



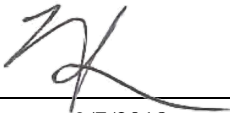

Contract No. 13/WSD/16

Mainlaying in Tseung Kwan O

Baseline Noise Monitoring Report

June 2018

(Rev. 2)

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Signature		
Date:	9/7/2018	9/7/2018

Revision History

0	1 st Submission	27/6/2018
1	2 nd Submission	3/7/2018
Rev.	DESCRIPTION OF MODIFICATION	DATE

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EXECUTIVE SUMMARY

The proposed Desalination Plant at Tseung Kwan O (DPTKO) will produce potable water with an initial capacity of 135 million liters per day (MLD), expandable to an ultimate capacity of 270 Mld in the future to provide a secure and alternative fresh water resource complying with the World Health Organization (WHO) standards. The plant will adopt the Seawater Reverse Osmosis (SWRO) technology, which dominates the market due to its reliability and progressive reduction in cost as the technology advances.

In accordance with the approved Environmental Monitoring and Audit Manual (EM&A Manual) for the Project, baseline environmental monitoring for noise impact should be conducted prior to the commencement of construction works. Pursuant to EP Condition 3.4, Baseline Monitoring Report shall be submitted to the Director of Environmental Protection at least 2 weeks before the commencement of construction of the Project. Baseline monitoring for noise impact was conducted according to the EM&A Manual before the commencement of construction works at selected locations at Tseung Kwan O (TKO).

Monitoring on 7/6/2018 & 8/6/2018 were cancelled due to typhoon (Strong Wind Signal, No. 3) and the adverse weather (i.e. strong wind and heavy rain) it brought along; monitoring on 12/6/2018 was cancelled due to amber rainstorm warning. Thus, additional monitoring on 12/6/2018, 13/6/2018 were scheduled, and the monitoring on 12/6/2018 was further postponed to 14/6/2018.

Daily baseline noise monitoring for A-weighted levels L_{eq} , L_{10} and L_{90} were conducted in a sample period of 30 minutes during daytime (0700 – 1900 hrs). Details of the methodology, locations and results are presented in the report.

The baseline monitoring noise measured levels $L_{Aeq(30min.)}$ on daytime (0700-1900 hrs) for the three Noise Sensitive Receivers (NSRs) range from 57.6 dB(A) – 72.6 dB(A). The baseline average levels, NSRs ID and Location are summarized as below. The baseline noise quality monitoring measurement and the result are recorded in Appendix D.

The baseline average levels as follows:

Daytime (0700-1900 hrs) $L_{Aeq(30min.)}$				
NSR ID	Location	L_{Aeq} (dB(A))	L_{10}(dB(A))	L_{90} dB(A)
NSR4	Creative Secondary School	70.0	72.8	63.3
NSR24*	PLK Laws Foundation College	72.0	74.4	60.3
NSR31	School of Continuing and Professional Studies - CUHK	61.6	64.8	56.0

Remarks: *Free field correction +3dB(A) has been made for NSR24

Contract No. 13/WSD/16
Mainlaying for Desalination Plant at Tseung Kwan O
Baseline Monitoring Report



Action and Limit Level Determination for Noise

Results of the baseline noise monitoring data are processed to provide Action Levels ["AL"] and Limit Levels ["LL"] as per the table below:

Time Period	Action	NSR ID	Location	Type of sensitive receiver(s)	Measurement Type	Limit (dB(A))
(0700-1900 hrs) on normal working day	When one documented complaint is received	NSR4	Creative Secondary School	Educational	Facade	70 dB(A), 65 dB(A) during examination
		NSR24	PLK Laws Foundation College	Educational	Free-field	
		NSR31	School of Continuing and Professional Studies - CUHK	Educational	Facade	

1. INTRODUCTION

1.1 Background

- 1.1.1 Penta-Ocean-Concentric Joint Venture ["POCJV"] is contracted to carry out the Mainlaying works for the development of Desalination Plant at Tseung Kwan O (DPTKO) under Contract No. 13/WSD/16 (hereinafter known as "the Project"). In line with the requirements stated in the Project EM&A Manual, POCJV is required to conduct the noise monitoring.
- 1.1.2 Acuity Sustainability Consulting Limited. ["ASCL"] is commissioned by POCJV to assist POCJV to carry out the Noise Monitoring in fulfillment of the EPD's EM&A Requirements.
- 1.1.3 Pursuant to the Environmental Impact Assessment Ordinance (EIAO), the Director of Environmental Protection granted the further Environmental Permit (No. EP-503/2015/A) to Water Supplies Department (WSD) for this project.
- 1.1.4 The overall view of alignment of the Project is shown in **Figure 1.1**

