Appendix F Water Quality Equipment Calibration Certificate

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR NELSON TSUI	WORK ORDER:	HK1917914
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	1908, iPLACE, NOS. 301-305 CASTLE PEAK ROAD, KWAI CHUNG, NEW TERRITORIES, HONG KONG	SUB-BATCH: LABORATORY: DATE RECEIVED: DATE OF ISSUE:	0 HONG KONG 30-Apr-2019 09-May-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Dissolved Oxygen, pH Value, Turbidity, Salinity, Redox Potential and Temperature
Equipment Type:	Multifunctional Meter
Brand Name:	HORIBA
Model No.:	U-5000 Multiparameter Water Quality Meter
Serial No.:	--
Equipment No.:	BGYP9CKD
Date of Calibration:	09-May-2019

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1917914

SUB-BATCH: 0
DATE OF ISSUE: 09-May-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000 Multiparameter Water Quality Meter
Serial No.: --
Equipment No.: BGYP9CKD
Date of Calibration: 09-May-2019 Date of Next Calibration: 09-Aug-2019

PARAMETERS:

Dissolved Oxygen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
8.10	8.11	+0.01
5.57	5.42	-0.15
3.15	3.06	-0.09
	Tolerance Limit (mg/L)	±0.20

pH Value Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.94	-0.06
7.0	7.06	+0.06
10.0	9.87	-0.13
	Tolerance Limit (pH unit)	±0.20

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1917914

SUB-BATCH: 0
DATE OF ISSUE: 09-May-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000 Multiparameter Water Quality Meter
Serial No.: --
Equipment No.: BGYP9CKD
Date of Calibration: 09-May-2019 Date of Next Calibration: 09-Aug-2019

PARAMETERS:

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.33	--
4	4.21	+5.3
40	42.3	+5.7
80	81.3	+1.6
400	402	+0.5
800	845	+5.6
	Tolerance Limit (%)	±10.0

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.0	--
10	9.8	-2.0
20	19.7	-1.5
30	29.9	-0.3
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1917914

SUB-BATCH: 0
DATE OF ISSUE: 09-May-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000 Multiparameter Water Quality Meter
Serial No.: --
Equipment No.: BGYP9CKD
Date of Calibration: 09-May-2019 Date of Next Calibration: 09-Aug-2019

PARAMETERS:

Temperature Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
9.5	10.11	+0.6
19.0	19.45	+0.4
38.5	39.05	+0.5
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1917914

SUB-BATCH: 0
DATE OF ISSUE: 09-May-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000 Multiparameter Water Quality Meter
Serial No.: --
Equipment No.: BGYP9CKD
Date of Calibration: 09-May-2019 Date of Next Calibration: 09-Aug-2019

PARAMETERS:

Redox Potential

Method Ref: APHA (21st edition), 2580B
Method Ref: Orion Research Instruction Manual and the Laboratory Manual the Environmental of Water, Wastewater and Soil (2nd edition), Rump & Krist (1992)

Expected Reading (mV)	Displayed Reading (mV)	Difference of A and B (mV)
Solution A (~234mV)	68	
Solution B (~300mV)	115	+47.0
	Tolerance Limit (mV)	>66

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR NELSON TSUI	WORK ORDER:	HK1913288
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	1908, IPLACE, NOS. 301-305 CASTLE PEAK ROAD, KWAI CHUNG, NEW TERRITORIES, HONG KONG	SUB-BATCH: LABORATORY: DATE RECEIVED: DATE OF ISSUE:	0 HONG KONG 29-Mar-2019 24-Apr-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature
Equipment Type:	Multifunctional Meter
Brand Name:	YSI
Model No.:	Professional DSS
Serial No.:	--
Equipment No.:	15M101091
Date of Calibration:	29-Mar-2019, 11-Apr-2019 and 18-Apr-2019

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1913288

SUB-BATCH: 0
DATE OF ISSUE: 24-Apr-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: --
Equipment No.: 15M101091
Date of Calibration: 29-Mar-2019 Date of Next Calibration: 29-Jun-2019

PARAMETERS:

Dissolved Oxygen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.85	2.74	-0.11
5.99	5.99	+0.00
8.54	8.50	-0.04
	Tolerance Limit (mg/L)	±0.20

Salinity Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	9.94	-0.6
20	19.84	-0.8
30	29.70	-1.0
	Tolerance Limit (%)	±10.0

