

**Installation of Submarine Gas
Pipelines and Associated Facilities
from To Kwa Wan to North Point for
Former Kai Tak Airport Development**

*Twenty-sixth Monthly Environmental Monitoring
& Audit (EM&A) Report*

12 August 2014

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Twenty-sixth Monthly Environmental Monitoring & Audit (EM&A) Report

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This document presents the Twenty-sixth Monthly Environmental Monitoring and Audit (EM&A) Report for the Installation of Submarine Gas Pipelines and Associated Facilities from To Kwa Wan to North Point for Former Kai Tak Airport Development.		12 August 2014			
		Approved by:			
		 Mr Craig Reid <i>Partner</i>			
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**Installation of Submarine Gas Pipelines and Associated Facilities from To
Kwa Wan to North Point for Former Kai Tak Airport Development
Environmental Certification Sheet
Environmental Permit No. EP-401/2010**

Reference Document/~~Plan~~


Document/ Plan to be Certified/ Verified:	Twenty-sixth Monthly Environmental Monitoring & Audit (EM&A) Report – July 2014
Date of Report:	12/8/2014
Date prepared by ET:	12/8/2014
Date received by IEC:	12/8/2014

Reference EM&A Manual/ EP Requirement


EM&A Manual Requirement:	Section 12.4
Content:	<i>Monthly Environmental Monitoring & Audit (EM&A) Report</i>
12.4	“The EM&A report should be prepared by the ET, endorsed by IEC and submitted within 10 working days of the end of each reporting month”.

EP Condition:	Condition No. 3.4
Content:	<i>Monthly Environmental Monitoring & Audit (EM&A) Report</i>
3.4	“Four hard copies and one electronic copy of monthly EM&A Report shall be submitted to the Director within two weeks after the end of the reporting month.....”

ET Certification

I hereby certify that the above referenced document/ plan complies with the above referenced section/condition of the EM&A Manual and EP.	
Ms Winnie Ko, Environmental Team Leader:	
	Date: 12/8/2014

IEC Verification

I hereby verify that the above referenced document/ plan complies with the above referenced section/condition of the EM&A Manual and EP.	
Dr Anne Kerr, Independent Environmental Checker:	
	Date: 13/8/2014

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EXECUTIVE SUMMARY

The construction works of the installation of submarine gas pipelines and associated facilities from To Kwa Wan to North Point for former Kai Tak Airport Development (“the Project”) commenced on 13 June 2012. This is the 26th Monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works carried out during the period from 1 to 31 July 2014 in accordance with the EM&A Manual of the Project ⁽¹⁾.

Summary of Construction Works undertaken during the Reporting Month

Works undertaken in the reporting month include:

Submarine Pipeline:

- Completion of armour rock backfilling for the 450mm diameter submarine pipelines;
- Completion of pipe laying and concrete surround for Y-line and X-line up to the test pit at To Kwa Wan Works Area;
- Completion of excavation of test pits for 450mm diameter pipelines at To Kwa Wan Works Area;
- Completion of repair works of 450mm diameter submarine pipeline Y-line at North Point Cofferdam; and
- Completion of concrete surround of 450mm diameter submarine pipeline riser (Y-line).

Landmains (To Kwa Wan and North Point):

- Completion of final testing of 600mm diameter pipeline; and
- Completion of reinstatement of 600mm diameter pipeline test pits at Chi Kiang Street and To Kwa Wan Works Area.

Works Area (To Kwa Wan):

- Completion of intermediate test;
- Substantial completion of installation of ICCP system;
- Completion of concrete surround of the submarine pipelines within To Kwa Wan Works Area;
- Completion of reinstatement of seawall blocks at To Kwa Wan cofferdam;
- Completion of reinstatement of granite facing stone at To Kwa Wan cofferdam; and
- Completion of extraction and concreting of pipe piles at To Kwa Wan cofferdam.

(1) Mott MacDonald 2010. Installation of Submarine Gas Pipelines and Associated Facilities from To Kwa Wan to North Point for Former Kai Tak Airport Development: Environmental Monitoring and Audit Manual.

Environmental Monitoring and Audit Progress

A summary of the monitoring activities undertaken in this reporting period is listed below:

- Impact marine water quality monitoring 1 time
- Post-construction marine water quality monitoring 12 times
- Air borne noise monitoring 5 sets
- Weekly Environmental Site Inspection 5 times

Marine Water Quality

Impact and post-construction marine water quality monitoring were conducted in accordance with the requirements described in the EM&A Manual and exceedances of Limit Levels for water quality were recorded during the reporting month. Following the review of monitoring data and marine works details in accordance with the procedures stipulated in the Event and Action Plan of the EM&A Manual, these exceedances were considered to be due to natural background variation in water quality characteristics of the Victoria Harbour waters in Hong Kong.

The review of monitoring data and works activities undertaken suggested that marine works have proceeded in an environmentally acceptable manner.

Air Borne Noise

Five sets of 30-minute construction noise measurements were carried out at the monitoring stations FSQ and SCH02 during normal weekdays of the reporting period. No exceedances of the Action and Limit Levels were identified during the reporting period and it is considered that construction works of the Project did not appear to generate any unacceptable noise impact during the monitoring period.

Waste Management

Waste generated from this Project includes inert construction and demolition (C&D) materials and non-inert C&D materials. A total of 28.8 tonnes of inert C&D materials were generated and reused in the Contract. 0.2 tonnes of non-inert C&D materials were also generated in this reporting month.

Environmental Site Inspection

A total of five weekly site inspections were conducted by representatives of the Contractor and the Environmental Team (ET). Joint site inspection was conducted on 29 July 2014 by the Contractor, the ET, the Resident Engineer (RE) and the Independent Environmental Checker (IEC). Details of the audit findings and implementation status of the mitigation measures are presented in *Section 5.1*.

Non-conformance/Compliant/Summons and Prosecution

No non-compliance event was recorded during the reporting period.

No environmental complaint and summon/prosecution was received in this reporting period.

Future Key Issues

Works to be undertaken in the next reporting month of August 2014 include:

- Seawall reinstatement above the high water mark;
- Backfilling of land main; and
- Final testing of submarine pipelines.

Potential environmental impacts arising from the above construction activities are mainly associated with dust, construction noise and waste management issues.

ERM-Hong Kong, Limited (ERM) and Mott MacDonald Hong Kong Limited were appointed by the Hong Kong and China Gas Company Limited and McDow-Kaden JV as the Environmental Team (ET) and the Independent Environmental Checker (IEC), respectively, to undertake the Environmental Monitoring and Audit (EM&A) activities for the installation of submarine gas pipelines and associated facilities from To Kwa Wan to North Point for former Kai Tak Airport Development (“the Project”).

1.1 PURPOSE OF THE REPORT

This is the 26th Monthly EM&A Report which summarises the impact monitoring results and inspection/audit findings for the EM&A programme during the reporting period from **1 to 31 July 2014**.

1.2 STRUCTURE OF THE REPORT

The remainder of the report is structured as follows:

Section 2 : Project Information

summarises the background and scope of the Project, works locations and construction works undertaken.

Section 3 : Environmental Monitoring and Audit (EM&A) Requirements

summarises the environmental monitoring and audit requirements including monitoring programmes, monitoring methodologies, monitoring parameters, monitoring frequency, monitoring locations, Action and Limit Levels, Event/ Action Plans, environmental mitigation measures as recommended in the approved Environmental Impact Assessment (EIA) report, Environmental Permit (EP) and relevant environmental requirements stated in the Contract Specifications.

Section 4 : Implementation Status on Environmental Mitigation Measures

summarises the implementation of environmental mitigation measures as recommended in the approved EIA report, EM&A Manual, EP and relevant environmental requirements stated in the Contract Specifications.

Section 5 : **Monitoring Results**

summarises the monitoring results obtained in the reporting period and the findings of the weekly site inspection undertaken within the reporting period.

Section 6 : **Environmental Non-conformance**

summarises any non-compliance of environmental performance standard, and environmental complaints and environmental summons received within the reporting period.

Section 7 : **Future Key Issues**

summarises the impact forecast and monitoring schedule for the next reporting month.

Section 8 : **Conclusion**

2 **PROJECT INFORMATION**

2.1 **PROJECT BACKGROUND**

The Project proposed by the Hong Kong and China Gas Company Limited comprises the construction of a new gas pipeline network from To Kwa Wan to North Point so as to replace the existing one affected by the proposed Cruise Terminal dredging works adjacent to the former Kai Tak runway and the proposed Central Kowloon Route crossing the Kowloon Bay at To Kwa Wan.

The EIA report (*Register No.: AEIAR-153/2010*) for the Project was approved by the Director of Environmental Protection (DEP) on 2 August 2010 under the Environmental Impact Assessment Ordinance (EIAO). Subsequent to the approval of the EIA, an EP (*Permit No. EP-401/2010*) for the Project was granted by the DEP on 6 October 2010.

2.2 **GENERAL SITE DESCRIPTION**

The Project involves the construction of the twin submarine gas pipelines across the Victoria Harbour from To Kwa Wan to North Point and the construction of the land gas pipelines and pigging stations for pigging operation at both To Kwa Wan and North Point.

