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 PEK1822

Client Details

Client	Rottnest Island Authority
Contact	David Pond
Address	PO Box 693, FREMANTLE, WA, 6959

Sample Details

Your Reference	South Thomson Barge Development
Number of Samples	3 Water
Date Samples Received	24/11/2023
Date Instructions Received	24/11/2023

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	29/11/2023
Date of Issue	28/11/2023

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

Authorisation Details

Results Approved By	Lien Tang, Assistant Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEK1822

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEK1822-01	ArmyJetty1-20231120	Water	20/11/2023	24/11/2023
PEK1822-02	ArmyJetty2-20231120	Water	20/11/2023	24/11/2023
PEK1822-03	ArmyJetty3-20231123	Water	23/11/2023	24/11/2023

Certificate of Analysis PEK1822

Inorganics - Physical Parameters (Water)

Envirolab ID	Units	PQL	PEK1822-01	PEK1822-02	PEK1822-03
Your Reference			ArmyJetty1-20231120	ArmyJetty2-20231120	ArmyJetty3-20231123
Date Sampled			20/11/2023	20/11/2023	23/11/2023
Total Suspended Solids	mg/L	5.0	<5.0	<5.0	<5.0
Turbidity	NTU	0.10	[NA]	[NA]	0.66

Method Summary

Method ID	Methodology Summary
INORG-019	Suspended Solids - determined gravimetrically by filtration of the sample. The solids are dried at 104±5°C
INORG-022	Turbidity - measured nephelometrically using a turbidimeter, in accordance with APHA latest edition, 2130-B.

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.

Data Quality Assessment Summary PEK1822

Client Details

Client	Rottnest Island Authority
Your Reference	South Thomson Barge Development
Date Issued	28/11/2023

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 PEK1822

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
TSS | Water	1-2	20/11/2023	24/11/2023	24/11/2023	Yes
	3	23/11/2023	24/11/2023	24/11/2023	Yes
Turbidity | Water	3	23/11/2023	24/11/2023	27/11/2023	Yes

Quality Control PEK1822

INORG-022 | Inorganics - Physical Parameters (Water) | Batch BEK2969

Analyte	Units	PQL	Blank	DUP1 BEK2969-DUP1# Samp | QC | RPD %	LCS %
Turbidity	NTU	0.10	<0.10	0.210 | 0.200 | 4.88	95.0

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

INORG-019 | Inorganics - Physical Parameters (Water) | Batch BEK3045

Analyte	Units	PQL	Blank	DUP1 BEK3045-DUP1# Samp | QC | RPD %	DUP2 BEK3045-DUP2# Samp | QC | RPD %	LCS %
Total Suspended Solids	mg/L	5.0	<5.0	353 | 320 | 9.90	192 | 185 | 3.97	86.0

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

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Certificate of Analysis PEL1754

Client Details

Client	Rottnest Island Authority
Contact	David Pond
Address	PO Box 693, FREMANTLE, WA, 6959

Sample Details

Your Reference	South Thomson Barge Landing - Baseline Water Quality Monitoring
Number of Samples	6 Water
Date Samples Received	29/12/2023
Date Instructions Received	29/12/2023

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	09/01/2024
Date of Issue	09/01/2024

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

Authorisation Details

Results Approved By	Diego Bigolin, Supervisor, Inorganics Heram Halim, Operations Manager Lien Tang, Assistant Operations Manager Michael Mowle, Inorganics Supervisor Sally Rogers, Senior Microbiological Analyst Travis Carey, Organics Supervisor
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEL1754

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEL1754-01	ST-01	Water	29/12/2023	29/12/2023
PEL1754-02	ST-02	Water	29/12/2023	29/12/2023
PEL1754-03	ST-03	Water	29/12/2023	29/12/2023
PEL1754-04	ST-04	Water	29/12/2023	29/12/2023
PEL1754-05	ST-05	Water	29/12/2023	29/12/2023
PEL1754-06	ST-06	Water	29/12/2023	29/12/2023

Volatile TRH and BTEX (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
TRH C6-C9	µg/L	10	<10	<10	<10	<10	<10
TRH C6-C10	µg/L	10	<10	<10	<10	<10	<10
TRH C6-C10 less BTEX (F1)	µg/L	10	<10	<10	<10	<10	<10
Methyl tert butyl ether (MTBE)	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
meta+para Xylene	µg/L	2.0	<2.0	<2.0	<2.0	<2.0	<2.0
ortho-Xylene	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total Xylene	µg/L	3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Naphthalene (value used in F2 calc)	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate Dibromofluoromethane	%		*96.7*	*94.5*	*95.8*	*94.9*	*97.6*
Surrogate Toluene-D8	%		*95.8*	*94.6*	*94.3*	*96.7*	*96.4*
Surrogate 4-Bromofluorobenzene	%		*105*	*103*	*104*	*105*	*100*

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
TRH C6-C9	µg/L	10	<10
TRH C6-C10	µg/L	10	<10
TRH C6-C10 less BTEX (F1)	µg/L	10	<10
Methyl tert butyl ether (MTBE)	µg/L	1.0	<1.0
Benzene	µg/L	1.0	<1.0
Toluene	µg/L	1.0	<1.0
Ethylbenzene	µg/L	1.0	<1.0
meta+para Xylene	µg/L	2.0	<2.0
ortho-Xylene	µg/L	1.0	<1.0
Total Xylene	µg/L	3.0	<3.0
Naphthalene (value used in F2 calc)	µg/L	1.0	<1.0
Surrogate Dibromofluoromethane	%		*97.8*
Surrogate Toluene-D8	%		*93.6*
Surrogate 4-Bromofluorobenzene	%		*105*

Semi-volatile TRH (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
TRH C10-C14	µg/L	50	<50	<50	<50	<50	<50
TRH C15-C28	µg/L	100	<100	<100	<100	<100	<100
TRH C29-C36	µg/L	100	<100	<100	<100	<100	<100
Total +ve TRH C10-C36	µg/L	50	<50	<50	<50	<50	<50
TRH >C10-C16	µg/L	50	<50	<50	<50	<50	<50
TRH >C10-C16 less Naphthalene F2	µg/L	50	<50	<50	<50	<50	<50
TRH >C16-C34 (F3)	µg/L	100	<100	<100	<100	<100	<100
TRH >C34-C40 (F4)	µg/L	100	<100	<100	<100	<100	<100
Total +ve TRH >C10-C40	µg/L	50	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%		*70.8*	*69.9*	*76.8*	*73.3*	*76.4*