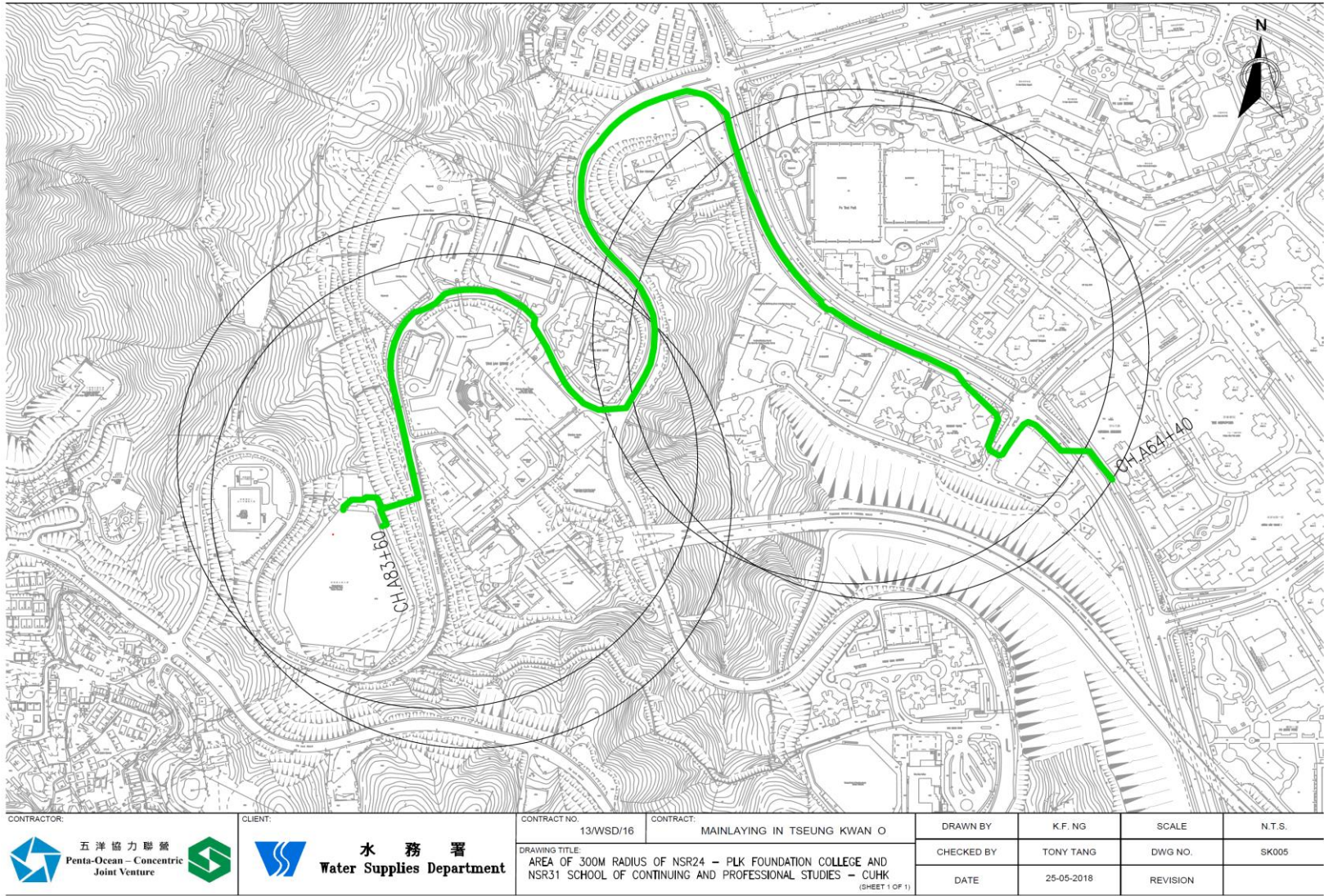


Figure 1.1 Overview of DPTKO

- 1.1.5 The updated construction programme is shown in **Appendix A**
- 1.2 Purpose of the Baseline Monitoring Report
 - 1.2.1 The purposes of this Baseline Monitoring Report are to:
 - Summarise the findings of baseline noise monitoring; and
 - Establish the AL and LL in accordance with the EM&A Manual for the subsequent impact monitoring during the construction stage.
 - 1.2.2 In accordance with the EM&A Manual, environmental baseline noise monitoring was carried out at three monitoring stations along the proposed alignment of the mainlaying works. This Baseline Monitoring Report contains baseline findings of these three monitoring stations.
- 1.3 Report Structure
 - 1.3.1 This Baseline Monitoring Report comprises the following sections:
 - Section 1 introduces the background of the Project and purpose of this Report;
 - Section 2 presents the baseline monitoring methodologies, requirements, results, influencing factors, as well as determination of the AL and LL of noise; and
 - Section 3 concludes the findings of baseline monitoring.

2. NOISE MONITORING

2.1 Monitoring Requirements

- 2.1.1 To ensure no adverse noise impact, noise monitoring is recommended to be carried out at the nearby NSRs during the construction phase.
- 2.1.2 In accordance with the EM&A Manual, baseline noise monitoring should be conducted for at least two weeks to obtain background noise levels prior to the commissioning of major construction works.

2.2 Noise Monitoring Parameters, Time, Frequency and Duration

- 2.2.1 The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq} , L_{10} , L_{90}). At each designated monitoring location, measurements of 5-minutes A-weighted equivalent sound pressure level [$L_{eq\ 5min}$] between 0700-1900 hrs shall be carried out. These measured " $L_{eq\ 5min}$ " shall be then combined into equivalent sound pressure level for 30-minutes period [$L_{eq\ 30min}$] for comparison with the Noise Control Ordinance (NCO) criteria. **Table 2.1** summarizes the monitoring parameters, frequency and duration of the baseline noise monitoring. The monitoring schedule is provided in **Appendix B**.

Table 2.1 Noise Monitoring Parameters, Time, Frequency and Duration

Time	Frequency	Duration	Parameters
Daytime: 0700-1900 hrs	Daily for at least 14 days	Continuously in $L_{eq\ 5min}/L_{eq\ 30min}$ (average of 6 consecutive $L_{eq\ 5min}$)	L_{eq} , L_{10} & L_{90}

2.3 Noise Monitoring Locations

- 2.3.1 According to the environmental findings detailed in the EIA report, the designated locations for the construction noise monitoring are listed in **table 2.2**.