2.3 **CONSTRUCTION ACTIVITIES UNDERTAKEN DURING THE REPORTING PERIOD**

A summary of the major construction activities undertaken in the reporting period is shown in *Table 2.1*. The locations of the construction activities are shown in *Annex A*.

Table 2.1 Summary of Construction Activities Undertaken in Reporting Period

Construction Activities Undertaken
<p>Marine works (Submarine Pipeline):</p> <ul style="list-style-type: none"> • Completion of armour rock backfilling for the 450mm diameter submarine pipelines; • Completion of pipe laying and concrete surround for Y-line and X-line up to the test pit at To Kwa Wan Works Area; • Completion of excavation of test pits for 450mm diameter pipelines at To Kwa Wan Works Area; • Completion of repair works of 450mm diameter submarine pipeline Y-line at North Point Cofferdam; and • Completion of concrete surround of 450mm diameter submarine pipeline riser (Y-line).
<p>Landmains (To Kwa Wan and North Point):</p> <ul style="list-style-type: none"> • Completion of final testing of 600mm diameter pipeline; and • Completion of reinstatement of 600mm diameter pipeline test pits at Chi Kiang Street and To Kwa Wan Works Area.
<p>Works Area (To Kwa Wan):</p> <ul style="list-style-type: none"> • Completion of intermediate test; • Substantial completion of installation of ICCP system; • Completion of concrete surround of the submarine pipelines within To Kwa Wan Works Area; • Completion of reinstatement of seawall blocks at To Kwa Wan cofferdam; • Completion of reinstatement of granite facing stone at To Kwa Wan cofferdam; and • Completion of extraction and concreting of pipe piles at To Kwa Wan cofferdam.

2.4 STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS

A summary of the valid permits, licences and notifications on environmental protection for this Project is presented in *Table 2.2*.

Table 2.2 Summary of Environmental Licensing, Notification and Permit Status

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Environmental Permit	EP-401/2010	Throughout the Contract	Permit granted on 6 October 2010
Notification of Commencement of Works	Ref No. 1123/01.01/12/0233/L	Throughout the Contract	-
Water Discharge License (North Point)	WT00012521-2012	Till 31 March 2017	Wastewater discharge licence was issued by EPD on 22 March 2012
Water Discharge License (To Kwa Wan)	WT00012299-2012	Till 30 April 2017	Wastewater discharge licence was issued by EPD on 25 April 2012
Construction Noise Permit (Marine works)	GW-RE0486-12	Till 17 December 2012; Expired; new permit granted	Issued on 20 June 2012
Construction Noise Permit (Marine works)	GW-RE0976-12	Till 9 March 2013; Expired; new permit granted	Issued on 13 November 2012

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Construction Noise Permit (Marine works)	GW-RE0193-13	Till 9 April 2013; Expired; new permit granted	Issued on 1 March 2013
Construction Noise Permit (Marine works)	GW-RE0313-13	Till 9 August 2013; Expired; new permit granted	Issued on 27 March 2013
Construction Noise Permit (Marine works)	GW-RE0570-13	Till 25 July 2013; Expired; new permit granted	Issued on 15 June 2013
Construction Noise Permit (Marine works)	GW-RS0761-13	Till 11 September 2013; Expired; new permit granted	Issued on 10 July 2013
Construction Noise Permit (Marine works)	GW-RE1014-13	Till 16 December 2013; Expired; new permit granted	Issued on 18 September 2013
Construction Noise Permit (Marine works)	GW-RS1115-13	Till 31 December 2013; Expired; new permit granted	Issued on 10 October 2013
Construction Noise Permit (Marine works)	GW-RE0069-14	Till 30 April 2014; Expired; new permit granted	Issued on 20 January 2014
Construction Noise Permit (Marine works)	GW-RE0391-14	Till 31 October 2014	Issued on 8 April 2014
Chemical Waste Producer Registration	5213-244-M2830-01	Throughout the Contract	License approved on 17 February 2012
Marine Dumping Permit (Sediment Type 1, Cheung Chau South)	EP/MD/12-125	Till 14 November 2012; Expired; new permit granted	Issued on 15 May 2012
Marine Dumping Permit (Sediment Type 1, Cheung Chau South)	EP/MD/13-102	Till 17 June 2013; Expired; Expired; new permit granted	Issued on 17 December 2012
Marine Dumping Permit (Sediment Type 1, Cheung Chau South)	EP/MD/14-028	Till 25 December 2013; Expired	Issued on 26 June 2013
Marine Dumping Permit (Sediment Type 1, East Ninepin)	EP/MD/13-012	Till 30 September 2012; Expired	Issued on 29 May 2012
Marine Dumping Permit (Sediment Type 2, East Sha Chau)	EP/MD/13-023	Till 17 July 2012; Expired; new permit granted	Issued on 15 June 2012
Marine Dumping Permit (Sediment Type 2, East Sha Chau)	EP/MD/13-042	Till 17 August 2012; Expired; new permit granted	Issued on 17 July 2012
Marine Dumping Permit (Sediment Type 2, East Sha Chau)	EP/MD/13-054	Till 20 September 2012; Expired; new permit granted	Issued on 20 August 2012
Marine Dumping Permit (Sediment Type 2, East Sha Chau)	EP/MD/13-078	Till 8 November 2012; Expired; new permit granted	Issued on 8 October 2012

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Marine Dumping Permit (Sediment Type 2, East Sha Chau)	EP/MD/13-090	Till 8 December 2012; Expired; new permit granted	Issued on 8 November 2012
Marine Dumping Permit (Sediment Type 2, East Sha Chau)	EP/MD/13-136	Till 21 April 2013; Expired; new permit granted	Issued on 21 March 2013
Marine Dumping Permit (Sediment Type 2, East Sha Chau)	EP/MD/14-004	Till 31 May 2013; Expired	Issued on 30 April 2013
Marine Dumping Permit (Sediment Type 3, East Sha Chau)	EP/MD/12-127	Till 8 September 2012; Expired; new permit granted	Issued on 8 August 2012
Marine Dumping Permit (Sediment Type 3, East Sha Chau)	EP/MD/13-067	Till 24 October 2012; Expired	Issued on 25 September 2012

3 EM&A REQUIREMENTS

3.1 MARINE WATER QUALITY MONITORING

3.1.1 Water Quality Parameters

The parameters measured *in situ* were:

- Dissolved Oxygen (DO) (% saturation and mg L⁻¹)
- Salinity (ppt)
- Temperature (°C)
- Turbidity (NTU)

The only parameter to be measured in the laboratory was:

- Suspended solids (SS) (mg L⁻¹)

In addition to the water quality parameters, other relevant data were measured and recorded in Water Quality Monitoring Logs, including monitoring location, time, tidal stages, weather conditions and any special phenomenon or work underway at the construction site that may influence the monitoring results.

3.1.2 Monitoring Equipment

Table 3.1 summaries the equipment used for the water quality monitoring.

Table 3.1 Equipment used during the Water Quality Monitoring Programme

Equipment	Model
Global Positioning Device	Garmin etrex 10
Water Depth Detector (Echo sounder)	Speedtech Instrument SM-5A
Water Sampler	1510 Kemmerer Water Sampler
Salinity, DO, Temperature Measuring Meter	YSI Pro 2030
Turbidity Meter	HACH Model 2100Q Turbidimeter

3.1.3 Sampling / Testing Protocol

All *in situ* monitoring instruments were checked, calibrated and certified by the analytical laboratory before use (see calibration reports in Annex F) ⁽¹⁾. Responses of sensors and electrodes were checked with certified standard solutions before each use.

Wet bulb calibration for a DO probe was carried out at least once per monitoring day. A zero check in distilled water was performed with the

(1) Baseline water quality monitoring was undertaken by the HOKLAS accredited laboratory ETS-Testconsult Ltd.

turbidity probe at least once per monitoring day. The probe was calibrated with a solution of known NTU. In addition, the turbidity probe was calibrated at least twice per month to establish the relationship between turbidity readings (in NTU) and levels of suspended solids (in mg L⁻¹).

On-site calibration of equipment was also carried out following the “*Guide to On-Site Test Methods for the Analysis of Waters*”, BS 1427:1993 to check the responses of sensors and electrodes using certified standard solutions before each use. Sufficient stocks of spare parts were maintained for replacements when necessary. Backup monitoring equipment was made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.

Water samples for SS measurements were collected in high density polythene, packed in ice (cooled to 4 °C without being frozen) and delivered to the analytical laboratory as soon as possible after collection.

3.1.4 Laboratory Measurement and Analysis

Analysis of SS was carried out in a HOKLAS accredited laboratory ⁽¹⁾. Water samples of about 1 L were collected at the monitoring stations for carrying out the laboratory SS determination. The SS determination work started within 24 hours after the collection of the water samples. The SS analyses followed the standard method APHA 2540D with a detection limit of 1 mgL⁻¹ as described in *APHA Standard Methods for the Examination of Water and Wastewater, 21st Edition*, unless specified.