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
TRH C10-C14	µg/L	50	<50
TRH C15-C28	µg/L	100	<100
TRH C29-C36	µg/L	100	<100
Total +ve TRH C10-C36	µg/L	50	<50
TRH >C10-C16	µg/L	50	<50
TRH >C10-C16 less Naphthalene F2	µg/L	50	<50
TRH >C16-C34 (F3)	µg/L	100	<100
TRH >C34-C40 (F4)	µg/L	100	<100
Total +ve TRH >C10-C40	µg/L	50	<50
Surrogate o-Terphenyl	%		*87.6*

Acid Extractable Metals (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
Phosphorus	mg/L	0.050	<0.10 [4]	<0.25 [4]	<0.25 [4]	<0.25 [4]	<0.25 [4]

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
Phosphorus	mg/L	0.050	<0.25 [4]

Dissolved Low Level Metals (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
Arsenic	µg/L	1.0	1.6	1.6	1.8	2.0	1.8
Boron	µg/L	20	4600	4400	4400	4400	4400
Barium	µg/L	1.0	5.5	5.7	5.4	5.9	6.0
Beryllium	µg/L	0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium	µg/L	0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Cobalt	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium	µg/L	1.0	<1.0	9.6	<1.0	<1.0	<1.0
Copper	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Mercury	µg/L	0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Manganese	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium	µg/L	1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium	µg/L	1.0	2.2	2.3	2.2	2.1	2.1
Zinc	µg/L	1.0	<1.0	620	<1.0	11	<1.0

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
Arsenic	µg/L	1.0	2.0
Boron	µg/L	20	4300
Barium	µg/L	1.0	5.8
Beryllium	µg/L	0.50	<0.50
Cadmium	µg/L	0.10	<0.10
Cobalt	µg/L	1.0	<1.0
Chromium	µg/L	1.0	<1.0
Copper	µg/L	1.0	<1.0
Mercury	µg/L	0.050	<0.050
Manganese	µg/L	1.0	<1.0
Nickel	µg/L	1.0	<1.0
Lead	µg/L	1.0	<1.0
Selenium	µg/L	1.0	<1.0
Vanadium	µg/L	1.0	2.0
Zinc	µg/L	1.0	<1.0

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Inorganics - Physical Parameters (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
Total Dissolved Solids	mg/L	5.0	40000	41000	41000	41000	41000
Total Suspended Solids	mg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
Total Dissolved Solids	mg/L	5.0	40000
Total Suspended Solids	mg/L	5.0	<5.0

Inorganics - Ionic Balance and Indexes (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
Bicarbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	130	130	130	130	130
Carbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hydroxide OH- as CaCO3	mg/L as CaCO3	5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total Alkalinity as CaCO3	mg/L as CaCO3	5.0	130	130	130	130	130
Chloride	mg/L	1.0	19000	19000	19000	20000	19000
Sulfate	mg/L	1.0	2600	2800	2800	2800	2800
Calcium	mg/L	0.50	390	400	400	400	400
Magnesium	mg/L	0.50	1200	1200	1300	1200	1200
Potassium	mg/L	0.50	370	380	380	380	390
Sodium	mg/L	0.50	11000	11000	12000	12000	12000
Hardness as CaCO3	mg/L	3.0	6000	6100	6200	6100	6100
Ionic Balance	%		2.1	1.9	2.3	1.6	2.3
Total Anions	mg/L	7.0	22000	22000	22000	22000	22000
Anions as meq	meq/L	0.59	600	610	610	610	610
Total Cations	mg/L	2.0	13000	13000	14000	14000	14000
Cations as meq	meq/L	0.10	620	630	640	630	640

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
Bicarbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	130
Carbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0
Hydroxide OH- as CaCO3	mg/L as CaCO3	5.0	<5.0
Total Alkalinity as CaCO3	mg/L as CaCO3	5.0	130
Chloride	mg/L	1.0	20000
Sulfate	mg/L	1.0	2900
Calcium	mg/L	0.50	400
Magnesium	mg/L	0.50	1300
Potassium	mg/L	0.50	390
Sodium	mg/L	0.50	12000
Hardness as CaCO3	mg/L	3.0	6200
Ionic Balance	%		2.2
Total Anions	mg/L	7.0	23000
Anions as meq	meq/L	0.59	610
Total Cations	mg/L	2.0	14000
Cations as meq	meq/L	0.10	640

Inorganics - Nutrients (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
Ammonia as N	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrate as N	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrate as NO3 by calculation	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Nitrite as N	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Nitrite as NO2 by calculation	mg/L	0.020	<0.020	<0.020	<0.020	<0.020	<0.020
NOx as N	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
TKN as N by calculation	mg/L	0.10	0.16	0.12	0.14	0.13	0.14
Organic Nitrogen by calc.	mg/L	0.10	0.15	0.12	0.14	0.12	0.14
Total Nitrogen	mg/L	0.10	0.16	0.12	0.15	0.13	0.15
Phosphate as P	mg/L	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
Ammonia as N	mg/L	0.0050	<0.0050
Nitrate as N	mg/L	0.0050	<0.0050
Nitrate as NO3 by calculation	mg/L	0.020	<0.020
Nitrite as N	mg/L	0.0050	<0.0050
Nitrite as NO2 by calculation	mg/L	0.020	<0.020
NOx as N	mg/L	0.0050	<0.0050
TKN as N by calculation	mg/L	0.10	0.15
Organic Nitrogen by calc.	mg/L	0.10	0.15
Total Nitrogen	mg/L	0.10	0.15
Phosphate as P	mg/L	0.0050	<0.0050

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Inorganics - Nutrients (Water) - Analysed By Envirolab Services Sydney

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
Chlorophyll a	mg/m3	1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
Chlorophyll a	mg/m3	1.0	<1.0

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Microbiological Suite (Water)

Envirolab ID	Units	PQL	PEL1754-01	PEL1754-02	PEL1754-03	PEL1754-04	PEL1754-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			29/12/2023	29/12/2023	29/12/2023	29/12/2023	29/12/2023
Thermotolerant Coliforms	cfu/100mL	1	1	<1	<1	1	<1
Enterococci	cfu/100mL	1	1	<1	<1	<1	<1
E.coli	cfu/100mL	1	<1	<1	<1	1	<1

Envirolab ID	Units	PQL	PEL1754-06
Your Reference			ST-06
Date Sampled			29/12/2023
Thermotolerant Coliforms	cfu/100mL	1	<1
Enterococci	cfu/100mL	1	<1
E.coli	cfu/100mL	1	<1

Result Comments

Identifier	Description
[4]	PQL(s) has/have been raised due to suppression of the internal standard, which required the sample(s) to be diluted. This is likely due to the high level of salts in the sample.