Table 2.2 Noise Sensitive Receivers

NSR ID	Noise Sensitive Receivers	Monitoring Location	Position
NSR 4	Creative Secondary School	Roof Floor	1 m from facade
NSR 24	PLK Laws Foundation College	Pedestrian Road on Ground Floor	Free-field
NSR 31	School of Continuing and Professional Studies - CUHK	Roof Floor	1 m from facade

- 2.3.2 The monitoring locations should normally be made at a point 1m from the exterior of the NSRs building façade and be at a position 1.2m above the ground. A correction of +3dB(A) should be made to the free-field measurements.
- 2.3.3 Three practicable noise monitoring locations for noise measurement are proposed at the sensitive receivers as shown as in **Figures 2.1 – 2.3** below:

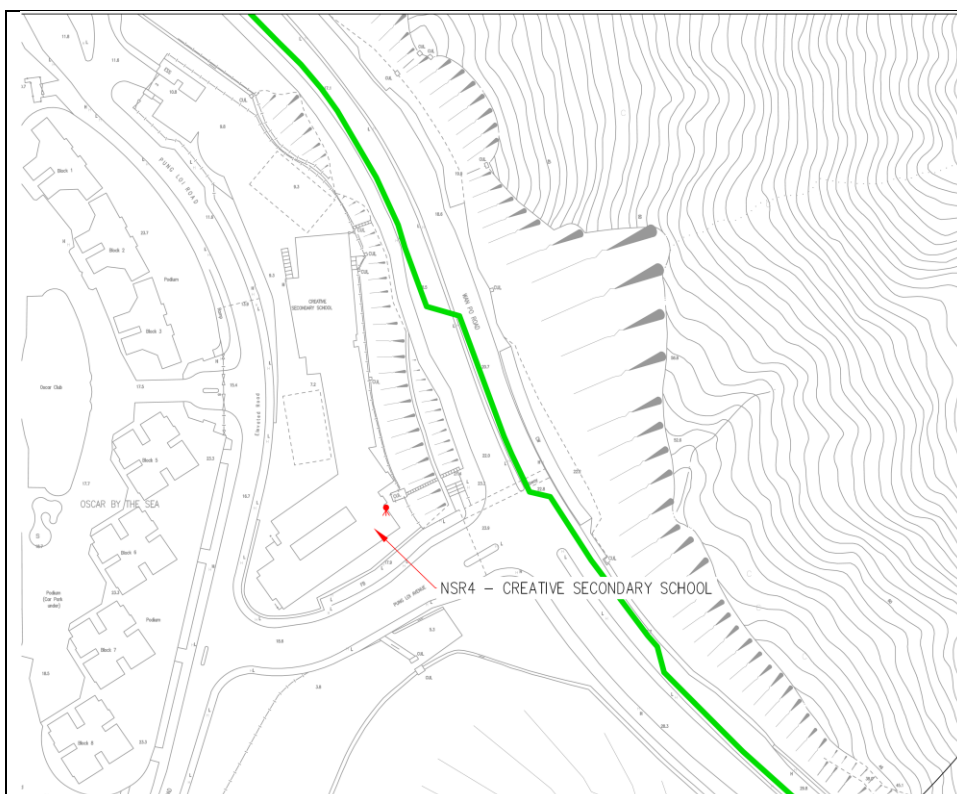


Figure 2.1 NSR4 Creative Secondary School

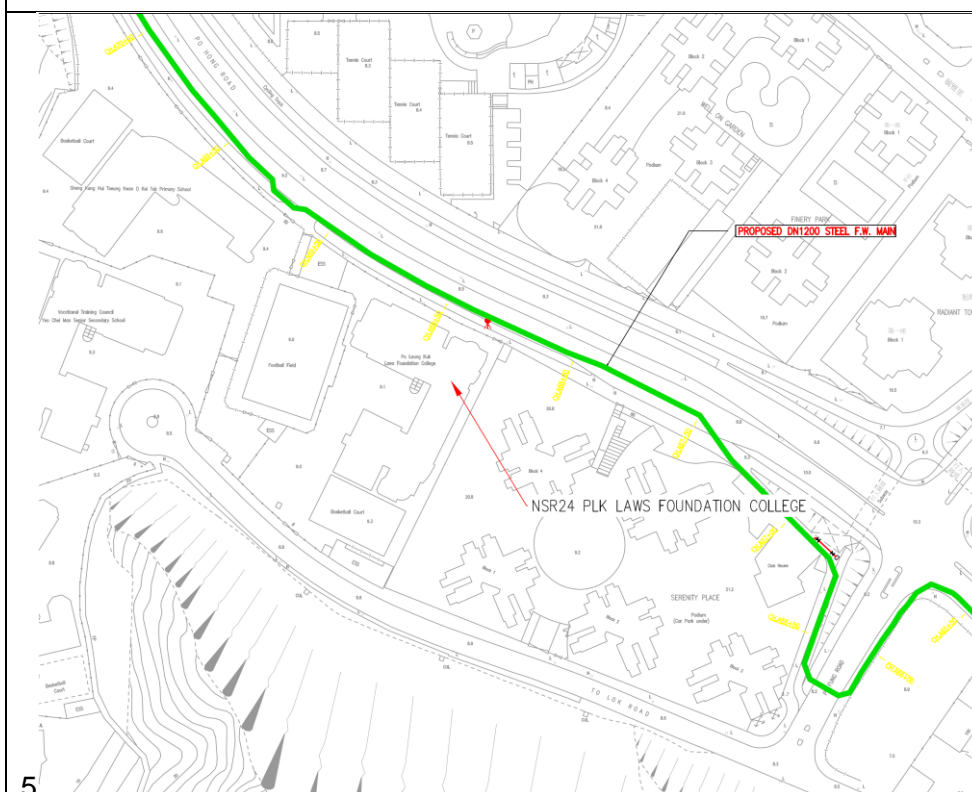
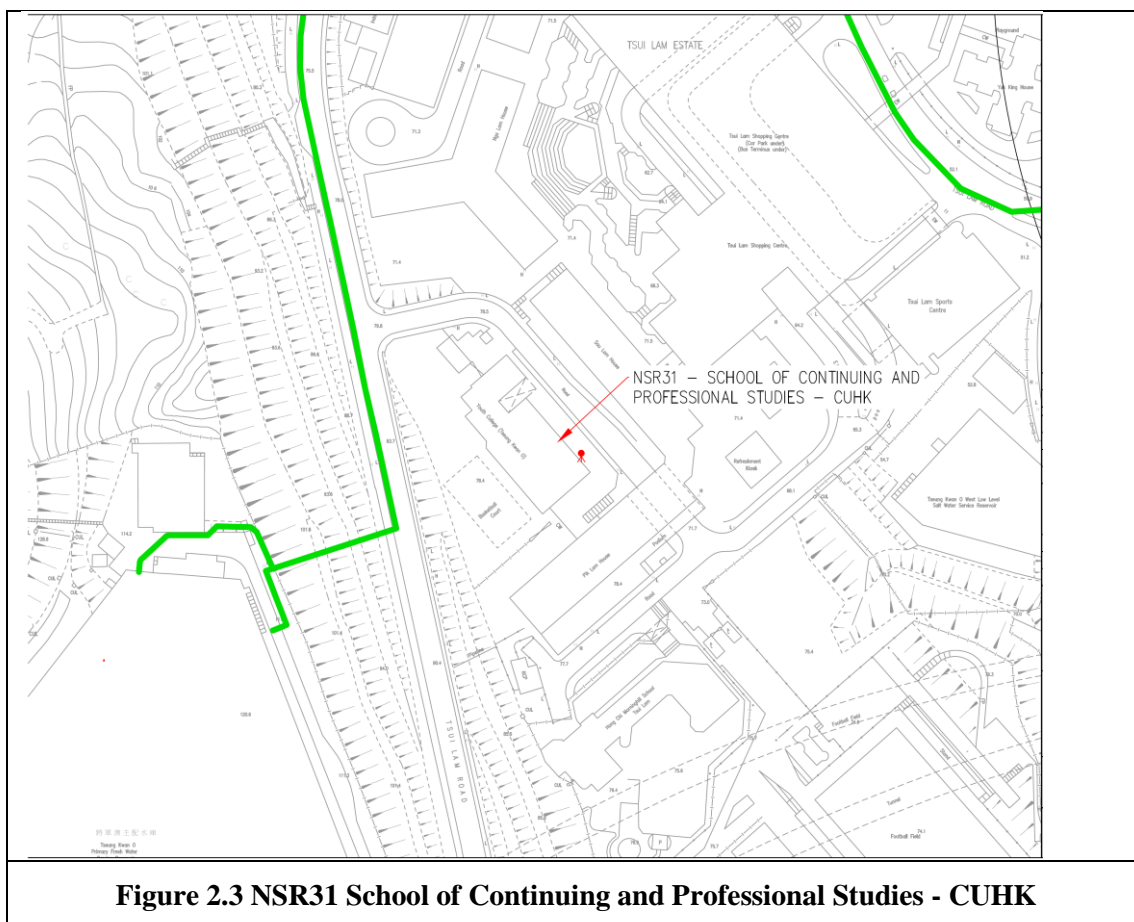


Figure 2.2 NSR24 PLK Laws Foundation College



2.4 Baseline Monitoring Methodology

- 2.4.1 Baseline noise monitoring will be conducted for 14 consecutive days (Monday to Sunday). At each designated monitoring location, measurement of 30 minutes A-weighted equivalent sound pressure level [$L_{eq}(30min)$, L_{10} , L_{90}] should be carried out between 0700 and 1900 hrs for daytime measurements. Six measured " $L_{eq}(5min)$ " will then be condensed into equivalent sound pressure level for 30-minutes period [$L_{eq}(30min)$] for comparison with the NCO criteria.