Quality Assurance/ Quality Control (QA/ QC) details (such as blank, spike recovery, number of duplicate samples per batch etc) were provided in accordance with requirements of HOKLAS (details refer to *Annex G*).

3.1.5 Sampling Depths & Replication

Each station was sampled and measurements/ water samples were taken at three depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth was less than 6 m, the mid-depth station may be omitted. For stations that were less than 3 m in depth, only the mid-depth sample was taken.

For *in situ* measurements, duplicate readings were made at each water depth at each station. Duplicate water samples were collected at each water depth at each station.

3.1.6 Monitoring Locations and Frequency

Impact water quality monitoring was conducted during the marine works period at the monitoring stations listed in *Table 3.2* and shown in *Annex B1*. Post-construction water quality monitoring was conducted for four weeks at the same monitoring locations and frequency as impact water quality

⁽¹⁾ Marine water quality monitoring was undertaken by the HOKLAS accredited laboratory ETS-Testconsult Ltd.

monitoring after the substantial completion of marine construction activities on 3 July 2014.

Table 3.2 *Water Quality Monitoring Stations*

Monitoring Station	Area	Easting	Northing
WM1	Tai Wan WSD Seawater Intake	837818.8258	818059.9297
WM2	City Garden	838278.6734	817209.9656
WM3	Provident Centre	838443.5777	817233.5234
WM4	North Point Government Offices	839536.1868	817215.6195
WM5	Quarry Bay WSD Seawater Intake	839781.4231	817107.8097
WM6	Taikoo Place	840026.6594	817000
C1	Control Station	836625.9264	817422.6424
C2	Control Station	836747.9445	816670.1762
C3	Control Station	840810.5828	817825.8986
C4	Control Station	840432.5877	816920.1674

In accordance with the EM&A Manual, marine water quality monitoring were conducted at six Water Sensitive Receivers (WM1, WM2, WM3, WM4, WM5 and WM6) as well as four Control stations (C1, C2, C3 and C4) (Table 3.2) at a frequency of three times a week during the marine works period and during the post-construction period for the Project. Monitoring was undertaken at mid-flood and mid-ebb tides during each monitoring day. The interval between two sets of consecutive monitoring was not less than 36 hours.

For scheduling, references were made to the predicted tides at Quarry Bay, which is the tidal station nearest to the Project Site, published on the website of the Hong Kong Observatory ⁽¹⁾. Schedule for impact monitoring during this reporting period had been submitted to the Contractor, IEC, Engineer Representative (ER) and Environmental Protection Department (EPD) prior to the commencement of the monitoring works (Annexes B2 and B3).

3.1.7 *Water Quality Compliance*

Water quality monitoring data were evaluated against Action and Limit Levels during the marine works period. The proposed Action and Limit Levels which were determined from the baseline water quality monitoring results are shown in Table 3.3.

In the event that the levels are exceeded, appropriate actions in the Event and Action Plan (Annex D1) should be undertaken and a review of works will be carried out by the Contractor(s).

(1) Hong Kong Observatory (2012) <http://www.hko.gov.hk/tide/eQUBtide.htm> [Accessed in March 2012]

Table 3.3 Action and Limit Levels for Water Quality ^(e)

Parameters	Action Level	Limit Level
DO in mg L ⁻¹ (Surface, Middle & Bottom)	<i>WSD Seawater Intakes</i> 2 mg L ⁻¹	Surface and Middle <i>WSD Seawater Intake</i> 2 mg L ⁻¹
	<i>Other Impact Monitoring Stations</i> 5 percentile of baseline data, i.e. 7.79 mg L ⁻¹	<i>Other Impact Monitoring Stations</i> 4 mg L ⁻¹ or 1 percentile of baseline data, i.e. 7.46 mg L ⁻¹
		Bottom <i>Impact Monitoring Stations</i> 2 mg L ⁻¹ or 1 percentile of baseline data, i.e. 7.66 mg L ⁻¹
SS in mg L ⁻¹ (depth-averaged)	<i>WSD Seawater Intakes</i> 10 mg L ⁻¹	<i>WSD Seawater Intake</i> 10 mg L ⁻¹
	<i>Other Impact Monitoring Stations</i> 95 percentile of baseline data, i.e. 5.13 mg L ⁻¹ or 120% of upstream control station at the same tide of the same day	<i>Other Impact Monitoring Stations</i> 99 percentile of baseline data, i.e. 5.53 mg L ⁻¹ or 130% of upstream control station at the same tide of the same day
Turbidity (depth-averaged)	<i>WSD Seawater Intakes</i> 10 NTU	<i>WSD Seawater Intakes</i> 10 NTU
	<i>Other Impact Monitoring Stations</i> 95 percentile of baseline data, i.e. 3.71 NTU or 120% of upstream control station at the same tide of the same day	<i>Other Impact Monitoring Stations</i> 99 percentile of baseline data, i.e. 4.03 NTU or 130% of upstream control station at the same tide of the same day

Notes:

- (a) "Depth-averaged" is calculated by taking the arithmetic means of the readings of the three depths.
- (b) For DO measurement, non-compliance occurs when monitoring result is lower than the limits.
- (c) For SS and turbidity, non-compliance of water quality results when monitoring results is higher than the limits.
- (d) All the figures given in the table are used for reference only the EPD may amend the as whenever necessary.
- (e) The levels of SS, Turbidity and DO were confirmed to be similar amongst monitoring stations by statistical analysis. Therefore, the calculation of Action and Limit Levels was based on baseline monitoring data collected from all monitoring stations and the same set of Action and Limit Levels will be adopted for the *Impact Monitoring Stations* (ie not including the *WSD Seawater Intakes* and *Control Stations*).

3.2 AIR BORNE NOISE MONITORING

3.2.1 Monitoring Location

In accordance with the EM&A Manual, monitoring of construction noise impact should be conducted at the designated monitoring stations. The construction noise monitoring location for this Project is listed in *Table 3.4* and is shown in *Annexes C1 and C2*.

Table 3.4 *Noise Monitoring Location*

Monitoring Station	Area	Description
SCH02	To Kwa Wan	CCC Kei To Secondary School
FSQ	North Point	North Point Fire Services Married Quarters

3.2.2 Monitoring Parameter and Frequency

Weekly construction noise monitoring was conducted in accordance with the requirements stipulated in the EM&A Manual. The monitoring programme for this reporting period is shown in *Annex C3*.

The construction noise levels were measured in terms of A-weighted equivalent continuous sound pressure level (L_{eq}) in decibels dB(A). $L_{eq(30min)}$ was used as the monitoring parameter for the period in between 0700 – 1900 hours on normal weekdays. In order to obtain supplementary information for data auditing, two statistical sound levels L_{10} and L_{90} (ie the levels exceeded for 10 and 90 percent of the time, respectively), were also recorded during the monitoring for reference. The measured noise levels were logged in every 5 minutes throughout the impact monitoring period.

3.2.3 Action and Limit Levels

The Action and Limit levels for noise monitoring during different monitoring periods are summarised in *Table 3.5*.

Table 3.5 *Summary of Action and Limit Levels for Construction Noise*

Time Period	Action Level	Limit Level (dB(A))
0700-1900 hrs on normal weekdays	When one documented compliant is received	75*
1900-2300 hrs on normal weekdays	When one documented compliant is received	70
Restricted hours (2300-0700 hrs)	When one documented compliant is received	55

Note:

* 70 dB(A) for schools and 65 dB(A) during school examination periods.

3.2.4 Monitoring Equipment and Methodology

Construction noise measurements were conducted in accordance with the calibration and measurement procedures as stated in *Annex – General Calibration and Measurement Procedures of Technical Memorandum on Noise from*

Construction Work other than Percussive Piling (GW-TM) issued under the Noise Control Ordinance (NCO) (Cap. 400).

The sound level meters and calibrator used for the noise measurement, as listed in *Table 3.6*, complied with *IEC 651: 1979 and 804:1985 (Type 1)* specification. The calibration certificates of the sound level meter and calibrator are included in *Annex F*.

Table 3.6 **Noise Monitoring Equipment**

Monitoring Station	Monitoring Equipment (Sound Level Meter and Calibrator)
SCH02	Rion NL-18 (S/N 00360030), NL-52 (S/N 00331805), NC-73 (S/N 10997142)
FSQ	Rion NL-52 (S/N 00131627), NC-73 (S/N 10997142)

Immediately before and after the noise measurements, the accuracy of the measurement equipment was checked using an acoustic calibrator generating a known sound pressure level at a known frequency.

3.2.5 **Event and Action Plan**

The Event and Action Plan (EAP) for noise monitoring is presented in *Annex D2*.

IMPLEMENTATION STATUS ON ENVIRONMENTAL MITIGATION MEASURES

The Contractor has implemented environmental mitigation measures and requirements as stated in the EIA Report, EP and EM&A Manual. The implementation status during the reporting period is summarised in *Annex E*.

5.1 SITE INSPECTIONS & AUDITS

Weekly site inspections were conducted by representatives of the Contractor and the ET on 4, 10, 17 and 23 July 2014. Joint site inspection was conducted by the Contractor, the ET, the Resident Engineer (RE) and the IEC on 29 July 2014.