Method Summary

Method ID	Methodology Summary
Calc	Calculation
Calc - TKN	TKN determined by calculation (Total Nitrogen - NOx).
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-019	Suspended Solids - determined gravimetrically by filtration of the sample. The solids are dried at 104±5°C
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-055	Nitrate/Nitrite/NOx/TKN - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils/solids are analysed following a water extraction.
INORG-057	Ammonia - determined colourimetrically. Water samples are filtered on receipt prior to analysis. Soils and OHS media are analysed following a water extraction. Alternatively, Ammonia can be extracted from soil using 1M KCl.
INORG-060	Phosphate - determined colourimetrically using APHA latest edition 4500 P E. Water samples are filtered on receipt prior to analysis. Soils are analysed from a water extract.
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.
INORG-119	Chlorophyll A based on APHA 10200 H latest edition.
INORG-127	Total Nitrogen by high temperature catalytic combustion with chemiluminescence detection. Organic Carbon forms (inorganic, organic, total) determined using a TOC/NDIR analyser via combustion. Dissolved forms require filtering prior to determination.
METALS-020	Determination of various metals by ICP-OES.
METALS-021	Determination of Mercury by Cold Vapour AAS.
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.
ORG-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
ORG-023_F1_TOT	Determination of volatile organic compounds (VOCs) by P&T-GC-MS. Water samples are analysed directly by purge and trap GC-MS. Solids are extracted with Methanol, diluted and analysed by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

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.

Data Quality Assessment Summary PEL1754

Client Details

Client	Rottnest Island Authority
Your Reference	South Thomson Barge Landing - Baseline Water Quality Monitoring
Date Issued	09/01/2024

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	No	LCS Outliers Exist - See detailed list below
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	No	Matrix Spike Outliers Exist - See detailed list below
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	No	QC Frequency Outliers Exist - See detailed list below

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 PEL1754

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
vTRH&MBTEXN | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
sTRH | Water	1-6	29/12/2023	02/01/2024	03/01/2024	Yes
Total Phosphorus | Water	1	29/12/2023	02/01/2024	02/01/2024	Yes
	2-6	29/12/2023	02/01/2024	04/01/2024	Yes
Dissolved Metals (LL) | Water	1-6	29/12/2023	02/01/2024	03/01/2024	Yes
Dissolved Metals (LL)-Hg | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
TDS | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
TSS | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
Alkalinity Suite | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
Chloride | Water	1-6	29/12/2023	02/01/2024	05/01/2024	Yes
Dissolved Cations | Water	1-6	29/12/2023	02/01/2024	03/01/2024	Yes
Ion Balance | Water	1-6	29/12/2023	03/01/2024	08/01/2024	Yes
Sulfate | Water	1-6	29/12/2023	02/01/2024	05/01/2024	Yes
Chlorophyll a | Water	1-6	29/12/2023	05/01/2024	08/01/2024	No
Nitrogen - Ammonia | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
Nitrogen - Nitrate | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
Nitrogen - Nitrite | Water	1-6	29/12/2023	02/01/2024	02/01/2024	No
Nitrogen - NOx | Water	1-6	29/12/2023	02/01/2024	02/01/2024	Yes
Nitrogen - Total N | Water	1-6	29/12/2023	04/01/2024	01/08/2024	Yes
Phosphate as P | Water	1-6	29/12/2023	02/01/2024	02/01/2024	No
TKN as N calc | Water	1-6	29/12/2023	03/01/2024	09/01/2024	Yes
E. coli & T.T.coli | Water	1-6	29/12/2023	29/12/2023	29/12/2023	Yes
Enterococci | Water	1-6	29/12/2023	29/12/2023	29/12/2023	Yes

Outliers: Laboratory Control Samples

ORG-020|Semi-volatile TRH (Water)| Batch BFA0023

Sample ID	Analyte	% Limits	% Recovery
BFA0023-BS1	o-Terphenyl	60 - 140	##[3]

Data Quality Assessment Summary PEL1754

Outliers: Duplicates

INORG-019|Inorganics - Physical Parameters (Water)| Batch BFA0064

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BFA0064-DUP1#	DUP1	Total Suspended Solids	20.00	200[5]
BFA0064-DUP2#	DUP2	Total Suspended Solids	20.00	200[5]

METALS-022|Dissolved Low Level Metals (Water)| Batch BFA0019

Sample ID	Duplicate ID	Analyte	% Limits	RPD
BFA0019-DUP1#	DUP1	Selenium	20.00	92.1[6]

Outliers: Matrix Spike

METALS-020|Inorganics - Ionic Balance and Indexes (Water)| Batch BFA0020

Sample ID	Analyte	% Limits	% Recovery
BFA0020-MS1#	Sodium	70 - 130	##[1]

METALS-022|Dissolved Low Level Metals (Water)| Batch BFA0019

Sample ID	Analyte	% Limits	% Recovery
BFA0019-MS1#	Barium	70 - 130	##[2]
BFA0019-MS1#	Boron	70 - 130	##[1]
BFA0019-MS1#	Manganese	70 - 130	##[1]
BFA0019-MS1#	Vanadium	70 - 130	##[2]

ORG-020|Semi-volatile TRH (Water)| Batch BFA0023

Sample ID	Analyte	% Limits	% Recovery
BFA0023-MS1#	o-Terphenyl	60 - 140	##[3]

Outliers: QC Frequency

INORG-119|Inorganics - Nutrients (Water)| Batch BFA0344

Analysis	QC Type	Expected	Reported
Chlorophyll a	Duplicate	1	0

ORG-023_F1_TOT|Volatile TRH and BTEX (Water)| Batch BFA0072

Analysis	QC Type	Expected	Reported
vTRH&MBTEXN	Duplicate	2	0
	Matrix Spike	1	0

Quality Control PEL1754

ORG-023_F1_TOT | Volatile TRH and BTEX (Water) | Batch BFA0072

Analyte	Units	PQL	Blank	LCS %
TRH C6-C9	µg/L	10	<10	92.3
TRH C6-C10	µg/L	10	<10	90.0
TRH C6-C10 less BTEX (F1)	µg/L	10	<10	[NA]
Methyl tert butyl ether (MTBE)	µg/L	1.0	<1.0	[NA]
Benzene	µg/L	1.0	<1.0	102
Toluene	µg/L	1.0	<1.0	84.2
Ethylbenzene	µg/L	1.0	<1.0	88.6
meta+para Xylene	µg/L	2.0	<2.0	93.1
ortho-Xylene	µg/L	1.0	<1.0	88.9
Total Xylene	µg/L	3.0	<3.0	[NA]
Naphthalene (value used in F2 calc)	µg/L	1.0	<1.0	[NA]
Surrogate Dibromofluoromethane	*%*		*93.1*	*90.0*
Surrogate Toluene-D8	*%*		*98.5*	*92.2*
Surrogate 4-Bromofluorobenzene	*%*		*98.6*	*101*