Temperature Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
9.0	10.4	+1.4
23.0	22.5	-0.5
40.0	38.0	-2.0
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT CALIBRATION

WORK ORDER: HK1913288

SUB-BATCH: 0
DATE OF ISSUE: 24-Apr-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: --
Equipment No.: 15M101091
Date of Calibration: 11-Apr-2019 Date of Next Calibration: 29-Jun-2019

PARAMETERS:
Turbidity Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.03	--
4	3.78	-5.5
40	39.77	-0.6
80	79.08	-1.2
400	412.13	+3.0
800	842.98	+5.4
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1913288

SUB-BATCH: 0
DATE OF ISSUE: 24-Apr-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: --
Equipment No.: 15M101091
Date of Calibration: 18 April, 2019 Date of Next Calibration: 29-Jun-2019

PARAMETERS:
pH Value

Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.98	-0.02
7.0	7.03	+0.03
10.0	9.99	-0.01
	Tolerance Limit (pH unit)	±0.20

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK

WORK ORDER: HK1913288

SUB-BATCH: 0
DATE OF ISSUE: 24-Apr-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: --
Equipment No.: 15M101091
Date of Calibration: 29-Mar-2019

PARAMETERS:
Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	-0.54	--
4	4.24	+6.0
40	43.30	+8.2
80	87.60	+9.5
400	372.26	-6.9
800	562.73	-29.7
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

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Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR NELSON TSUI	WORK ORDER:	HK1923178
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	1908, iPLACE, NOS. 301-305 CASTLE PEAK ROAD, KWAI CHUNG, NEW TERRITORIES, HONG KONG	SUB-BATCH: LABORATORY: DATE RECEIVED: DATE OF ISSUE:	0 HONG KONG 05-Jun-2019 21-Jun-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Dissolved Oxygen, pH Value, Turbidity, Salinity, Redox Potential and Temperature
Equipment Type:	Multifunctional Meter
Brand Name:	HORIBA
Model No.:	U-53
Serial No.:	UHB5F2BB
Equipment No.:	--
Date of Calibration:	14-Jun-2019

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1923178

SUB-BATCH: 0
DATE OF ISSUE: 21-Jun-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-53
Serial No.: UHB5F2BB
Equipment No.: --
Date of Calibration: 14-Jun-2019 Date of Next Calibration: 14-Sep-2019

PARAMETERS:

Dissolved Oxygen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.46	2.63	+0.17
5.46	5.51	+0.05
7.56	7.57	+0.01
	Tolerance Limit (mg/L)	±0.20

pH Value Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.96	-0.04
7.0	7.06	+0.06
10.0	10.06	+0.06
	Tolerance Limit (pH unit)	±0.20

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1923178

SUB-BATCH: 0
DATE OF ISSUE: 21-Jun-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-53
Serial No.: UHB5F2BB
Equipment No.: --
Date of Calibration: 14-Jun-2019 Date of Next Calibration: 14-Sep-2019

PARAMETERS:

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	9.82	-1.8
20	19.06	-4.7
30	30.62	+2.1
	Tolerance Limit (%)	±10.0

Redox Potential

Method Ref: APHA (21st edition), 2580B
Method Ref: Orion Research Instruction Manual and the Laboratory Manual the Environmental of Water, Wastewater and Soil (2nd edition), Rump & Krist (1992)

Expected Reading (mV)	Displayed Reading (mV)	Difference of A and B (mV)
Solution A (~234mV)	226	
Solution B (~300mV)	293	+67.0
	Tolerance Limit (mV)	>66

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
11.5	13.42	+1.9
23.0	24.94	+1.9
40.0	40.18	+0.2
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT CALIBRATION

WORK ORDER: HK1923178

SUB-BATCH: 0
DATE OF ISSUE: 21-Jun-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-53
Serial No.: UHB5F2BB
Equipment No.: --
Date of Calibration: 20-Jun-2019 Date of Next Calibration: 14-Sep-2019

PARAMETERS:
Turbidity Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.00	--
4	3.92	-2.0
40	39.1	-2.3
80	79.3	-0.9
400	392	-2.0
800	798	-0.3
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK

WORK ORDER: HK1923178

SUB-BATCH: 0
DATE OF ISSUE: 21-Jun-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-53
Serial No.: UHB5F2BB
Equipment No.: --
Date of Calibration: 14-Jun-2019

PARAMETERS:
Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.67	--
4	23.8	+495.0
40	150	+275.0
80	222	+177.5
400	729	+82.3
800	0.00	-100.0
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic