ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Brendan Stuart	Manager	Huong Crawford
Client	PREMISE	Laboratory	SGS Alexandria Environmental
Address	LEVEL 1 100 BRUNSWICK STREET FORTITUDE VALLEY QLD 4006	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	61 2 6939 5000	Telephone	+61 2 8594 0400
Facsimile	(Not specified)	Facsimile	+61 2 8594 0499
Email	Brendan.stuart@premise.com.au	Email	au.environmental.sydney@sgs.com
Project	**217501 - Portland GD**	SGS Reference	**SE232618 R0**
Order Number	**217501**	Date Received	01 Jun 2022
Samples	1	Date Reported	08 Jun 2022

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Bennet LO
Senior Chemist

Dong LIANG
Metals/Inorganics Team Leader

Kamrul AHSAN
Senior Chemist

Shane MCDERMOTT
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE232618.001 Sample Matrix: Water Sample Date: 31 May 2022 Sample Name: SW1
Total Phenolics in Water Method: AN295 Tested: 3/6/2022			
Total Phenols	mg/L	0.05	<0.05
Anions by Ion Chromatography in Water Method: AN245 Tested: 3/6/2022			
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.039**
Chloride	mg/L	1	**83**
Sulfate, SO4	mg/L	1	**260**
Fluoride	mg/L	0.1	**0.15**
Ammonia Nitrogen by Discrete Analyser Method: AN291 Tested: 3/6/2022			
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.16**
pH in water Method: AN101 Tested: 1/6/2022			
pH**	No unit	-	**7.5**
Alkalinity Method: AN135 Tested: 7/6/2022			
Total Alkalinity as CaCO3	mg/L	5	**290**
COD in Water Method: AN179/AN181 Tested: 2/6/2022			
Chemical Oxygen Demand	mg/L	10	**110**

Parameter	Units	LOR	Sample Number: SE232618.001 Sample Matrix: Water Sample Date: 31 May 2022 Sample Name: SW1
Forms of Carbon Method: AN190 Tested: 7/6/2022			
Total Organic Carbon as NPOC	mg/L	0.2	**36**
Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 3/6/2022			
Total Suspended Solids Dried at 103-105°C	mg/L	5	**12**
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 1/6/2022			
Total Calcium	mg/L	0.1	**130**
Total Magnesium	mg/L	0.1	**37**
Total Potassium	mg/L	0.2	**97**
Total Sodium	mg/L	0.1	**55**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 1/6/2022			
Total Iron	µg/L	5	**830**
Total Manganese	µg/L	1	**79**

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB250353	mg/L	5	<5	NVL	119%

Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB250151	mg/L	0.01	<0.01	3%	111%	103%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate Nitrogen, NO3-N	LB250101	mg/L	0.005	<0.005		98%
Chloride	LB250101	mg/L	1	<0.05		96%
Sulfate, SO4	LB250101	mg/L	1	<1.0	1 - 2%	94%
Fluoride	LB250101	mg/L	0.1	<0.10		102%

COD in Water Method: ME-(AU)-[ENV]AN179/AN181

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chemical Oxygen Demand	LB250013	mg/L	10	<10	2%	104%

Forms of Carbon Method: ME-(AU)-[ENV]AN190

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Organic Carbon as NPOC	LB250348	mg/L	0.2	<0.2	4 - 5%	87%	80%

Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Calcium	LB249900	mg/L	0.1	<0.1	0 - 2%	103%
Total Magnesium	LB249900	mg/L	0.1	<0.1	0 - 2%	102%
Total Potassium	LB249900	mg/L	0.2	<0.2	0 - 2%	86%
Total Sodium	LB249900	mg/L	0.1	<0.1	0 - 2%	98%

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

pH in water **Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB249908	No unit	-	1%	99%

Total and Volatile Suspended Solids (TSS / VSS) **Method: ME-(AU)-[ENV]AN114**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Suspended Solids Dried at 103-105°C	LB250172	mg/L	5	<5	9 - 15%	101%

Total Phenolics in Water **Method: ME-(AU)-[ENV]AN295**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phenols	LB250087	mg/L	0.05	<0.05	0%	99%	90%

Trace Metals (Total) in Water by ICPMS **Method: ME-(AU)-[ENV]AN022/AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Iron	LB249902	µg/L	5	<5	4%	116%
Total Manganese	LB249902	µg/L	1	<1	16%	117%

METHOD	METHODOLOGY SUMMARY
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN181	Analysis of COD by Semi Closed Reflux: The sample is refluxed with strong acid and a known excess of oxidant. After digestion the unreduced oxidant is back titrated to determine the amount of oxidant consumed. The chemically oxidised matter is calculated in terms of oxygen equivalents. Reference APHA 5220 B.
AN190	TOC and DOC in Water: A homogenised micro portion of sample is injected into a heated reaction chamber packed with an oxidative catalyst that converts organic carbon to carbon dioxide. The CO2 is measured using a non-dispersive infrared detector. The process is fully automated in a commercially available analyser. If required a sugar value can be calculated from the TOC result. Reference APHA 5310 B.
AN190	Chemical oxygen demand can be calculated/estimated based on the O2/C relation as 2.67*NPOC (TOC). This is an estimate only and the factor will vary with sample matrix so results should be interpreted with caution.
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN295	The water sample or extract of sample is distilled in a phosphoric acid stream. Phenolic compounds in the distillate react with a reagent stream of potassium hexacyanoferrate(III) and 4-Amino-2,3-dimethyl-3-pryazolin-5-one in an alkaline medium to form a coloured complex which is analysed spectrophotometrically onboard a continuous flow analyser.

METHOD	METHODOLOGY SUMMARY
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
***	Indicates that both * and ** apply.	NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.