ORG-020 | Semi-volatile TRH (Water) | Batch BFA0023

Analyte	Units	PQL	Blank	DUP1 BFA0023-DUP1# Samp | QC | RPD %	DUP2 PEL1754-01 Samp | QC | RPD %	LCS %	Spike % BFA0023-MS1#
TRH C10-C14	µg/L	50	<50	<50 | <50 | [NA]	<50 | <50 | [NA]	90.4	89.7
TRH C15-C28	µg/L	100	<100	<100 | <100 | [NA] [6]	<100 | <100 | [NA]	98.3	94.5
TRH C29-C36	µg/L	100	<100	<100 | <100 | [NA]	<100 | <100 | [NA]	83.7	78.4
TRH >C10-C16	µg/L	50	<50	<50 | <50 | [NA]	<50 | <50 | [NA]	94.1	92.8
TRH >C16-C34 (F3)	µg/L	100	<100	<100 | <100 | [NA] [6]	<100 | <100 | [NA]	97.1	93.0
TRH >C34-C40 (F4)	µg/L	100	<100	<100 | <100 | [NA]	<100 | <100 | [NA]	82.1	78.6
Surrogate o-Terphenyl	*%*		*82.8*	*82.7 | 73.6*	*70.8 | 79.2*	*## [3]*	*##[3]*

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

METALS-020 | Acid Extractable Metals (Water) | Batch BFA0022

Analyte	Units	PQL	Blank	DUP1 BFA0022-DUP1# Samp | QC | RPD %	DUP2 PEL1754-01 Samp | QC | RPD %	LCS %	Spike % BFA0022-MS1#
Phosphorus	mg/L	0.050	<0.050	22.5 | 22.7 | 1.17	<0.10 | <0.10 | [NA]	102	93.0

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

METALS-022 | Dissolved Low Level Metals (Water) | Batch BFA0019

Analyte	Units	PQL	Blank	DUP1 BFA0019-DUP1# Samp | QC | RPD %	DUP2 PEL1754-01 Samp | QC | RPD %	LCS %	Spike % BFA0019-MS1#
Arsenic	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	1.55 | 1.77 | 13.3	104	128
Barium	µg/L	1.0	<1.0	185 | 190 | 2.29	5.52 | 5.78 | 4.60	93.3	##[2]
Beryllium	µg/L	0.50	<0.50	<1.0 | <1.0 | [NA]	<0.50 | <0.50 | [NA]	86.0	112
Boron	µg/L	20	<20	3030 | 3040 | 0.540	4620 | 4400 | 4.72	101	##[1]
Cadmium	µg/L	0.10	<0.10	<0.20 | <0.20 | [NA]	<0.10 | <0.10 | [NA]	101	120
Chromium	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	<1.0 | <1.0 | [NA]	103	123
Cobalt	µg/L	1.0	<1.0	4.78 | 5.06 | 5.69	<1.0 | <1.0 | [NA]	104	119
Copper	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	<1.0 | <1.0 | [NA]	103	111
Lead	µg/L	1.0	<1.0	3.02 | 2.60 | 14.9	<1.0 | <1.0 | [NA]	94.3	110
Manganese	µg/L	1.0	<1.0	4840 | 4960 | 2.43	<1.0 | <1.0 | [NA]	101	##[1]
Nickel	µg/L	1.0	<1.0	28.0 | 33.6 | 18.3	<1.0 | <1.0 | [NA]	103	115
Selenium	µg/L	1.0	<1.0	6.82 | 2.52 | 92.1 [6]	<1.0 | <1.0 | [NA]	98.4	120
Vanadium	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	2.16 | 2.22 | 2.74	103	##[2]
Zinc	µg/L	1.0	<1.0	<2.0 | <2.0 | [NA]	<1.0 | <1.0 | [NA]	103	111

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

Quality Control PEL1754

METALS-021|Dissolved Low Level Metals (Water) | Batch BFA0021

Analyte	Units	PQL	Blank	DUP1 BFA0021-DUP1# Samp | QC | RPD %	LCS %	Spike % BFA0021-MS1#
Mercury	µg/L	0.050	<0.050	<0.050 | <0.050 | [NA]	90.0	80.4

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 BFA0063

Analyte	Units	PQL	Blank	DUP1 BFA0063-DUP1# Samp | QC | RPD %	DUP2 BFA0063-DUP2# Samp | QC | RPD %	LCS %
Total Dissolved Solids	mg/L	5.0	<5.0	142000 | 145000 | 2.28	2350 | 2380 | 1.35	111

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

INORG-019|Inorganics - Physical Parameters (Water) | Batch BFA0064

Analyte	Units	PQL	Blank	DUP1 BFA0064-DUP1# Samp | QC | RPD %	DUP2 BFA0064-DUP2# Samp | QC | RPD %	LCS %
Total Suspended Solids	mg/L	5.0	<5.0	## | ## | [NA] [5]	## | ## | [NA] [5]	112

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

METALS-020|Inorganics - Ionic Balance and Indexes (Water) | Batch BFA0020

Analyte	Units	PQL	Blank	DUP1 BFA0020-DUP1# Samp | QC | RPD %	DUP2 BFA0020-DUP2# Samp | QC | RPD %	LCS %	Spike % BFA0020-MS1#
Calcium	mg/L	0.50	<0.50	834 | 827 | 0.832	436 | 438 | 0.431	90.4	89.6
Magnesium	mg/L	0.50	<0.50	456 | 455 | 0.228	1480 | 1490 | 0.394	93.9	96.3
Potassium	mg/L	0.50	<0.50	112 | 109 | 2.67	116 | 117 | 0.793	91.4	90.4
Sodium	mg/L	0.50	<0.50	2950 | 2930 | 0.714	10500 | 10600 | 1.36	95.1	##[1]
Hardness as CaCO3	mg/L	3.0	<3.0	3960 | 3940 | 0.545	7190 | 7220 | 0.400	[NA]	[NA]

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 BFA0027

Analyte	Units	PQL	Blank	DUP1 BFA0027-DUP1# Samp | QC | RPD %	DUP2 BFA0027-DUP2# Samp | QC | RPD %	LCS %
Bicarbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	258 | 260 | 0.733	336 | 346 | 2.96	[NA]
Carbonate Alkalinity as CaCO3	mg/L as CaCO3	5.0	<5.0	<5.0 | <5.0 | [NA]	<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	258 | 260 | 0.733	336 | 346 | 2.96	[NA]