Major observations during the reporting period were summarised as follows:

4 July 2014

- To Kwa Wan Land-based Site:
 - Two of the drip trays containing generator and chemical drums were not plugged properly. The Contractor was advised to plug the drip trays properly at all times to prevent the surrounding soil from being contaminated.
 - Stagnant water was accumulated in one of the chemical drums. The Contractor was reminded to clear the stagnant water away in timely manner.
 - Excavated materials were not covered by tarpaulin sheet. The Contractor was reminded to cover any excavated material by the end of the working day.

10 July 2014

- To Kwa Wan Land-based Site:
 - One of the drip trays containing generator was still not plugged properly. The Contractor was advised to plug any drip trays in used properly at all times to prevent the surrounding soil from being contaminated.
 - Stagnant water was accumulated next to some covered excavated materials. The Contractor was reminded to carry out appropriate measure to prevent any water from accumulating at site.
 - General refuse was scattered within the site. The Contractor was reminded to maintain good house-keeping practice and get rid of those scattered general refuse more regularly.

17 July 2014

- To Kwa Wan Land-based Site:
 - One of the drip trays containing chemical drums was still not plugged properly. The Contractor was advised to plug any drip trays in used properly at all times to prevent the surrounding soil from being contaminated.

- General refuse was scattered within the site. The Contractor was reminded to maintain good house-keeping practice and get rid of those scattered general refuse more regularly.

23 July 2014

- To Kwa Wan Land-based Site:
 - Excavated materials were not covered properly by tarpaulin sheet. The Contractor was reminded to cover them by the end of the day.

29 July 2014

- North Point Construction Site:
 - A diesel container was found at the pigging station. The Contractor was reminded to remove it accordingly.
 - It was suggested to place sandbags or implement other mitigation measures at the edge of the seawall to prevent runoff for the coming concrete works.

5.2 *MARINE WATER QUALITY MONITORING*

In accordance with the requirements described in the EM&A Manual, marine water quality monitoring was conducted during periods when marine works were scheduled to be undertaken and for four weeks after substantial completion of marine construction works on 3 July 2014. Impact monitoring was undertaken on 3 July 2014 for marine works (see monitoring schedule for the present monitoring period in *Annex B2*) while post-construction monitoring was undertaken three times a week for four weeks from 5 to 31 July 2014 (see monitoring schedule for the present monitoring period in *Annex B3*). During the period of impact and post-project monitoring, weather condition was generally fine.

Monitoring results for impact and post-project monitoring are presented graphically in *Annexes B4 – B8* and key observations are described below.

DO levels from surface, mid-depth and bottom waters were generally similar amongst Control, Impact and WSD Seawater Intake stations, and DO levels were variable throughout the impact monitoring period which represented natural background fluctuation in water quality.

Similar to DO levels, turbidity and SS levels were generally similar amongst stations and variable throughout the impact monitoring period. Similar fluctuations were also observed during baseline monitoring and they are thus considered to be sporadic events and characteristic of water quality in this area of Hong Kong.

Exceedances were recorded on 3 July 2014. Exceedances in the Limit Levels of surface, mid-depth and bottom DO were observed. It is considered that the exceedances in DO levels are more likely to be representing natural background fluctuation in water quality rather than indicating any

unacceptable water quality impacts from the Project since exceedances were recorded when marine works were not being undertaken for the Project during mid-flood tide on 3 July 2014. In addition, the levels of DO at the Impact Stations where exceedances were recorded were similar to those at the Control Stations, which are far away from the Project area.

Following the review of monitoring data and marine works details in accordance with the procedures stipulated in the Event and Action Plan of the EM&A Manual, these exceedances were considered to be due to natural background variation in water quality characteristics.

The results from post-project monitoring indicated that DO levels, turbidity and SS levels were generally similar amongst stations and variable throughout the monitoring period. Similar fluctuations were also observed during baseline monitoring and they are thus considered to be sporadic events and characteristic of water quality in this area of Hong Kong.

Overall, it is considered that marine construction works of the Project did not appear to generate any unacceptable water quality impact during the monitoring period. The review of monitoring data and works activities undertaken suggested that marine works have proceeded in an environmentally acceptable manner.

5.3 *AIR BORNE NOISE MONITORING*

Thirty-minute construction noise measurements were carried out on 4, 10, 16, 23 and 31 July 2014 at monitoring station FSQ and on 3, 10, 17, 24 and 31 July 2014 at monitoring station SCH02 during normal working hours of the reporting period (see *Annex C3* for monitoring schedule).

The monitoring results together with graphical presentations are presented in *Annexes C4 – C7*. No exceedances of Action and Limit Level were recorded in the reporting period. The local impacts observed near the monitoring stations of SCH02 and FSQ were due to traffic noise from Sung On Street and Island Eastern Corridor, respectively.

Overall, it is considered that construction works of the Project did not appear to generate any unacceptable noise impact during the monitoring period.

5.4 *WASTE MANAGEMENT EM&A*

Waste generated from this Project includes inert construction and demolition (C&D) materials and non-inert C&D materials. Reference has been made to the Monthly Summary Waste Flow Table prepared by the Contractor (*Annex H*). The waste statistics provided in this section represent the cumulative quantity of wastes generated from all sites in this Project. With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting month are summarised in *Table 5.1*. During the reporting period of July 2014, 28.8 tonnes of inert C&D

materials were generated and reused in the Contract. 0.2 tonnes of non-inert C&D materials were generated in July 2014 and disposed of at the SENT Landfill.

Table 5.1 *Quantities of Waste Generated from the Project for all Sites*

Month / Year	Quantity					
	C&D Materials (inert) ^(a)	C&D Materials (non-inert)	Chemical Waste	Marine Deposit		
				Type 1	Type 2	Type 3
July 2014	28.8 tonnes ^(b)	0.2 tonnes ^(c)	0 L	0 m ³	0 m ³	0 m ³

Notes:

(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil.
(b) 28.8 tonnes of inert C&D Materials were generated and reused in the Contract in July 2014.
(c) The non-inert C&D materials consisted of 0.2 tonnes of general refuse generated in this reporting month.

6 ENVIRONMENTAL NON-COMFORMANCE

6.1 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

No non-compliance of EIA/ EM&A/ EP/ legislative requirements was recorded during the reporting period.

6.2 SUMMARY OF ENVIRONMENTAL COMPLAINT

No complaint was received during the reporting period. The cumulative complaint/summons/prosecution log is shown in *Annex I*.

6.3 SUMMARY OF ENVIRONMENTAL SUMMON AND SUCCESSFUL PROSECUTION

No summons/ prosecution was received during the reporting period. The cumulative compliant/summons/prosecution log is shown in *Annex I*.

7 FUTURE KEY ISSUES

7.1 CONSTRUCTION ACTIVITIES FOR THE COMING MONTH

Works to be undertaken for the coming monitoring periods are summarised in *Table 7.1*.

Table 7.1 Construction Works to be undertaken in the Coming Month

Works to be taken

- Seawall reinstatement above the high water mark;
 - Backfilling of land main; and
 - Final testing of submarine pipelines.
-

Potential environmental impacts arising from the above construction activities are mainly associated with dust, construction noise and waste management issues.

7.2 MONITORING SCHEDULE FOR THE COMING MONTH

The tentative schedules of noise monitoring for the next reporting period of August 2014 is presented in *Annex C8*. Noise monitoring will be conducted at the same monitoring locations in the next reporting period. Following completion of marine works on 3 July 2014 and the related post-construction water quality monitoring, no more marine water quality monitoring is scheduled to be undertaken for the Project. The monitoring programme has been reviewed and is considered adequate to cater for the nature of works in progress.

7.3 SOLID AND LIQUID WASTE MANAGEMENT STATUS

As the major construction works in the coming month are seawall reinstatement above the high water mark and backfilling of land main, waste generated from this Project for the coming month will include both inert and non-inert C&D materials. Part of the inert C&D materials will be stockpiled on site for reuse and the remaining will be disposed of at Tseung Kwan O Area 137 Fill Bank. Chemical waste will be stored at designated area and collected by a licensed collector. Sewage and wastewater will be reduced using proper site management such as the use of sedimentation tanks with sufficient capacity, vehicle and plant cleaning before leaving a construction site, etc (detailed in *Annex E*). General refuse generated from the Project will be disposed of at the SENT Landfill.

This 26th Monthly EM&A Report presents the EM&A programme undertaken during the reporting period from 1 to 31 July 2014 in accordance with EM&A Manual and requirements of the EP (EP-401/2010).

Impact and post-construction marine water quality monitoring were conducted in accordance with the requirements described in the EM&A Manual. Exceedances of Limit Levels for water quality were recorded in one (1) monitoring event in this reporting period. The review of monitoring data and works activities undertaken suggested that marine works have proceeded in an environmentally acceptable manner.

