenter, Metals Technician Heram Halim, Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFB1068

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFB1068-01	Sample 1	Water	19/02/2024	19/02/2024

Acid Extractable Low Level Metals (Water)

Envirolab ID	Units	PQL	ADWG	PFB1068-01
Your Reference			Health	Sample 1
Date Sampled			Value	19/02/2024
Cadmium	µg/L	0.10	2.0	<0.10
Copper	µg/L	1.0	2000	1.8
Iron	µg/L	10		<10
Manganese	µg/L	1.0	500	<1.0
Lead	µg/L	1.0	10	<1.0

Inorganics - Physical Parameters (Water)

Envirolab ID	Units	PQL	ADWG	PFB1068-01
Your Reference			Health	Sample 1
Date Sampled			Value	19/02/2024
pH	pH units		6.5-8.5	9.8
Electrical Conductivity	µS/cm	2.0		96
Total Dissolved Solids	mg/L	5.0		58

Inorganics - Ionic Balance and Indexes (Water)

Envirolab ID	Units	PQL	PFB1068-01
Your Reference			Sample 1
Date Sampled			19/02/2024
Bicarbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0
Carbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	34
Hydroxide OH- as CaCO3	mg/L as CaCO3	5.0	<5.0
Total Alkalinity as CaCO3	mg/L as CaCO3	5.0	35
Chloride	mg/L	1.0	8.8
Sulfate	mg/L	1.0	<1.0
Calcium	mg/L	0.50	5.8
Magnesium	mg/L	0.50	2.8
Potassium	mg/L	0.50	0.79
Sodium	mg/L	0.50	6.9
Hardness as CaCO3	mg/L	3.0	26
Ionic Balance	%		-6.5

Inorganics - Nutrients (Water)

Envirolab ID	Units	PQL	ADWG	PFB1068-01
Your Reference			Health	Sample 1
Date Sampled			Value	19/02/2024
Nitrate as N	mg/L	0.10		0.11
Nitrate as NO3 by calc	mg/L	0.50	50	<0.50

Heterotrophic Plate Count (Water)

Envirolab ID	Units	PQL	PFB1068-01
Your Reference			Sample 1
Date Sampled			19/02/2024
Heterotrophic Plate Count 36C	cfu/mL	10	670

Certificate of Analysis PFB1068

Microbiological Suite (Water)

Envirolab ID	Units	PQL	ADWG	PFB1068-01
Your Reference			Health	Sample 1
Date Sampled			Value	19/02/2024
Thermotolerant Coliforms	cfu/100mL	1	1	<1
Enterococci	cfu/100mL	1	1	<1
E.coli	cfu/100mL	1	1	<1

Method Summary

Method ID	Methodology Summary
INORG-001	pH - Measured using pH meter and electrode based on APHA latest edition, Method 4500-H+. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the APHA recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-002	Conductivity and Salinity - measured using a conductivity cell at 25°C based on APHA latest edition Method 2510. Soil results reported from a 1:5 Soil:Water extract unless otherwise specified. Please note Resistivity is estimated by calculation and may not correlate with results otherwise obtained using the Resistivity current method (based on AS 1289.4.4.1), depending on the nature of the soil being analysed.
INORG-006	Alkalinity - determined titrimetrically based on APHA latest edition 2320-B. Solids reported from a 1:5 water extract unless otherwise specified. Total Carbon Dioxide - determined by calculation in accordance with APHA latest edition,4500-CO2 D.
INORG-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180±10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation: TDS = EC*0.6
INORG-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% i.e. total anions = total cations +/-15%.
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
METALS-020	Determination of various metals by ICP-OES.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements.
MICRO-001B	E. coli/Thermotolerant coliforms: Microbial Water Analysis - in accordance with MICRO-001 (AS4276.5-latest edition). Recommended maximums based on NHMRC Australian Drinking Water Guidelines. Please note that results for this test derived from counts outside of the range 10-100 are considered approximate as per AS4276.1.
MICRO-001DE	Enterococci: Microbial Water Analysis - in accordance with MICRO-001 (AS 4276.9: latest edition). Please note that results for this test derived from counts outside of the range 10-100 are concidered approximate as per AS 4276.1.
MICRO-001E	Heterotrophic Plate Count: Microbial Water Analysis - in accordance with MICRO-001 (AS4276.3-latest edition).

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from the latest "Australian Drinking Water Guidelines", published by NHMRC. No guideline values have been set for Total Coliforms in drinking water. Increased concentrations should be investigated. Total Coliforms are not considered useful as indicators of the presence of faecal contamination.