Analyte	Units	PQL	Blank	LCS %
Total Alkalinity as CaCO3	mg/L as CaCO3	5		104

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 BFA0081

Analyte	Units	PQL	Blank	DUP1 BFA0081-DUP1# Samp | QC | RPD %	DUP2 PEL1754-01 Samp | QC | RPD %	LCS %	Spike % BFA0081-MS1#
Chloride	mg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	19200 | 19400 | 1.05	89.1	87.2
Sulfate	mg/L	1.0	<1.0	<1.0 | <1.0 | [NA]	2600 | 2640 | 1.44	91.7	97.5

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

Quality Control PEL1754

INORG-057 | Inorganics - Nutrients (Water) | Batch BFA0031

Analyte	Units	PQL	Blank	DUP1 PEL1754-01 Samp | QC | RPD %	LCS %	Spike % PEL1754-02
Ammonia as N	mg/L	0.0050	<0.0050	<0.0050 | <0.0050 | [NA]	94.6	107
Nitrate as N	mg/L	0.0050	<0.0050	<0.0050 | <0.0050 | [NA] [6]	99.9	110
Nitrate as NO3 by calculation	mg/L	0.020	<0.020		[NA]	[NA]
Nitrite as N	mg/L	0.0050	<0.0050	<0.0050 | <0.0050 | [NA]	[NA]	[NA]
Nitrite as NO2 by calculation	mg/L	0.020	<0.020		[NA]	[NA]
NOx as N	mg/L	0.0050	<0.0050	<0.0050 | <0.0050 | [NA] [6]	99.9	110
Phosphate as P	mg/L	0.0050	<0.0050	<0.0050 | <0.0050 | [NA] [6]	112	126

Analyte	Units	PQL	Blank	LCS %	Spike % PEL1754-02
Nitrite as N	mg/L	0.005		99.9	118

INORG-127 | Inorganics - Nutrients (Water) | Batch BFA0225

Analyte	Units	PQL	Blank	DUP1 PEL1754-01 Samp | QC | RPD %	DUP2 BFA0225-DUP2# Samp | QC | RPD %	LCS %	Spike % PEL1754-02
Total Nitrogen	mg/L	0.10	<0.10	0.160 | 0.138 | 14.9	24.3 | 23.9 | 1.79	120	126

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

INORG-119 | Inorganics - Nutrients (Water) | Batch BFA0344

Analyte	Units	PQL	Blank	LCS %
Chlorophyll a	mg/m3	1.0	<1.0	101

MICRO-001B | Microbiological Suite (Water) | Batch BEL3276

Analyte	Units	PQL	Blank	DUP1 BEL3276-DUP1# Samp | QC | RPD %	DUP2 BEL3276-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 BEL3276-DUP3# Samp | QC | RPD %	DUP4 BEL3276-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]

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

MICRO-001DE | Microbiological Suite (Water) | Batch BEL3277

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

Quality Control PEL1754

QC Comments

Identifier	Description
[1]	Spike recovery is not applicable due to the relatively high analyte background in the sample (>3* spike level). However, the LCS recovery is within acceptance criteria.
[2]	Spike recovery is outside routine acceptance criteria (70-130%), this may be due to suspected non-homogeneity and/or matrix interference effects. However, an acceptable recovery was achieved for the LCS.
[3]	Surrogate recovery is outside routine acceptance criteria (60-140%) as a result of the high concentration of analyte(s) in the sample.
[5]	Note: There was insufficient sample to perform all QC according to our internal guidelines.
[6]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.

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 PFA1208

Client Details

Client	Rottnest Island Authority
Contact	David Pond
Address	PO Box 693, FREMANTLE, WA, 6959

Sample Details

Your Reference	South Thomson Barge Landing - Baseline Water Quality Monitoring
Number of Samples	6 Water
Date Samples Received	24/01/2024
Date Instructions Received	24/01/2024

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	01/02/2024
Date of Issue	01/02/2024

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

Authorisation Details

Results Approved By	Diego Bigolin, Supervisor, Inorganics Lien Tang, Assistant Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PFA1208

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PFA1208-01	ST-01	Water	23/01/2024	24/01/2024
PFA1208-02	ST-02	Water	23/01/2024	24/01/2024
PFA1208-03	ST-03	Water	23/01/2024	24/01/2024
PFA1208-04	ST-04	Water	23/01/2024	24/01/2024
PFA1208-05	ST-05	Water	23/01/2024	24/01/2024
PFA1208-06	ST-06	Water	23/01/2024	24/01/2024

Sample Comments

General Comment	Insufficient volume for low level TSS - Testing routine level

Certificate of Analysis PFA1208

Inorganics - Physical Parameters (Water)

Envirolab ID	Units	PQL	PFA1208-01	PFA1208-02	PFA1208-03	PFA1208-04	PFA1208-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			23/01/2024	23/01/2024	23/01/2024	23/01/2024	23/01/2024
Total Dissolved Solids	mg/L	5.0	41000	49000	41000	41000	41000
Total Suspended Solids	mg/L	5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Envirolab ID	Units	PQL	PFA1208-06
Your Reference			ST-06
Date Sampled			23/01/2024
Total Dissolved Solids	mg/L	5.0	41000
Total Suspended Solids	mg/L	5.0	<5.0

Certificate of Analysis PFA1208

Inorganics - Nutrients (Water) - Analysed By Envirolab Services Sydney

Envirolab ID	Units	PQL	PFA1208-01	PFA1208-02	PFA1208-03	PFA1208-04	PFA1208-05
Your Reference			ST-01	ST-02	ST-03	ST-04	ST-05
Date Sampled			23/01/2024	23/01/2024	23/01/2024	23/01/2024	23/01/2024
Chlorophyll a	mg/m3	1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Envirolab ID	Units	PQL	PFA1208-06
Your Reference			ST-06
Date Sampled			23/01/2024
Chlorophyll a	mg/m3	1.0	<1.0

Method Summary

Method ID	Methodology Summary
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-019	Suspended Solids - determined gravimetrically by filtration of the sample. The solids are dried at 104±5°C
INORG-119	Chlorophyll A based on APHA 10200 H 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.