- 2.4.2 During the baseline monitoring, there shall not be any construction activities in the vicinity of the monitoring locations and in the project site. Any non-project related construction activities in the vicinity of the monitoring stations during the baseline monitoring shall be noted and the source and location of such activities should be recorded. In accordance to current good practice for drafting of the Environmental Management Plan (EMP), the LL for school should be 70 dB(A) and 65 dB(A) during examination period.

2.5 Monitoring Equipment

- 2.5.1 Integrated sound level meter shall be used for the noise monitoring. The meter shall be in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a

known frequency. Measurements may be accepted as valid only if the calibration level before and after the noise measurements agree to within 1.0 dB(A). Calibration certificates of the instruments used are presented in **Appendix C**.

- 2.5.2 Noise measurements shall not be made in the presence of fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

Table 2.3 Baseline Noise Monitoring Equipment

Equipment	Brand and Model	Detection Limit
Sound Level Meter	Nti XL2	30-130 dB(A)
Sound Level Meter Calibrator	Rion NC-74	Nil
Pocket Wind Meter Anemometer	Kestrel 1000 Wind Meter	Nil

2.6 Results and Observations

- 2.6.1 Baseline monitoring for noise impact was conducted from 29/5/2018 to 14/6/2018. The baseline noise levels at Noise Monitoring Stations at TKO (i.e. NSR 4, 24 and 31) are summarized in **Tables 2.4**. Details of noise monitoring results are presented in **Appendix D**.

Table 2.4 Summary of Baseline Noise Monitoring Results

NSR ID	Noise in dB(A)					
	Average			Range		
	L _{eq} 30min	L ₁₀ 30min	L ₉₀ 30min	L _{eq} 30min	L ₁₀ 30min	L ₉₀ 30min
NSR 4	70.0	72.8	63.3	68.8-72.6	71.3-75.6	59.9-68.7
NSR 24*	72.0	74.4	60.3	68.8-74.9	70.9-77.0	56.5-64.6
NSR 31	61.6	64.8	56.0	57.6-69.1	60.0-72.2	51.4-60.5

Remarks: *Free field correction +3dB(A) has been made for NSR24

- 2.6.2 No construction activity was observed during the baseline monitoring. The major noise source at the monitoring station included the traffic noise and school activities. These noise sources are expected to exist in near future and throughout the construction period of the Project.
- 2.6.3 Monitoring on 7/6/2018 & 8/6/2018 were cancelled due to typhoon (Strong Wind Signal, No. 3) and the adverse weather (i.e. strong wind and heavy rain) it brought along; monitoring on 12/6/2018 was cancelled due to amber rainstorm warning. Thus, additional monitoring on 12/6/2018, 13/6/2018 were scheduled, and the monitoring on 12/6/2018 was further postponed to 14/6/2018.

2.7 Action and Limit Levels

- 2.7.1 The AL and LL in line with the criteria of Practice Note for Professional Persons (ProPECC PN 2/93) "Noise from Construction Activities – Non-statutory Controls", Technical Memorandum on Environmental Impact Assessment Process issued by HKSAR Environmental Protection Department ["EPD"] under the

Environmental Impact Assessment Ordinance, Cap 499, S.16 and EM&A Manual are presented in **Table 2.4**.

Table 2.4 Action and Limit Levels for Noise

Time Period	Action	Limit (dB(A))
0700-1900 hrs on normal weekdays	When one documented complaint is received from any one of the noise sensitive receivers or 75 dB(A) recorded at the monitoring station	<ul style="list-style-type: none"> • 70 dB(A) for school and • 65 dB(A) during examination period
Notes: (a) Limits specified in the GW-TM and IND-TM for construction and operation noise, respectively.		

3. CONCLUSION

- 3.1 Baseline noise monitoring was carried out from 29/5/2018 to 14/6/2018 at three monitoring stations at TKO. All monitoring stations as specified in EM&A Manual were accessible and thus there is no revision for inclusion in the EM&A Manual.
- 3.2 At NSR31, the averaged baseline daytime noise monitoring results were below the criteria of 70dB(A) for educational premises. At NSR4 and NSR24, the averaged baseline daytime noise monitoring results were above criteria of 70dB (A) for educational premises. The measured level during impact monitoring will be adjusted by the below equation when exceeded the baseline level:
- Adjusted Measure Level = $10 * \text{Log} (10^{(\text{Measured Level} * 0.1)} - 10^{(\text{Baseline Level} * 0.1)})$
- 3.3 Traffic noise and school activities were observed as the major noise sources affecting the noise background at the three monitoring stations.
- 3.4 The Action Level of construction noise is based on documented valid complaints received, while the Limit Level for each monitoring location is set at a specific limit according to EIAO-TM and the EM&A Manual. The high background noise level of NSR4 and NSR24 recorded from the baseline study will be taken into account for the future EM&A programme during impact monitoring at construction phase.

Appendix A: Construction Programme

Contract No. 13/WSD/16

Mainlaying for Desalination Plant at Tseung Kwan O

Baseline Monitoring Report



13/WSD/16 - Mainlaying in Tseung Kwan O
Outline Construction Programme

MONTH	LOCATION		FROM	TO	2018												2019												2020												2021																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	PJ-ID	ROAD			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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*TKOFWPSR - Tseung Kwan O Fresh Water Primary Service Reservoir
**Remaining 1581m within TKO137 with site possession from Nov 2019

Appendix B: Monitoring Scheulde

Baseline Noise Monitoring Schedule

Date and Monitoring Period			Noise Monitoring Minimum 30-minutes monitoring period during (0700 – 1900 hrs)
Tue	29/5/2018	09:00 – 12:00 (14:30 for NSR4)	$L_{eq(30min)}$, L_{10} , L_{90}
Wed	30/5/2018	09:00 – 12:00	$L_{eq(30min)}$, L_{10} , L_{90}
Thu	31/5/2018	09:00 – 12:00	$L_{eq(30min)}$, L_{10} , L_{90}
Fri	1/6/2018	09:00 – 12:00	$L_{eq(30min)}$, L_{10} , L_{90}
Sat	2/6/2018	12:00 – 15:00	$L_{eq(30min)}$, L_{10} , L_{90}
Sun	3/6/2018	12:00 – 15:00	$L_{eq(30min)}$, L_{10} , L_{90}
Mon	4/6/2018	12:00 – 17:00	$L_{eq(30min)}$, L_{10} , L_{90}
Tue	5/6/2018	12:00 – 17:00	$L_{eq(30min)}$, L_{10} , L_{90}
Wed	6/6/2018	15:00 – 18:00	$L_{eq(30min)}$, L_{10} , L_{90}
Thu	7/6/2018	15:00 – 18:00	$L_{eq(30min)}$, L_{10} , L_{90}
Fri	8/6/2018	15:00 – 18:00	$L_{eq(30min)}$, L_{10} , L_{90}
Sat	9/6/2018	15:00 – 18:00	$L_{eq(30min)}$, L_{10} , L_{90}
Sun	10/6/2018	09:00 – 12:00	$L_{eq(30min)}$, L_{10} , L_{90}
Mon	11/6/2018	13:30 – 16:30	$L_{eq(30min)}$, L_{10} , L_{90}
Tue	12/6/2018	15:00 – 18:00	$L_{eq(30min)}$, L_{10} , L_{90}
Wed	13/6/2018	15:00 – 18:00	$L_{eq(30min)}$, L_{10} , L_{90}
Thu	14/6/2018	15:00 – 18:00	$L_{eq(30min)}$, L_{10} , L_{90}

Remark:

1. *Monitoring on 7/6/2018 & 8/6/2018 were cancelled due to typhoon (Strong Wind Signal, No. 3) and the adverse weather (i.e. strong wind and heavy rain) it brought along; monitoring on 12/6/2018 was cancelled due to amber rainstorm warning. Thus, additional monitoring on 12/6/2018, 13/6/2018 were scheduled, and the monitoring on 12/6/2018 was further postponed to 14/6/2018.*

Appendix C: Noise Monitoring Equipment Calibration Certificates



輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration 校正證書

Certificate No. : C176148
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-1542) Date of Receipt / 收件日期 : 26 October 2017
Description / 儀器名稱 : Audio Analyzer
Manufacturer / 製造商 : NTi
Model No. / 型號 : XL2
Serial No. / 編號 : A2A-09696-E0
Supplied By / 委託者 : Acumen Environmental Engineering and Technologies Co., Ltd.
Lot 11, Tam Kon Shan Road, North Tsing Yi, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^{\circ}\text{C}$
Line Voltage / 電壓 : ---

Relative Humidity / 相對濕度 : $(55 \pm 20)\%$

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 3 November 2017

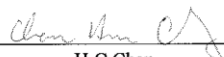
TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By : 
測試 : K C Lee
Engineer

Certified By : 
核證 : H C Chan
Engineer

Date of Issue : 7 November 2017
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.
本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。



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- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- Self-calibration using the laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.3.2.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

- Test procedure : MA101N.

6 Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting			Applied Value		UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	A	FAST	94.00	1	93.9

6.1.1.2 After Self-calibration

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	A	FAST	94.00	1	94.0	± 1.1

6.1.2 Linearity

UUT Setting			Applied Value		UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	A	FAST	94.00	1	94.0 (Ref.)
			104.00		104.0
			114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

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6.2 Time Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	A	FAST	94.00	1	94.0	Ref.
		SLOW			94.0	± 0.3

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	A	FAST	94.00	63 Hz	67.7	-26.2 ± 1.5
				125 Hz	77.8	-16.1 ± 1.5
				250 Hz	85.3	-8.6 ± 1.4
				500 Hz	90.7	-3.2 ± 1.4
				1 kHz	94.0	Ref.
				2 kHz	95.2	$+1.2 \pm 1.6$
				4 kHz	95.0	$+1.0 \pm 1.6$
				8 kHz	92.9	$-1.1 (+2.1; -3.1)$
				12.5 kHz	89.7	$-4.3 (+3.0; -6.0)$

6.3.2 C-Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	C	FAST	94.00	63 Hz	93.1	-0.8 ± 1.5
				125 Hz	93.8	-0.2 ± 1.5
				250 Hz	94.0	0.0 ± 1.4
				500 Hz	94.0	0.0 ± 1.4
				1 kHz	94.0	Ref.
				2 kHz	93.8	-0.2 ± 1.6
				4 kHz	93.2	-0.8 ± 1.6
				8 kHz	91.0	$-3.0 (+2.1; -3.1)$
				12.5 kHz	87.7	$-6.2 (+3.0; -6.0)$

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輝創工程有限公司 – 校正及檢測實驗室
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輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

Certificate of Calibration 校正證書

Certificate No. : C176148
證書編號

Remarks : - Mfr's Spec. : IEC 61672 Class 2

- Uncertainties of Applied Value : 94 dB : 63 Hz - 125 Hz : ± 0.35 dB
250 Hz - 500 Hz : ± 0.30 dB
1 kHz : ± 0.20 dB
2 kHz - 4 kHz : ± 0.35 dB
8 kHz : ± 0.45 dB
12.5 kHz : ± 0.70 dB
104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)
114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)

- UUT Microphone Model No. : MA220 (ACO7052) & S/N : 62324

- The uncertainties are for a confidence probability of not less than 95 %.

Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載按正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。

Sun Creation Engineering Limited Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

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輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

Certificate of Calibration 校正證書

Certificate No. : C174832

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-1862)

Date of Receipt / 收件日期 : 10 August 2017

Description / 儀器名稱 : Sound Calibrator

Manufacturer / 製造商 : Rion

Model No. / 型號 : NC-74

Serial No. / 編號 : 34615222

Supplied By / 委託者 : Acumen Environmental Engineering and Technologies Co., Ltd.
Lot 11, Tam Kon Shan Road, North Tsing Yi, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^{\circ}\text{C}$

Relative Humidity / 相對濕度 : $(55 \pm 20)\%$

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 26 August 2017

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.

The results do not exceed manufacturer's specification.


The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By
測試

:


H T Wong
Technical Officer

Certified By
核證

:


K C Lee
Engineer

Date of Issue
簽發日期

: 28 August 2017

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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Certificate of Calibration 校正證書

Certificate No. : C174832
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- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C173864
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C161175

- Test procedure : MA100N.
- Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.3	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec. (Hz)	Uncertainty of Measured Value (Hz)
1	1.002	1 kHz $\pm 1\%$	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

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Certificate of Conformity

This instrument was produced under rigorous factory production control and documented standard procedures. It was individually visually inspected, leak tested and function tested for display, backlight, button and software performance. The accuracy of each of its primary measurements was individually calibrated and/or tested against standards traceable to the National Institute of Standards and Technology ("NIST") or calibrated intermediary standards. This instrument is certified to have performed at the time of manufacture in compliance with the following specifications as they apply to this meter's specific model, measurements and features.

Methods Used in Calibration and Testing

Wind Speed:

The Kestrel Weather & Environmental Meter impeller installed in this unit was individually tested in a subsonic wind tunnel operating at approximately 300 fpm (1.5 m/s) and 1200 fpm (6.1 m/s) monitored by a Gill Instruments Model 1350 ultrasonic time-of-flight anemometer. The Standard's maximum combined uncertainty is $\pm 1.04\%$ within the airspeed range 706.6 to 3923.9 fpm (3.59 to 19.93 m/s), and $\pm 1.66\%$ within the airspeed range 166.6 to 706.6 fpm (0.85 to 3.59 m/s).

Temperature:

Temperature response is verified in comparison with a Eutechnics 4600 Precision Thermometer or a standard Kestrel 4000 Weather & Environmental Meter calibrated weekly against the Eutechnics 4600. The Eutechnics 4600 is calibrated annually and is traceable to NIST with a system accuracy of $\pm 0.05^\circ\text{C}$.

Direction / Heading

The sensitivity of the magnetic directional sensor is verified at the component level by applying a magnetic field to the sensor and measuring the signal output at 4 points, as well as after assembly by orienting the unit to the cardinal directions and measuring the magnetic field output. In both cases, the compass output must be accurate to within ± 5 degrees.

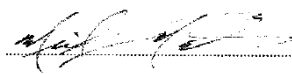
Relative Humidity:

Relative humidity receives a two-point calibration in humidity and temperature controlled chambers at 75.3% RH and 32.8% RH at 25°C . The calibration tanks are monitored with an Edgetech Model 2002 DewPrime II Standard Chilled Mirror Hygrometer. Following calibration, performance is further verified at an RH of approximately 43.2% against the Edgetech Hygrometer. The Edgetech Hygrometer is calibrated annually and is traceable to NIST with a maximum relative expanded uncertainty of $\pm 0.2\%$ RH.

Barometric Pressure:

Pressure response is verified against a Vaisala PTB210A Digital Barometer or a standard Kestrel 4000 Weather & Environmental Meter calibrated weekly against the Vaisala Barometer. The Vaisala Barometer is calibrated annually and is traceable to NIST with an accuracy of $\pm 0.15\text{ hPa}$ at $+20^\circ\text{C}$ defined as the root sum of the squares (RSS) of end point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature.

Approved By:



Michael Naughton, Engineering Manager

s uncertainty of the measurement derived from statistical analysis considering the combined effects from primary sensor specifications, circuit conversions,

Appendix D: Baseline Monitoring Data (Noise)

Contract No. 13/WSD/16
Mainlaying for Desalination Plant at Tseung Kwan O
Baseline Monitoring Report

NSR ID: NSR4
 Baseline monitoring period: 29/5/2018 to 14/6/2018
 Parameter : L_{eq} 30min, L_{10} 30min, L_{90} 30min
 Major Site Activities No construction works were conducted in the vicinity during the monitoring period.
 Major dust source Nearby traffic and school activities
 Other Factors NA

Date	Time	Weather	L_{eq} -5min, dB(A)						L_{30min} , dB(A)	$L_{10-30min}$, dB(A)	$L_{90-30min}$, dB(A)
			Reading (1)	Reading (2)	Reading (3)	Reading (4)	Reading (5)	Reading (6)			
29/5/2018	14:37-15:07	sunny	72.1	72.3	72.9	73.3	72.4	72.7	72.6	75.6	68.7
30/5/2018	9:53-10:23	sunny	68.7	69.0	68.6	69.6	68.8	69.4	69.0	72.3	61.0
31/5/2018	9:18-9:48	sunny	68.9	68.2	68.7	68.8	68.4	70.9	69.1	72.0	59.9
1/6/2018	15:20-15:50	sunny	69.4	72.7	68.7	69.5	70.1	69.1	70.1	73.0	62.3
2/6/2018	13:59-14:29	Fine	69.5	70.8	68.2	70.6	71.4	70.7	70.3	72.5	61.8
3/6/2018	13:53-14:23	Fine	69.1	69.4	68.0	68.8	70.1	69.5	69.2	72.4	62.0
4/6/2018	15:42-14:12	cloudy	70.1	71.6	71.8	70.3	70.5	71.4	71.0	72.9	63.0
5/6/2018	12:28-12:58	cloudy	69.4	68.7	69.9	70.2	71.5	70.6	70.1	72.1	62.8
6/6/2018	16:54-17:24	Cloudy	70.3	71.1	71.8	72.1	71.4	70.9	71.3	73.2	62.1
7/6/2018	cancelled due to typhoon and the adverse weather										
8/6/2018	cancelled due to typhoon and the adverse weather										
9/6/2018	14:26-14:56	fine	68.1	67.4	69.5	69.8	70.4	70.1	69.3	71.5	62.2
10/6/2018	14:16-14:46	Fine	68.3	69.0	68.6	69.4	68.7	69.0	68.8	71.3	61.9
11/6/2018	13:40-14:10	fine	69.8	68.3	69.2	69.0	69.2	67.9	68.9	72.3	61.6
12/6/2018	cancelled due to typhoon and the adverse weather										
13/6/2018	15:14-15:44	Fine	68.4	69.3	68.7	69.1	69.6	70.3	69.3	73.5	63.6
14/6/2018	15:02-15:35	Fine	68.7	69.3	69.2	68.3	69.4	69.5	69.1	72.4	64.8

Contract No. 13/WSD/16
Mainlaying for Desalination Plant at Tseung Kwan O
Baseline Monitoring Report

NSR ID: NSR24
 Baseline monitoring period: 29/5/2018 to 14/6/2018
 Parameter : L_{eq} 30min, L_{10} 30min, L_{90} 30min
 Major Site Activities No construction works were conducted in the vicinity during the monitoring period.
 Major dust source Nearby traffic and school activities
 Other Factors NA

Date	Time	Weather	L_{eq} -5min, dB(A)						L_{-30min} , dB(A)	$L_{10-30min}$, dB(A)	$L_{90-30min}$, dB(A)	Free-field Correction L_{-30min} , dB(A)	Free-field Correction $L_{10-30min}$, dB(A)	Free-field Correction $L_{90-30min}$, dB(A)
			Reading (1)	Reading (2)	Reading (3)	Reading (4)	Reading (5)	Reading (6)						
29/5/2018	10:18-10:48	sunny	67.9	71.1	66.2	68.3	68.7	67.8	68.6	70.5	55.4	71.6	73.5	58.4
30/5/2018	11:10-11:40	sunny	68.6	67.5	69.1	68.4	68.8	67.3	68.3	70.4	56.5	71.3	73.4	59.5
31/5/2018	10:35-11:05	sunny	69.2	68.6	67.1	68.9	68.6	68.6	68.5	72.0	55.9	71.5	75.0	58.9
1/6/2018	13:50-14:20	sunny	66.3	65.4	69.6	65.1	69.2	69.1	67.8	69.9	54.9	70.8	72.9	57.9
2/6/2018	12:57-13:27	Fine	68.6	67.8	69.0	68.3	68.5	69.3	68.6	70.8	56.3	71.6	73.8	59.3
3/6/2018	16:28-16:58	Fine	69.5	68.2	68.3	69.7	68.8	69.4	69.0	71.2	55.8	72.0	74.2	58.8
4/6/2018	16:55-17:25	cloudy	72.6	71.8	70.5	71.3	72.2	72.8	71.9	74.0	58.4	74.9	77.0	61.4
5/6/2018	13:34-14:04	cloudy	69.4	71.1	71.5	72.3	70.4	70.6	71.0	73.0	61.6	74.0	76.0	64.6
6/6/2018	14:06-14:36	Cloudy	71.5	69.3	68.8	70.4	71.0	69.6	70.2	72.4	59.4	73.2	75.4	62.4
7/6/2018	cancelled due to typhoon and the adverse weather													
8/6/2018	cancelled due to typhoon and the adverse weather													
9/6/2018	15:24-15:54	fine	64.3	65.2	65.8	67.1	66.4	65.3	65.8	67.9	59.7	68.8	70.9	62.7
10/6/2018	15:25-15:55	Fine	68.3	67.9	69.1	68.6	67.8	68.0	68.3	70.3	55.8	71.3	73.3	58.8
11/6/2018	14:49-15:19	fine	67.7	65.2	69.2	66.5	67.5	67.3	67.4	70.0	54.1	70.4	73.0	57.1
12/6/2018	cancelled due to typhoon and the adverse weather													
13/6/2018	15:50-16:20	Fine	68.3	68.1	68.9	67.5	67.8	67.1	68.0	71.6	55.7	71.0	74.6	58.7
14/6/2018	17:06-17:31	Fine	70.4	66.2	70.6	69.6	68.4	61.0	68.6	72.6	53.5	71.6	75.6	56.5

Remarks: Free-field correction +3dB(A) has been made for NSR24

Contract No. 13/WSD/16
Mainlaying for Desalination Plant at Tseung Kwan O
Baseline Monitoring Report

NSR ID: NSR31
 Baseline monitoring period: 29/5/2018 to 14/6/2018
 Parameter : L_{eq} 30min, L_{10} 30min, L_{90} 30min
 Major Site Activities No construction works were conducted in the vicinity during the monitoring period.
 Major dust source Nearby traffic and school activities
 Other Factors NA

Date	Time	Weather	L_{eq} -5min, dB(A)						L_{-30min} , dB(A)	$L_{10-30min}$, dB(A)	$L_{90-30min}$, dB(A)
			Reading (1)	Reading (2)	Reading (3)	Reading (4)	Reading (5)	Reading (6)			
29/5/2018	11:26-11:56	sunny	58.4	58.8	59.9	60.0	60.3	58.2	59.3	63.3	52.5
30/5/2018	12:16-13:46	sunny	58.8	54.7	57.3	60.9	58.7	58.1	58.5	60.7	53.7
31/5/2018	12:13-12:43	sunny	56.7	58.2	56.5	57.2	57.4	59.5	57.7	61.1	52.1
1/6/2018	12:06-12:36	sunny	59.9	61.6	59.3	60.1	58.2	59.3	59.9	62.8	55.8
2/6/2018	11:44-12:34	Fine	63.2	60.8	59.7	59.4	60.3	59.8	60.7	62.4	55.5
3/6/2018	15:19-15:49	Fine	59.7	58.5	57.9	57.3	59.0	58.8	58.6	60.4	52.8
4/6/2018	14:29-14:59	cloudy	67.9	68.3	69.9	69.1	69.4	69.6	69.1	72.2	60.5
5/6/2018	14:27-14:57	cloudy	60.4	61.3	61.5	62.2	64.1	63.2	62.3	64.4	58.3
6/6/2018	15:14-15:44	Cloudy	62.4	64.0	64.8	63.6	61.5	62.1	63.2	65.2	59.3
7/6/2018	cancelled due to typhoon and the adverse weather										
8/6/2018	cancelled due to typhoon and the adverse weather										
9/6/2018	16:22-16:52	fine	58.8	57.5	57.9	58.4	58.6	57.6	58.2	60.0	53.6
10/6/2018	16:10-16:40	Fine	59.1	57.9	58.3	58.7	57.8	59.3	58.6	60.1	52.7
11/6/2018	15:34-16:04	fine	58.0	59.3	57.2	56.6	56.6	57.0	57.6	60.8	51.9
12/6/2018	cancelled due to typhoon and the adverse weather										
13/6/2018	16:27-16:57	Fine	57.6	57.9	58.1	57.6	58.3	58.9	58.1	61.0	51.4
14/6/2018	16:04-16:34	Fine	57.4	58.7	57.8	59.2	57.0	57.7	58.0	67.5	58.8

Contract No. 13/WSD/16
Mainlaying for Desalination Plant at Tseung Kwan O
Baseline Monitoring Report