Where we have provided guideline values eg. ADWG Health Value, it is the responsiblity of the reader to decide if the water is fit for consumption. Please note that the tests we have conducted are just a selection of common tests to give you a general idea of drinking water quality. There are many other tests included in the ADWG that we have not tested for.

Data Quality Assessment Summary PFB1068

Client Details

Client	Modit
Your Reference	RO Filter System
Date Issued	22/02/2024

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFB1068

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Total Metals (LL) | Water	1	19/02/2024	20/02/2024	22/02/2024	Yes
EC | Water	1	19/02/2024	20/02/2024	21/02/2024	Yes
pH | Water	1	19/02/2024	20/02/2024	21/02/2024	Yes
TDS | Water	1	19/02/2024	19/02/2024	22/02/2024	Yes
Alkalinity Suite | Water	1	19/02/2024	20/02/2024	21/02/2024	Yes
Chloride | Water	1	19/02/2024	20/02/2024	20/02/2024	Yes
Dissolved Cations | Water	1	19/02/2024	20/02/2024	21/02/2024	Yes
Ion Balance | Water	1	19/02/2024	21/02/2024	22/02/2024	Yes
Sulfate | Water	1	19/02/2024	20/02/2024	20/02/2024	Yes
Nitrogen - Nitrate | Water	1	19/02/2024	20/02/2024	20/02/2024	Yes
HPC-36C | Water	1	19/02/2024	19/02/2024	19/02/2024	Yes
E. coli & T.T.coli | Water	1	19/02/2024	19/02/2024	20/02/2024	Yes
Enterococci | Water	1	19/02/2024	19/02/2024	19/02/2024	Yes

Quality Control PFB1068

METALS-022|Acid Extractable Low Level Metals (Water) | Batch BFB2252

Analyte	Units	PQL	Blank	DUP1 BFB2252-DUP1# Samp | QC | RPD %	DUP2 BFB2252-DUP2# Samp | QC | RPD %	LCS %	Spike % BFB2252-MS1#
Cadmium	µg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	<0.10 | <0.10 | [NA]	110	113
Copper	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	109	114
Iron	µg/L	10	<10	<10 | <10 | [NA]	1520 | 1500 | 1.01	112	116
Lead	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	<1.0 | <1.0 | [NA]	106	107
Manganese	µg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	44.4 | 42.8 | 3.52	106	113

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-018|Inorganics - Physical Parameters (Water) | Batch BFB2064

Analyte	Units	PQL	Blank	DUP1 BFB2064-DUP1# Samp | QC | RPD %	DUP2 BFB2064-DUP2# Samp | QC | RPD %	LCS %
Total Dissolved Solids	mg/L	5.0	<5.0	57.0 | 57.0 | 0.00	265 | 237 | 11.2	94.9

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-001|Inorganics - Physical Parameters (Water) | Batch BFB2127

Analyte	Units	PQL	Blank	DUP1 PFB1068-01 Samp | QC | RPD %	DUP2 BFB2127-DUP2# Samp | QC | RPD %	LCS %
pH	pH units		4.9	9.8 | 9.8 | 0.407	7.6 | 7.6 | 0.131	100
Electrical Conductivity	µS/cm	2.0	<2.0	96.2 | 96.5 | 0.311	1410 | 1420 | 0.691	101

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-006|Inorganics - Ionic Balance and Indexes (Water) | Batch BFB2127

Analyte	Units	PQL	Blank	DUP1 PFB1068-01 Samp | QC | RPD %	DUP2 BFB2127-DUP2# Samp | QC | RPD %	LCS %
Bicarbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	<5.0 | <5.0 | [NA]	458 | 441 | 3.76	[NA]
Carbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	34.5 | 34.0 | 1.46	<5.0 | <5.0 | [NA]	[NA]
Hydroxide OH- as CaCO3	mg/L as CaCO3	5.0	<5.0	<5.0 | <5.0 | [NA]	<5.0 | <5.0 | [NA]	[NA]
Total Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	35.0 | 34.0 | 2.90	458 | 441 | 3.76	[NA]

Analyte	Units	PQL	Blank	LCS %
Total Alkalinity as CaCO3	mg/L as CaCO3	5		100

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-081|Inorganics - Ionic Balance and Indexes (Water) | Batch BFB2167

Analyte	Units	PQL	Blank	DUP1 BFB2167-DUP1# Samp | QC | RPD %	DUP2 BFB2167-DUP2# Samp | QC | RPD %	LCS %	Spike % BFB2167-MS1#
Chloride	mg/L	1.0	<1.0	39.1 | 38.9 | 0.282	4.57 | 4.56 | 0.313	93.9	105
Sulfate	mg/L	1.0	<1.0	1.89 | 2.01 | 6.00	<1.0 | <1.0 | [NA]	90.9	98.2

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

Quality Control PFB1068

METALS-020|Inorganics - Ionic Balance and Indexes (Water) | Batch BFB2256

Analyte	Units	PQL	Blank	DUP1 BFB2256-DUP1# Samp | QC | RPD %	DUP2 BFB2256-DUP2# Samp | QC | RPD %	LCS %	Spike % BFB2256-MS1#
Calcium	mg/L	0.50	<0.50	462 | 458 | 1.02	115 | 114 | 1.30	93.3	93.8
Magnesium	mg/L	0.50	<0.50	307 | 302 | 1.50	17.4 | 17.4 | 0.00	94.1	94.2
Potassium	mg/L	0.50	<0.50	85.1 | 83.6 | 1.81	4.98 | 4.96 | 0.461	97.0	96.1
Sodium	mg/L	0.50	<0.50	1420 | 1410 | 0.757	90.0 | 89.0 | 1.03	95.1	93.9
Hardness as CaCO3	mg/L	3.0	<3.0	2420 | 2390 | 1.27	359 | 355 | 1.04	[NA]	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

INORG-081|Inorganics - Nutrients (Water) | Batch BFB2167

Analyte	Units	PQL	Blank	DUP1 BFB2167-DUP1# Samp | QC | RPD %	DUP2 BFB2167-DUP2# Samp | QC | RPD %	LCS %	Spike % BFB2167-MS1#
Nitrate as N	mg/L	0.10	<0.10	<0.10 | <0.10 | [NA]	0.116 | 0.115 | 1.13	88.3	80.1
Nitrate as NO3 by calc	mg/L	0.50	<0.50			[NA]	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

MICRO-001E|Heterotrophic Plate Count (Water) | Batch BFB2156

Analyte	Units	PQL	Blank	DUP1 BFB2156-DUP1# Samp | QC | RPD %	DUP2 BFB2156-DUP2# Samp | QC | RPD %	LCS %
Heterotrophic Plate Count 36C	cfu/mL	10	<10	450 | 340 | 27.8	<10 | <10 | [NA]	[NA]

Analyte	Units	PQL	Blank	DUP3 BFB2156-DUP3# Samp | QC | RPD %	DUP4 BFB2156-DUP4# Samp | QC | RPD %	LCS %
Heterotrophic Plate Count 36C	cfu/mL	10		10 | <10 | 200	<10 | 20 | 200	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

MICRO-001DE|Microbiological Suite (Water) | Batch BFB2155

Analyte	Units	PQL	Blank	LCS %
Enterococci	cfu/100mL	1	<1	[NA]

Quality Control PFB1068

MICRO-001B | Microbiological Suite (Water) | Batch BFB2158

Analyte	Units	PQL	Blank	DUP1 BFB2158-DUP1# Samp | QC | RPD %	DUP2 BFB2158-DUP2# Samp | QC | RPD %	LCS %
Thermotolerant Coliforms	cfu/100mL	1	<1	<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]
E.coli	cfu/100mL	1	<1	<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]

Analyte	Units	PQL	Blank	DUP3 BFB2158-DUP3# Samp | QC | RPD %	DUP4 BFB2158-DUP4# Samp | QC | RPD %	LCS %
Thermotolerant Coliforms	cfu/100mL	1		<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]
E.coli	cfu/100mL	1		<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]

Analyte	Units	PQL	Blank	DUP5 BFB2158-DUP5# Samp | QC | RPD %	DUP6 BFB2158-DUP6# Samp | QC | RPD %	LCS %
Thermotolerant Coliforms	cfu/100mL	1		<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]
E.coli	cfu/100mL	1		<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]

Analyte	Units	PQL	Blank	DUP7 BFB2158-DUP7# Samp | QC | RPD %	DUP8 BFB2158-DUP8# Samp | QC | RPD %	LCS %
Thermotolerant Coliforms	cfu/100mL	1		<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]
E.coli	cfu/100mL	1		<1 | <1 | [NA]	<1 | <1 | [NA]	[NA]

Analyte	Units	PQL	Blank	DUP9 BFB2158-DUP9# Samp | QC | RPD %	LCS %
Thermotolerant Coliforms	cfu/100mL	1		<1 | <1 | [NA]	[NA]
E.coli	cfu/100mL	1		<1 | <1 | [NA]	[NA]

The QC reported was not specifically part of this workorder but formed part of the QC process batch.