Data Quality Assessment Summary PFA1208

Client Details

Client	Rottnest Island Authority
Your Reference	South Thomson Barge Landing - Baseline Water Quality Monitoring
Date Issued	01/02/2024

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	No	QC Frequency Outliers Exist - See detailed list below

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 PFA1208

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
TDS | Water	1-6	23/01/2024	29/01/2024	29/01/2024	Yes
TSS | Water	1-6	23/01/2024	29/01/2024	29/01/2024	Yes
Chlorophyll a-Frozen | Water	1-6	23/01/2024	23/01/2024	01/02/2024	Yes

Outliers: QC Frequency

INORG-119\|Inorganics - Nutrients (Water)\| Batch BFA2461

Analysis	QC Type	Expected	Reported
Chlorophyll a-Frozen	Duplicate	1	0

Quality Control PFA1208

INORG-018 | Inorganics - Physical Parameters (Water) | Batch BFA2535

Analyte	Units	PQL	Blank	DUP1 PFA1208-06 Samp | QC | RPD %	DUP2 BFA2535-DUP2# Samp | QC | RPD %	LCS %
Total Dissolved Solids	mg/L	5.0	<5.0	40800 | 40600 | 0.466	380 | 380 | 0.00	113

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

INORG-019 | Inorganics - Physical Parameters (Water) | Batch BFA2536

Analyte	Units	PQL	Blank	DUP1 PFA1208-06 Samp | QC | RPD %	DUP2 BFA2536-DUP2# Samp | QC | RPD %	LCS %
Total Suspended Solids	mg/L	5.0	<5.0	<5.0 | <5.0 | [NA] [1]	<5.0 | <5.0 | [NA] [1]	102

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

INORG-119 | Inorganics - Nutrients (Water) | Batch BFA2461

Analyte	Units	PQL	Blank	LCS %
Chlorophyll a	mg/m3	1.0	<1.0	80.4

QC Comments

Identifier	Description
[1]	Note: There was insufficient sample to perform all QC according to our internal guidelines.

ROTTNEST ISLAND AUTHORITY

Water Quality Field Parameters

Date	Site	T	DO	Cond	TDS	SAL	pH	ORP	Turbidity	Secchi depth
		°C	mg/L	mS/cm	g/L	ppt	-	mV	NTU	m
20/11/2023 10.00am	ST-01	25.12	7.2	56.176	36.51	37.32	8	67.6	0	-
	ST-02	25.49	7	56.272	36.58	37.38	7.01	91.5	3.5	-
	Samples collected:	TSS								
	Weather:	Sunny, light to moderate SSE winds at 15km/hr, tide low at 0.20m, slightly choppy seas from the south-east, swell 1.0m. Water quality reasonable. Moderate number of boats moored around Army Groyne.								
23/11/2023 10.00am	ST-01	no readings collected								-
	Samples collected:	TSS, turbidity								
	Weather:	Partly cloudy, strong E winds at 25km/hr, tide low at 0.24m, choppy seas from the east, swell 1.5m. Water quality poor-fair. Few boats moored around Army Groyne.								
29/12/2023 09.30am	ST-01	25.3	7.2	55.958	36.37	37.15	8.08	44.8	0	-
	ST-02	25.4	7.3	55.775	36.25	37.01	8.16	54.3	0	-
	ST-03	25.6	7.3	55.65	36.17	36.91	8.22	56.6	0	-
	ST-04	25.1	7.1	56.151	36.5	37.3	7.64	52.8	0	-
	ST-05	25.7	7.3	55.579	36.13	36.86	8.26	54.3	0	-
	ST-06	25.8	7.5	55.458	36.05	36.76	8.33	60.5	0	-
	Samples collected:	Suite A.								
	Weather:	Partly cloudy, strong E winds at 22km/hr, tide low at 0.16m, choppy seas from the east, swell 1.5m. Water quality fair. Many boats moored around Army Groyne.								
23/01/2024 13.00pm	ST-01	24	8.3	57.22	37.2	38.14	8.15	159	0	2.4 (bottom)
	ST-02	23.8	8.2	57.16	37.16	38.11	8.11	154	0	3.8 (bottom)
	ST-03	23.96	8.6	57.22	37.19	38.13	8.16	156	0	3.2 (bottom)
	ST-04	24.01	8.7	57.26	37.2	38.12	8.2	165	0	1.9 (bottom)
	ST-05	24.39	8.9	57.29	37.24	38.19	8.19	162	0	2.8 (bottom)
	ST-06	23.64	8.5	57.13	37.13	38.06	8.23	181	0	3.0 (bottom)
	Samples collected:	Suite B								
	Weather:	Sunny, light to moderate SW winds at 15km/hr, tide mid at 0.80m, slightly choppy seas from the south, swell 1.0m. Water quality good. Moderate number of boats moored around Army Groyne.								

ROTTNEST ISLAND AUTHORITY

Water Quality Analytical Results - December 2023

						Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX
						TRH C6-C9	TRH C6-C10	TRH C6-C10 less BTEX (F1)	Methyl tert butyl ether (MTBE)	Benzene	Toluene	Ethylbenzene	meta+para Xylene	ortho-Xylene
RptUnits						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
PQL						10	10	10	1.0	1.0	1.0	1.0	2.0	1.0
Matrix						Water	Water	Water	Water	Water	Water	Water	Water	Water
Method						ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT
Trigger values for Marine Water 99%						-	-	-	-	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	-	-	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	-	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
PEL1754	ST-02	02	0	29/12/2023	Water	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
PEL1754	ST-03	03	0	29/12/2023	Water	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
PEL1754	ST-04	04	0	29/12/2023	Water	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
PEL1754	ST-05	05	0	29/12/2023	Water	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
PEL1754	ST-06	06	0	29/12/2023	Water	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0
BFA0019	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

Water Quality Analytical Results - December 2023

						Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Volatile TRH and BTEX	Semi-volatile TRH	Semi-volatile TRH	Semi-volatile TRH	Semi-volatile TRH	Semi-volatile TRH
						Total Xylene	Naphthalene (value used in F2 calc)	Dibromofluoromethane	Toluene-D8	4-Bromofluorobenzene	TRH C10-C14	TRH C15-C28	TRH C29-C36	Total +ve TRH C10-C36	TRH >C10-C16
RptUnits						µg/L	µg/L	%	%	%	µg/L	µg/L	µg/L	µg/L	µg/L
PQL						3.0	1.0	-	-	-	50	100	100	50	50
Matrix						Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Method						ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-023_F1_TOT	ORG-020	ORG-020	ORG-020	ORG-020	ORG-020
Trigger values for Marine Water 99%						-	-	-	-	-	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	-	-	-	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	-	-	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	<3.0	<1.0	96.7	95.8	105	<50	<100	<100	<50	<50
PEL1754	ST-02	02	0	29/12/2023	Water	<3.0	<1.0	94.5	94.6	103	<50	<100	<100	<50	<50
PEL1754	ST-03	03	0	29/12/2023	Water	<3.0	<1.0	95.8	94.3	104	<50	<100	<100	<50	<50
PEL1754	ST-04	04	0	29/12/2023	Water	<3.0	<1.0	94.9	96.7	105	<50	<100	<100	<50	<50
PEL1754	ST-05	05	0	29/12/2023	Water	<3.0	<1.0	97.6	96.4	100	<50	<100	<100	<50	<50
PEL1754	ST-06	06	0	29/12/2023	Water	<3.0	<1.0	97.8	93.6	105	<50	<100	<100	<50	<50
BFA0019	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	<50	<100	<100	-	<50
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

Water Quality Analytical Results - December 2023

						Semi-volatile TRH	Semi-volatile TRH	Semi-volatile TRH	Semi-volatile TRH	Semi-volatile TRH	Acid Extractable Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals
						TRH >C10-C16 less Naphthalene F2	TRH >C16-C34 (F3)	TRH >C34-C40 (F4)	Total +ve TRH >C10-C40	o-Terphenyl	Phosphorus	Arsenic	Barium	Beryllium
RptUnits						µg/L	µg/L	µg/L	µg/L	%	mg/L	µg/L	µg/L	µg/L
PQL						50	100	100	50	-	0.050	1.0	1.0	0.50
Matrix						Water	Water	Water	Water	Water	Water	Water	Water	Water
Method						ORG-020	ORG-020	ORG-020	ORG-020	ORG-020	METALS-020	METALS-022	METALS-022	METALS-022
Trigger values for Marine Water 99%						-	-	-	-	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	-	-	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	0.02	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	<50	<100	<100	<50	70.8	<0.10	1.6	5.5	<0.50
PEL1754	ST-02	02	0	29/12/2023	Water	<50	<100	<100	<50	69.9	<0.25	1.6	5.7	<0.50
PEL1754	ST-03	03	0	29/12/2023	Water	<50	<100	<100	<50	76.8	<0.25	1.8	5.4	<0.50
PEL1754	ST-04	04	0	29/12/2023	Water	<50	<100	<100	<50	73.3	<0.25	2.0	5.9	<0.50
PEL1754	ST-05	05	0	29/12/2023	Water	<50	<100	<100	<50	76.4	<0.25	1.8	6.0	<0.50
PEL1754	ST-06	06	0	29/12/2023	Water	<50	<100	<100	<50	87.6	<0.25	2.0	5.8	<0.50
BFA0019	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	1.77	5.78	<0.50
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	<0.10	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	<100	<100	-	79.2	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

ROTTNEST ISLAND AUTHORITY

Water Quality Analytical Results - December 2023

						Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals
						Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury
RptUnits						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
PQL						20	0.10	1.0	1.0	1.0	1.0	1.0	0.050
Matrix						Water	Water	Water	Water	Water	Water	Water	Water
Method						METALS-022	METALS-022	METALS-022	METALS-022	METALS-022	METALS-022	METALS-022	METALS-021
Trigger values for Marine Water 99%						-	-	7.84#	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	31.8#	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	4600	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.050
PEL1754	ST-02	02	0	29/12/2023	Water	4400	<0.10	9.6	<1.0	<1.0	<1.0	<1.0	<0.050
PEL1754	ST-03	03	0	29/12/2023	Water	4400	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.050
PEL1754	ST-04	04	0	29/12/2023	Water	4400	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.050
PEL1754	ST-05	05	0	29/12/2023	Water	4400	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.050
PEL1754	ST-06	06	0	29/12/2023	Water	4300	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	<0.050
BFA0019	ST-01	DUP2	1	29/12/2023	Water	4400	<0.10	<1.0	<1.0	<1.0	<1.0	<1.0	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

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Water Quality Analytical Results - December 2023

						Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Dissolved Low Level Metals	Inorganics - Physical Parameters	Inorganics - Physical Parameters	Inorganics - Ionic Balance and Indexes
						Nickel	Selenium	Vanadium	Zinc	Total Dissolved Solids	Total Suspended Solids	Bicarbonate Alkalinity as CaCO3
RptUnits						µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L as CaCO3
PQL						1.0	1.0	1.0	1.0	5.0	5.0	5.0
Matrix						Water	Water	Water	Water	Water	Water	Water
Method						METALS-022	METALS-022	METALS-022	METALS-022	INORG-018	INORG-019	INORG-006
Trigger values for Marine Water 99%						-	-	50	7	-	-	-
Groundwater Investigation level for Marine Water						-	-	100	15	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	<1.0	<1.0	2.2	<1.0	40000	<5.0	130
PEL1754	ST-02	02	0	29/12/2023	Water	<1.0	<1.0	2.3	620	41000	<5.0	130
PEL1754	ST-03	03	0	29/12/2023	Water	<1.0	<1.0	2.2	<1.0	41000	<5.0	130
PEL1754	ST-04	04	0	29/12/2023	Water	<1.0	<1.0	2.1	11	41000	<5.0	130
PEL1754	ST-05	05	0	29/12/2023	Water	<1.0	<1.0	2.1	<1.0	41000	<5.0	130
PEL1754	ST-06	06	0	29/12/2023	Water	<1.0	<1.0	2.0	<1.0	40000	<5.0	130
BFA0019	ST-01	DUP2	1	29/12/2023	Water	<1.0	<1.0	2.22	<1.0	-	-	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

Water Quality Analytical Results - December 2023

						Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes
						Carbonate Alkalinity as CaCO3	Hydroxide OH- as CaCO3	Total Alkalinity as CaCO3	Chloride	Sulfate	Calcium
RptUnits						mg/L as CaCO3	mg/L as CaCO3	mg/L as CaCO3	mg/L	mg/L	mg/L
PQL						5.0	5.0	5.0	1.0	1.0	0.50
Matrix						Water	Water	Water	Water	Water	Water
Method						INORG-006	INORG-006	INORG-006	INORG-081	INORG-081	METALS-020
Trigger values for Marine Water 99%						-	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	<5.0	<5.0	130	19000	2600	390
PEL1754	ST-02	02	0	29/12/2023	Water	<5.0	<5.0	130	19000	2800	400
PEL1754	ST-03	03	0	29/12/2023	Water	<5.0	<5.0	130	19000	2800	400
PEL1754	ST-04	04	0	29/12/2023	Water	<5.0	<5.0	130	20000	2800	400
PEL1754	ST-05	05	0	29/12/2023	Water	<5.0	<5.0	130	19000	2800	400
PEL1754	ST-06	06	0	29/12/2023	Water	<5.0	<5.0	130	20000	2900	400
BFA0019	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	19400	2640	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

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Water Quality Analytical Results - December 2023

						Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes
						Magnesium	Potassium	Sodium	Hardness as CaCO3	Ionic Balance	Total Anions
RptUnits						mg/L	mg/L	mg/L	mg/L	%	mg/L
PQL						0.50	0.50	0.50	3.0	-	-
Matrix						Water	Water	Water	Water	Water	Water
Method						METALS-020	METALS-020	METALS-020	METALS-020	INORG-040	Calc
Trigger values for Marine Water 99%						-	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	1200	370	11000	6000	2.1	22000
PEL1754	ST-02	02	0	29/12/2023	Water	1200	380	11000	6100	1.9	22000
PEL1754	ST-03	03	0	29/12/2023	Water	1300	380	12000	6200	2.3	22000
PEL1754	ST-04	04	0	29/12/2023	Water	1200	380	12000	6100	1.6	22000
PEL1754	ST-05	05	0	29/12/2023	Water	1200	390	12000	6100	2.3	22000
PEL1754	ST-06	06	0	29/12/2023	Water	1300	390	12000	6200	2.2	23000
BFA0019	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

Water Quality Analytical Results - December 2023

						Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Ionic Balance and Indexes	Inorganics - Nutrients	Inorganics - Nutrients	Inorganics - Nutrients	Inorganics - Nutrients	Inorganics - Nutrients
						Anions as meq	Total Cations	Cations as meq	Ammonia as N	Nitrate as N	Nitrate as NO3 by calculation	Nitrite as N	Nitrite as NO2 by calculation
RptUnits						meq/L	mg/L	meq/L	mg/L	mg/L	mg/L	mg/L	mg/L
PQL						-	-	-	0.0050	0.0050	0.020	0.0050	0.020
Matrix						Water	Water	Water	Water	Water	Water	Water	Water
Method						Calc	Calc	Calc	INORG-057	INORG-055	INORG-055	INORG-055	INORG-055
Trigger values for Marine Water 99%						-	-	-	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	-	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	-	-	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	600	13000	620	<0.0050	<0.0050	<0.020	<0.0050	<0.020
PEL1754	ST-02	02	0	29/12/2023	Water	610	13000	630	<0.0050	<0.0050	<0.020	<0.0050	<0.020
PEL1754	ST-03	03	0	29/12/2023	Water	610	14000	640	<0.0050	<0.0050	<0.020	<0.0050	<0.020
PEL1754	ST-04	04	0	29/12/2023	Water	610	14000	630	<0.0050	<0.0050	<0.020	<0.0050	<0.020
PEL1754	ST-05	05	0	29/12/2023	Water	610	14000	640	<0.0050	<0.0050	<0.020	<0.0050	<0.020
PEL1754	ST-06	06	0	29/12/2023	Water	610	14000	640	<0.0050	<0.0050	<0.020	<0.0050	<0.020
BFA0019	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	-	-	-	<0.0050	<0.0050	-	<0.0050	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

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Water Quality Analytical Results - December 2023

						Inorganics - Nutrients	Inorganics - Nutrients	Inorganics - Nutrients	Inorganics - Nutrients	Inorganics - Nutrients	Inorganics - Nutrients	Microbiological Suite	Microbiological Suite	Microbiological Suite
						NOx as N	TKN as N by calculation	Organic Nitrogen by calc.	Total Nitrogen	Phosphate as P	Chlorophyll a	Enterococci	Thermotolerant Coliforms	E.coli
RptUnits						mg/L	mg/L	mg/L	mg/L	mg/L	mg/m3	cfu/100mL	cfu/100mL	cfu/100mL
PQL						0.0050	0.10	0.10	0.10	0.0050	1.0	1	1	1
Matrix						Water	Water	Water	Water	Water	Water	Water	Water	Water
Method						INORG-055	Calc - TKN	Calc	INORG-127	INORG-060	INORG-119	MICRO-001DE	MICRO-001B	MICRO-001B
Trigger values for Marine Water 99%						-	-	-	-	-	-	-	-	-
Groundwater Investigation level for Marine Water						-	-	-	-	-	-	-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	-	0.23	-	0.7	-	-	-
Reference	**Sample**	**Sample No.**	**Replicat**	**Date**	**Type of Sample**	-	-	-	-	-	-	-	-	-
PEL1754	ST-01	01	0	29/12/2023	Water	<0.0050	0.16	0.15	0.16	<0.0050	<1.0	1	1	<1
PEL1754	ST-02	02	0	29/12/2023	Water	<0.0050	0.12	0.12	0.12	<0.0050	<1.0	<1	<1	<1
PEL1754	ST-03	03	0	29/12/2023	Water	<0.0050	0.14	0.14	0.15	<0.0050	<1.0	<1	<1	<1
PEL1754	ST-04	04	0	29/12/2023	Water	<0.0050	0.13	0.12	0.13	<0.0050	<1.0	<1	1	1
PEL1754	ST-05	05	0	29/12/2023	Water	<0.0050	0.14	0.14	0.15	<0.0050	<1.0	<1	<1	<1
PEL1754	ST-06	06	0	29/12/2023	Water	<0.0050	0.15	0.15	0.15	<0.0050	<1.0	<1	<1	<1
BFA0019	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0022	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0023	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0031	ST-01	DUP1	1	29/12/2023	Water	<0.0050	-	-	-	<0.0050	-	-	-	-
BFA0081	ST-01	DUP2	1	29/12/2023	Water	-	-	-	-	-	-	-	-	-
BFA0225	ST-01	DUP1	1	29/12/2023	Water	-	-	-	0.138	-	-	-	-	-

 # - Indicates this is the combined value of Chromium (Cr III) and Chromium CrVI

Water Quality Analytcal Results - January 2024

						Inorganics - Physical Parameters	Inorganics - Physical Parameters	Inorganics - Nutrients
						Total Dissolved Solids	Total Suspended Solids	Chlorophyll a
RptUnits						mg/L	mg/L	mg/m3
PQL						5.0	5.0	1.0
Matrix						Water	Water	Water
Method						INORG-018	INORG-019	INORG-119
Trigger values for Marine Water 99%						-	-	-
Groundwater Investigation level for Marine Water						-	-	-
ANZECC Trigger value for slightly disturbed ecosystems (SW Australia - Marine - Inshore)						-	-	0.7
Reference	**Sample**	**Sample No.**	**Replicate**	**Date Sampled**	**Type of Sample**	-	-	-
PFA1208	ST-01	01	0	23/01/2024	Water	41000	<5.0	<1.0
PFA1208	ST-02	02	0	23/01/2024	Water	49000	<5.0	<1.0
PFA1208	ST-03	03	0	23/01/2024	Water	41000	<5.0	<1.0
PFA1208	ST-04	04	0	23/01/2024	Water	41000	<5.0	<1.0
PFA1208	ST-05	05	0	23/01/2024	Water	41000	<5.0	<1.0
PFA1208	ST-06	06	0	23/01/2024	Water	41000	<5.0	<1.0
BFA2535	ST-06	DUP1	1	23/01/2024	Water	40600	-	-
BFA2536	ST-06	DUP1	1	23/01/2024	Water	-	<5.0	-