Thirty-minute construction noise measurements were carried out on 4, 10, 16, 23 and 31 July 2014 at monitoring station FSQ and on 3, 10, 17, 24 and 31 July 2014 at monitoring station SCH02 during normal working hours of the reporting period. No exceedances of the Action and Limit Levels were identified during the reporting period and it is considered that construction works of the Project did not appear to generate any unacceptable noise impact during the monitoring period.

Weekly site inspections were conducted in the reporting period. Mitigation measures recommended in the EIA/ EM&A manual/ EP were implemented by the Contractor. Follow-up actions for the observed environmental deficiency during the site inspections were taken as reported by the Contractor and observed in the next weekly site inspection conducted.

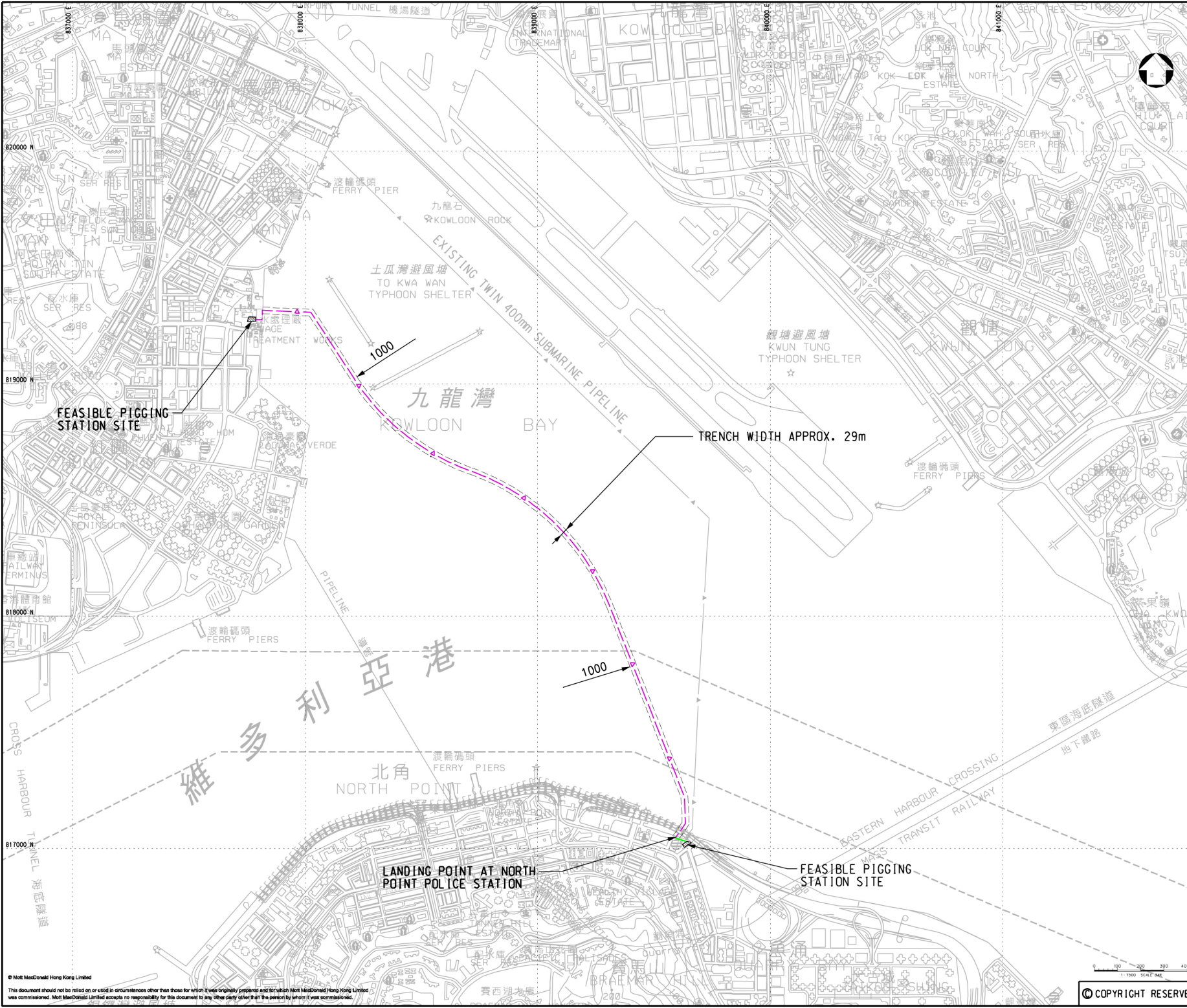
No non-compliance event was recorded during the reporting period.



No complaint and summons/prosecution was received during the reporting period.

The ET will keep track of the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures in the coming periods.

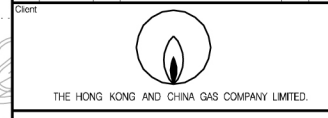
Annex A

Locations of Works Area



LEGEND:
 PROPOSED TWIN 450 SUBMARINE GAS MAIN
 CONNECTION TO NEW PIGGING STATION

P4	FEB 10	MING	GENERAL REVISION	FY	TI
P3	DEC 09	MING	GENERAL REVISION	BL	TI
P2	JUN 09	MING	MINOR AMENDMENT	BL	TI
P1	DEC 08	MING	FIRST ISSUE	BL	TI
Rev	Date	Drawn	Description	Chk'd	App'd



Project
INSTALLATION OF SUBMARINE GAS PIPELINES AND ASSOCIATED FACILITIES FROM TO KWA WAN TO NORTH POINT FOR FORMER KAI TAK AIRPORT DEVELOPMENT

Title
GENERAL LAYOUT

Designed	DL	Eng. Chk.	TT
Drawn	YKL	Coordination	DL
Dwg. Chk.	DL	Approved	TT
Scale	Project	Status	
1:7500@A1	237926	PRE	
Drawing No.	Project	Rev	
	237926/REPORT/ENR/EMBA MANUAL/002051/Figure 14.dwg		

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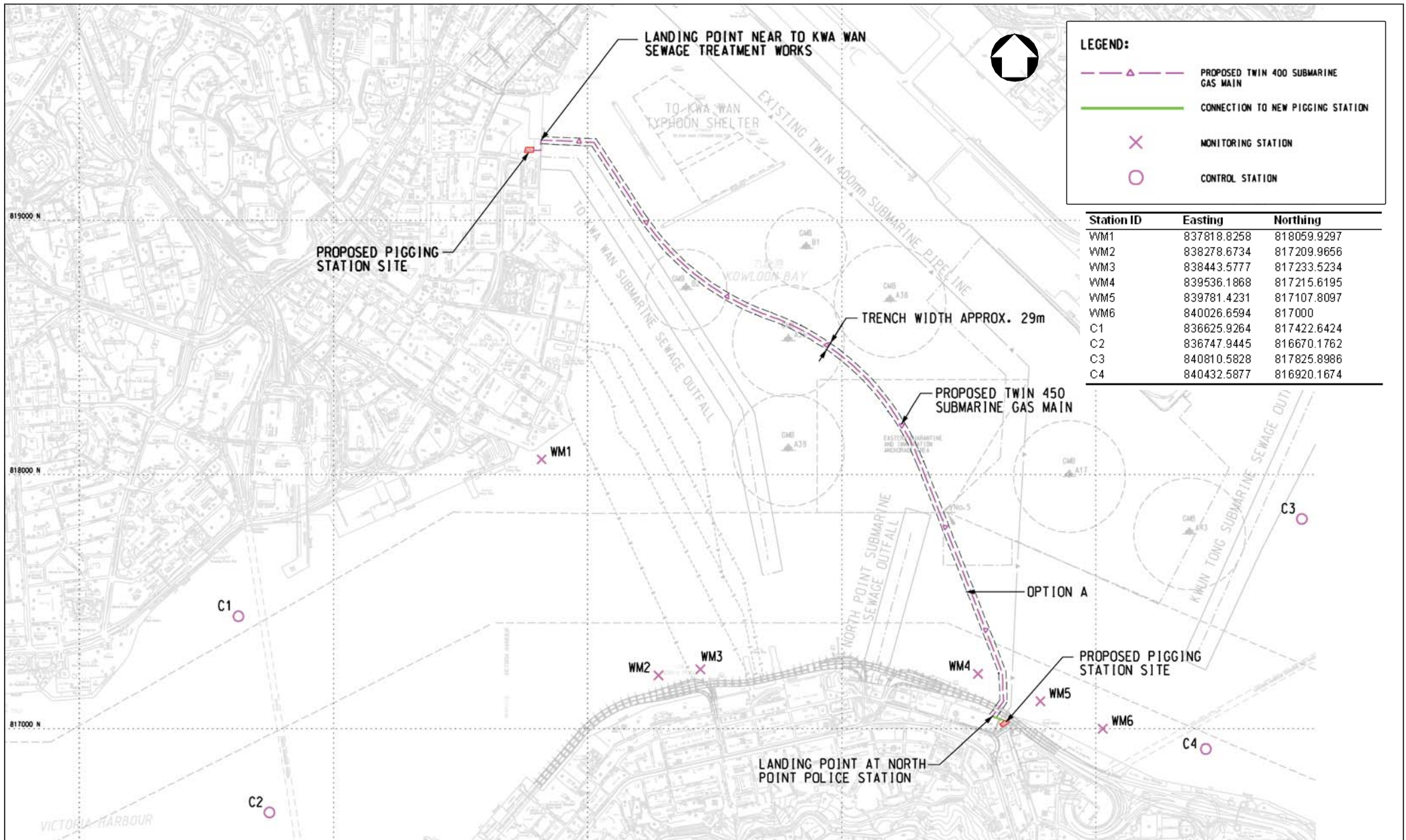
Annex A1

P4

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Annex B

Marine Water Quality Monitoring



Annex B1

Location of Water Quality Monitoring Stations

FILE: 0158059c
DATE: 03/04/2012

Environmental
Resources
Management



**Annex B2 Installation of Submarine Gas Pipelines and Associated Facilities
from To Kwa Wan to North Point for Former Kai Tak Airport Development
Impact Marine Water Quality Monitoring (WQM) Schedule (July 2014)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		public holiday 01-Jul	02-Jul	03-Jul	04-Jul	05-Jul
				WQM Mid-Flood 08:55 Mid-Ebb 15:39		
06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	11-Jul	12-Jul
13-Jul	14-Jul	15-Jul	16-Jul	17-Jul	18-Jul	19-Jul
20-Jul	21-Jul	22-Jul	23-Jul	24-Jul	25-Jul	26-Jul
27-Jul	28-Jul	29-Jul	30-Jul	31-Jul		

**Annex B3 Installation of Submarine Gas Pipelines and Associated Facilities
from To Kwa Wan to North Point for Former Kai Tak Airport Development
Post-Construction Marine Water Quality Monitoring (WQM) Schedule (July 2014)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		public holiday 01-Jul	02-Jul	03-Jul	04-Jul	05-Jul
						WQM Mid-Flood 10:37 Mid-Ebb 16:59
06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	11-Jul	12-Jul
		WQM Mid-Ebb 08:55 Mid-Flood 15:41		WQM Mid-Ebb 10:31 Mid-Flood 17:40		WQM Mid-Ebb 12:05 Mid-Flood 19:12
13-Jul	14-Jul	15-Jul	16-Jul	17-Jul	18-Jul	19-Jul
		WQM Mid-Flood 07:49 Mid-Ebb 14:28		WQM Mid-Flood 09:35 Mid-Ebb 16:00		WQM Mid-Flood 11:57 Mid-Ebb 17:53
20-Jul	21-Jul	22-Jul	23-Jul	24-Jul	25-Jul	26-Jul
		WQM Mid-Ebb 09:36 Mid-Flood 16:29		WQM Mid-Ebb 11:04 Mid-Flood 18:07		WQM Mid-Ebb 12:15 Mid-Flood 19:11
27-Jul	28-Jul	29-Jul	30-Jul	31-Jul		
		WQM Mid-Flood 07:07 Mid-Ebb 13:50		WQM Mid-Flood 08:22 Mid-Ebb 14:54		

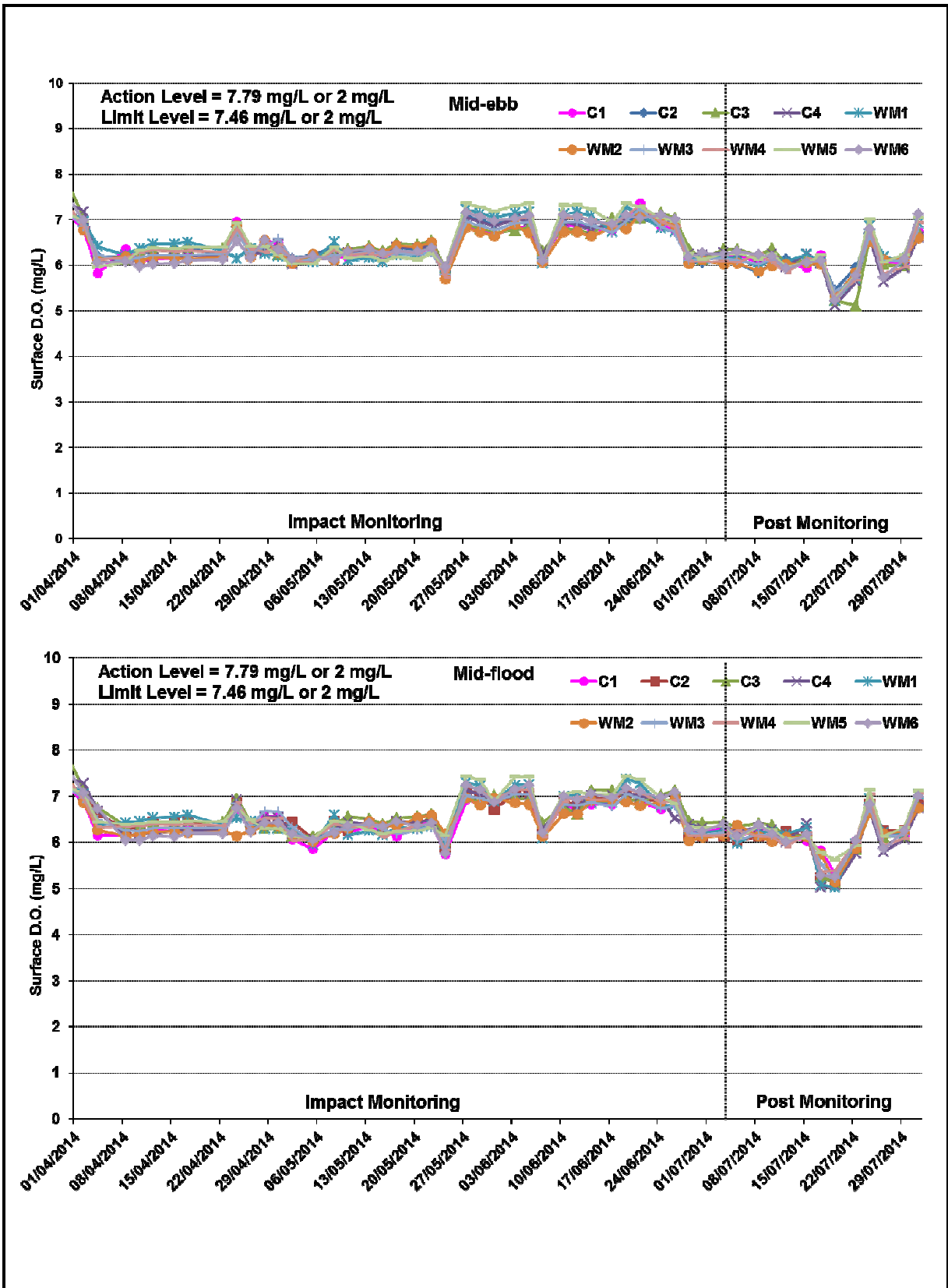


Figure B4 Impact and Post Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 April 2014 and 31 July 2014 at Monitoring Stations for Marine Works.

Ref: 0158059 Annex B3_Impact-WQ_Graph June to July 2014.xls



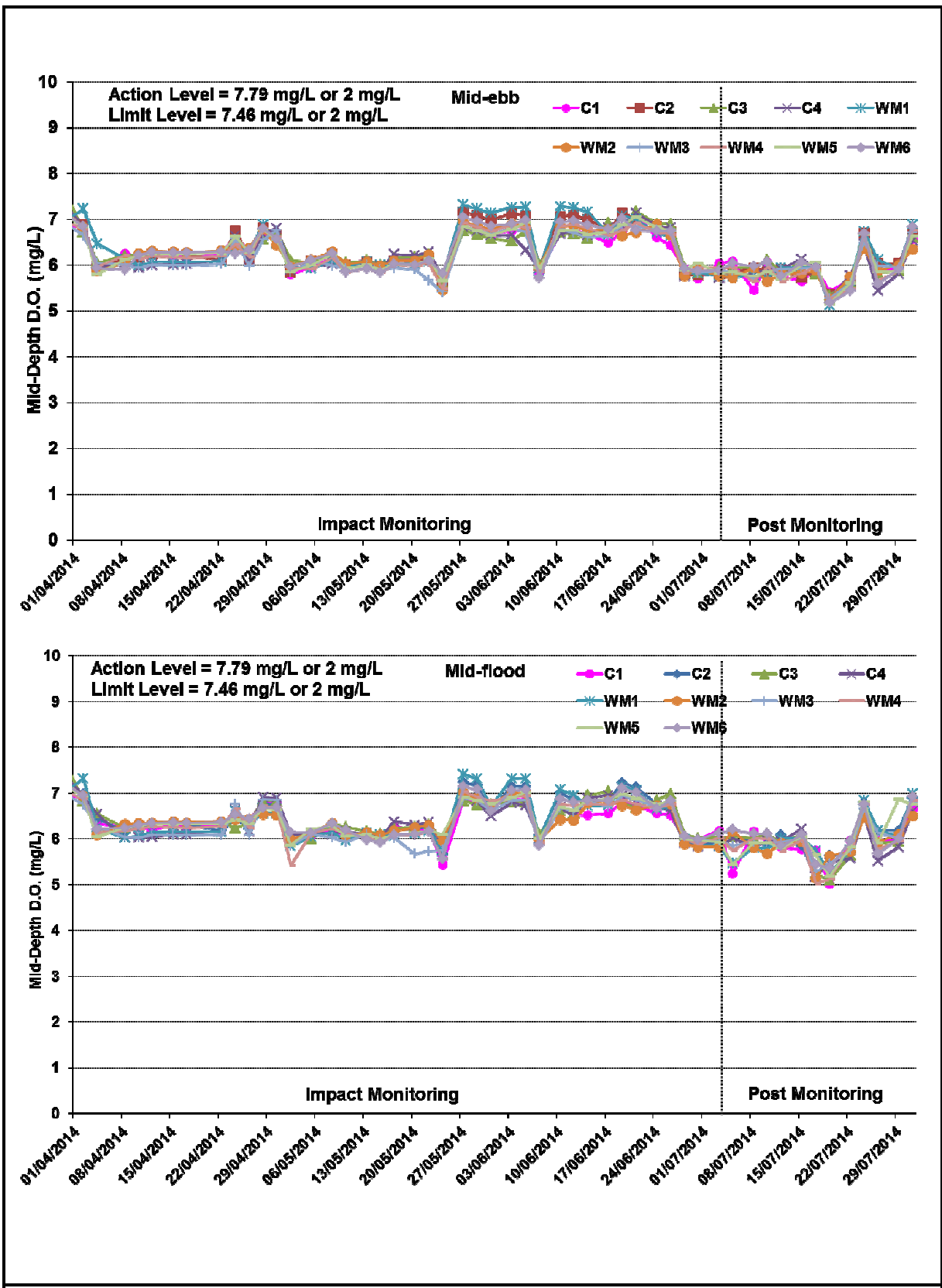


Figure B5 Impact and Post Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 April 2014 and 31 July 2014 at Monitoring Stations for Marine Works.

Ref: 0158059 Annex B3_Impact-WQ_Graph June to July 2014.xls



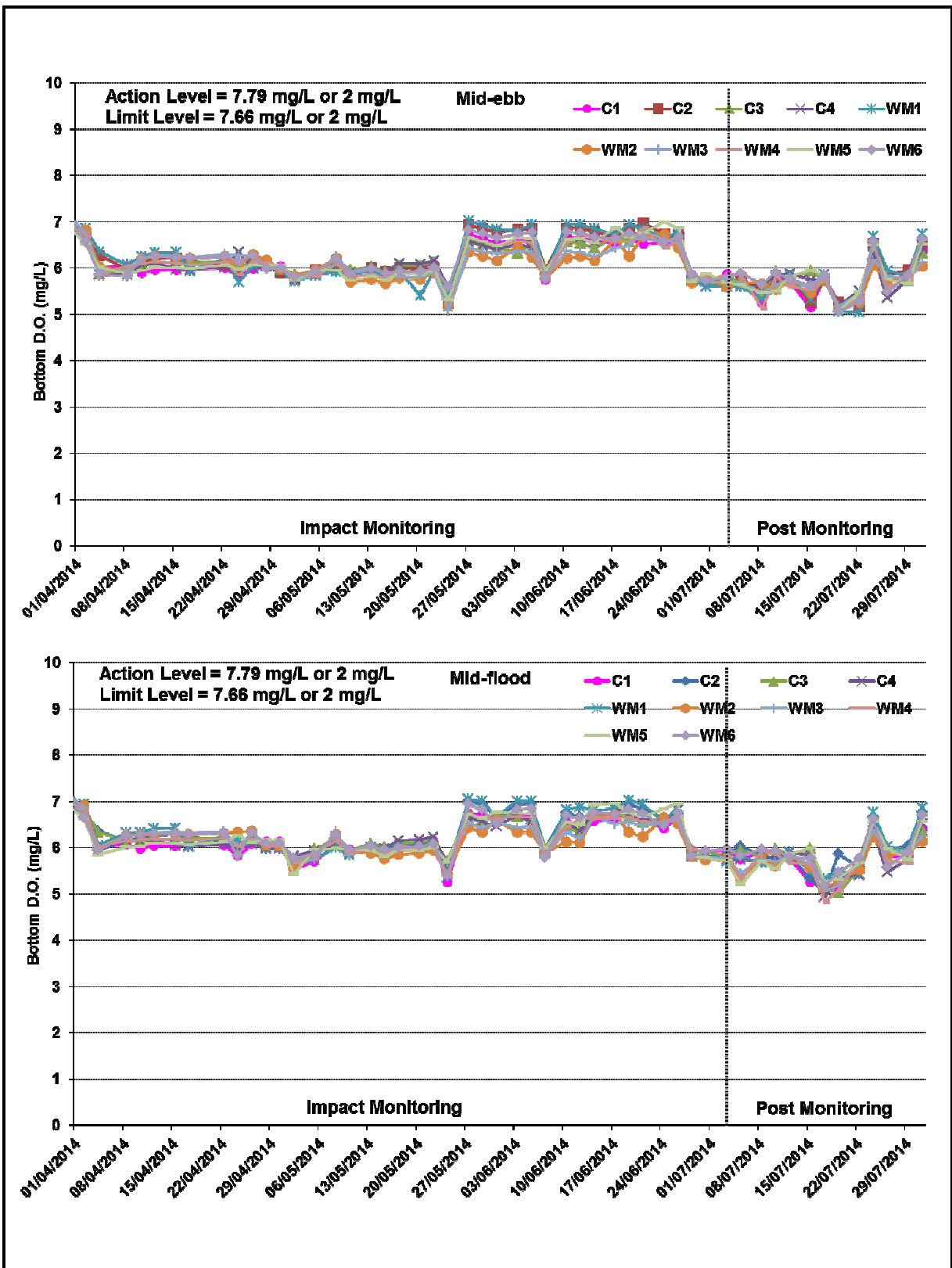


Figure B6 Impact and Post Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters between 1 April 2014 and 31 July 2014 at Monitoring Stations for Marine Works.

Ref: 0158059 Annex B3_Impact-WQ_Graph June to July 2014.xls



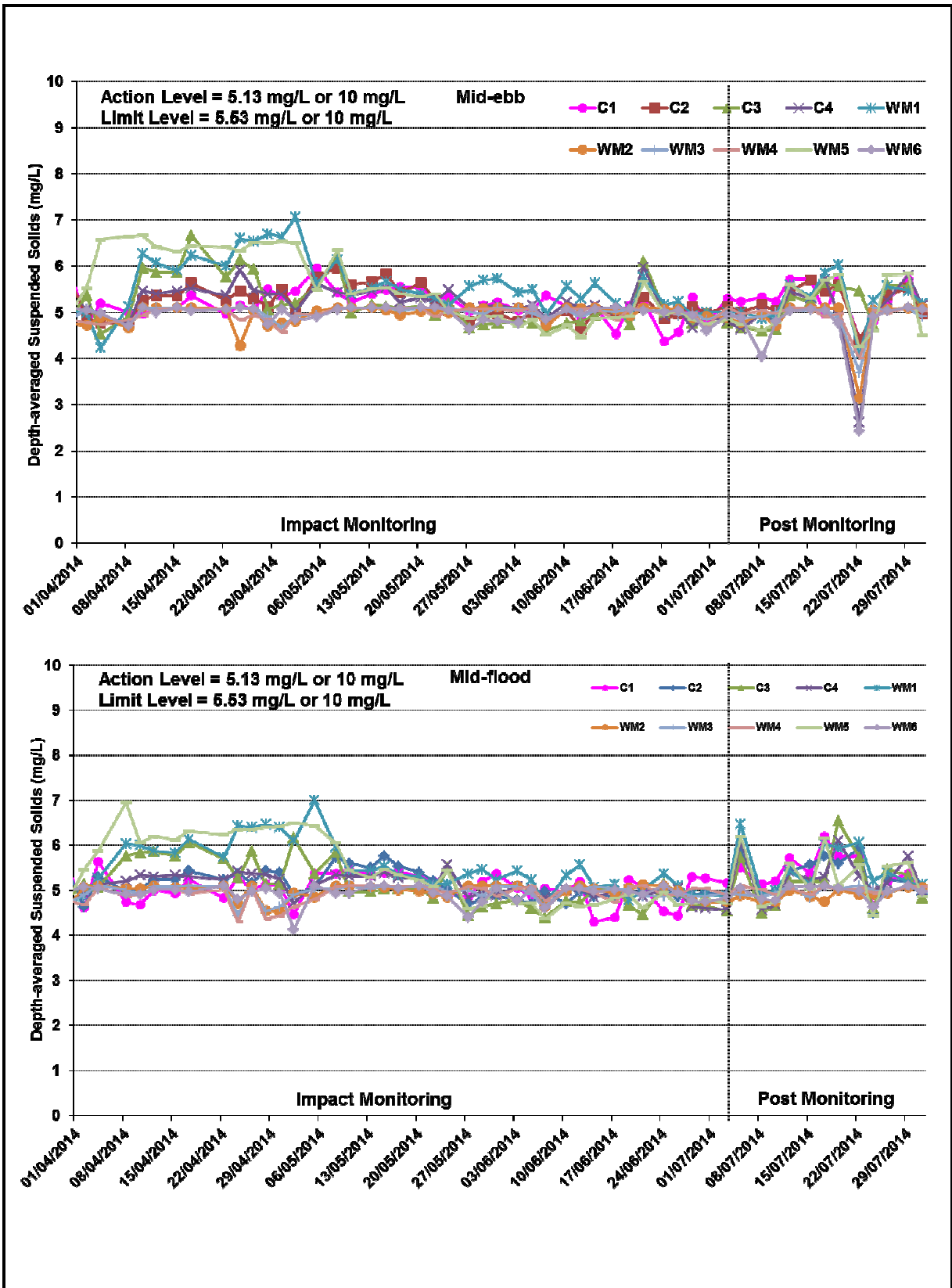


Figure B7 Impact and Post Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 April 2014 and 31 July 2014 at Monitoring Stations for Marine Works.

Ref: 0158059 Annex B3_Impact-WQ_Graph June to July 2014.xls



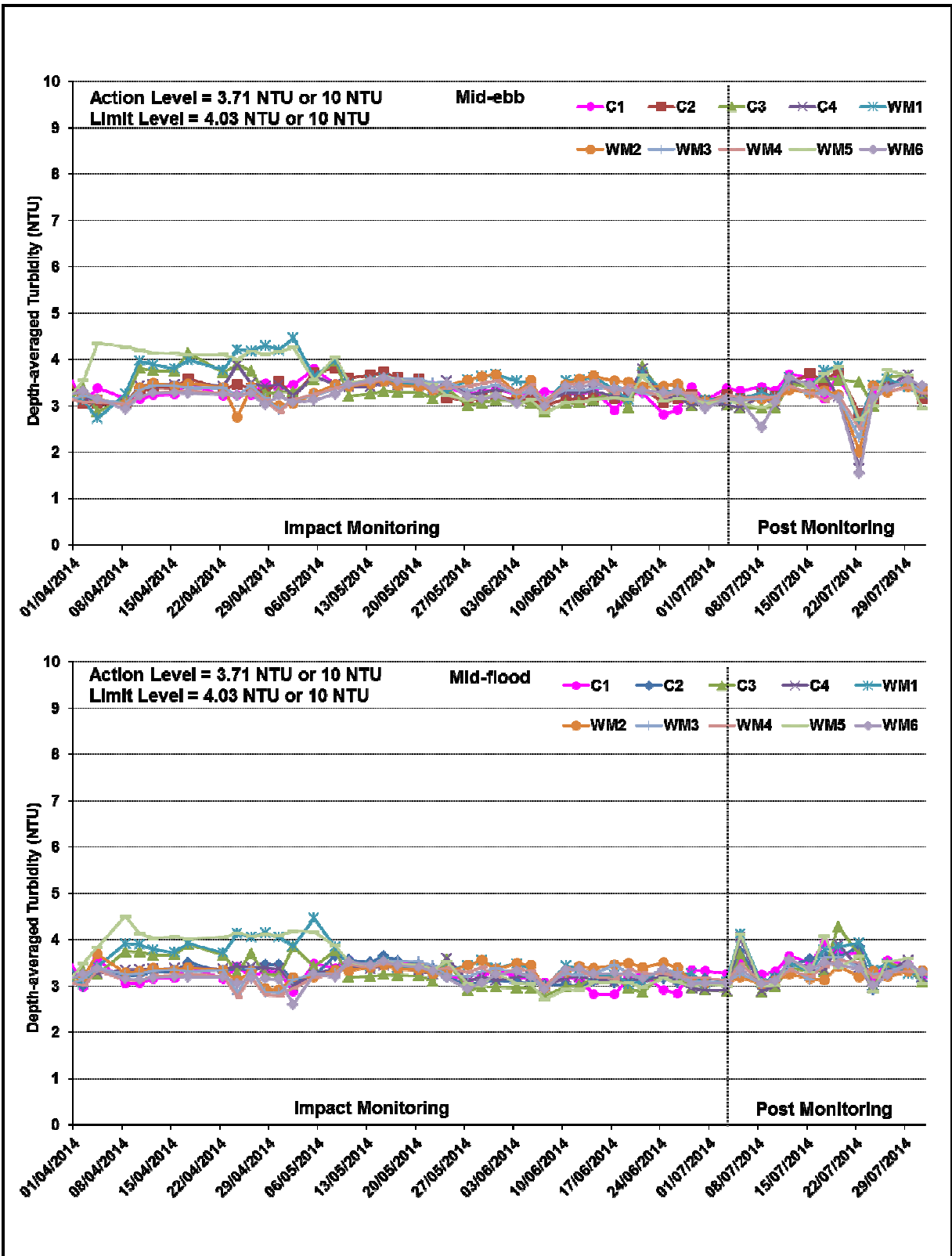


Figure B8 Impact and Post Monitoring – Mean Depth-averaged Level of Turbidity (NTU) between 1 April 2014 and 31 July 2014 at Monitoring Stations for Marine Works.

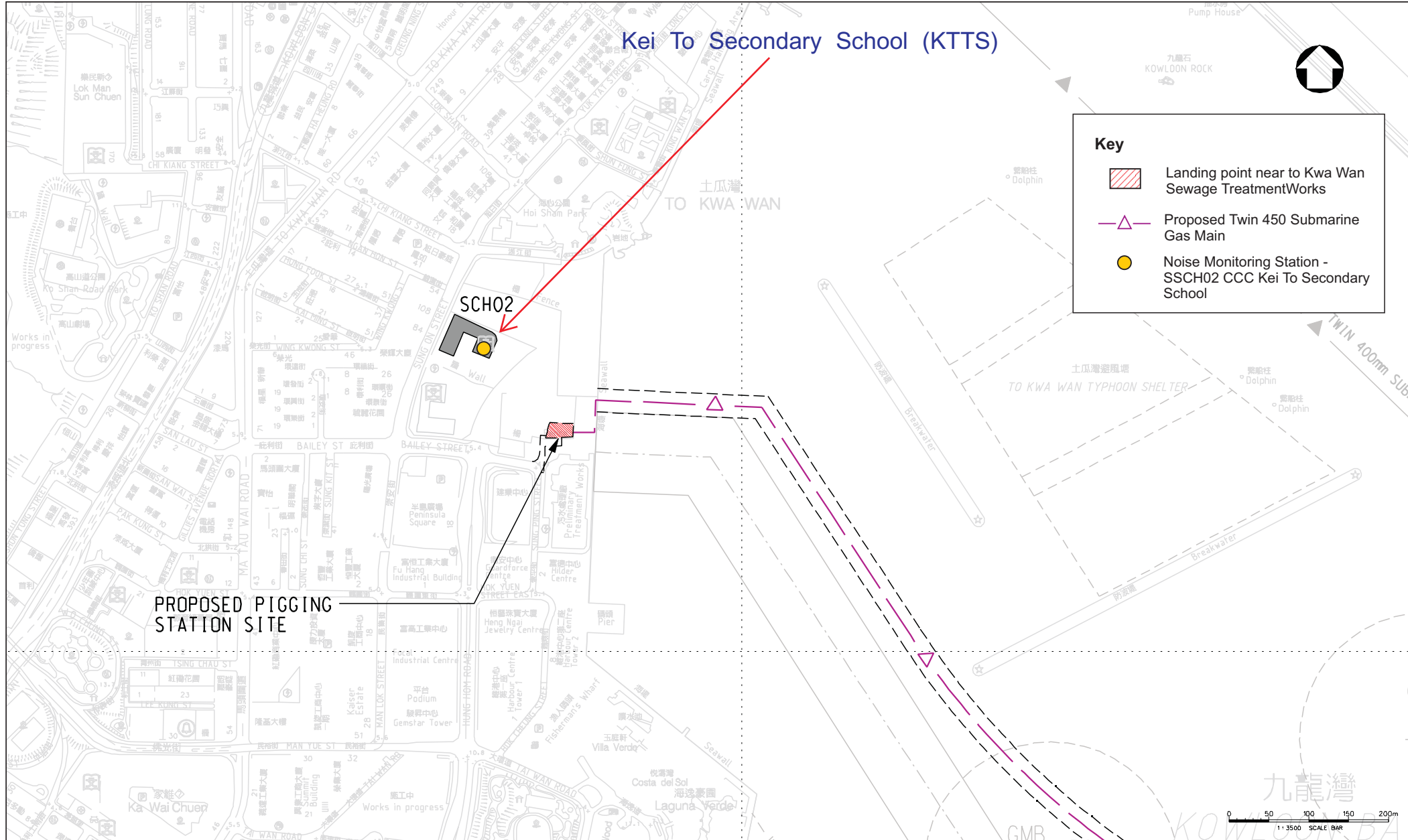
Ref: 0158059 Annex B3_Impact-WQ_Graph June to July 2014.xls



Annex C





Air Borne Noise Monitoring

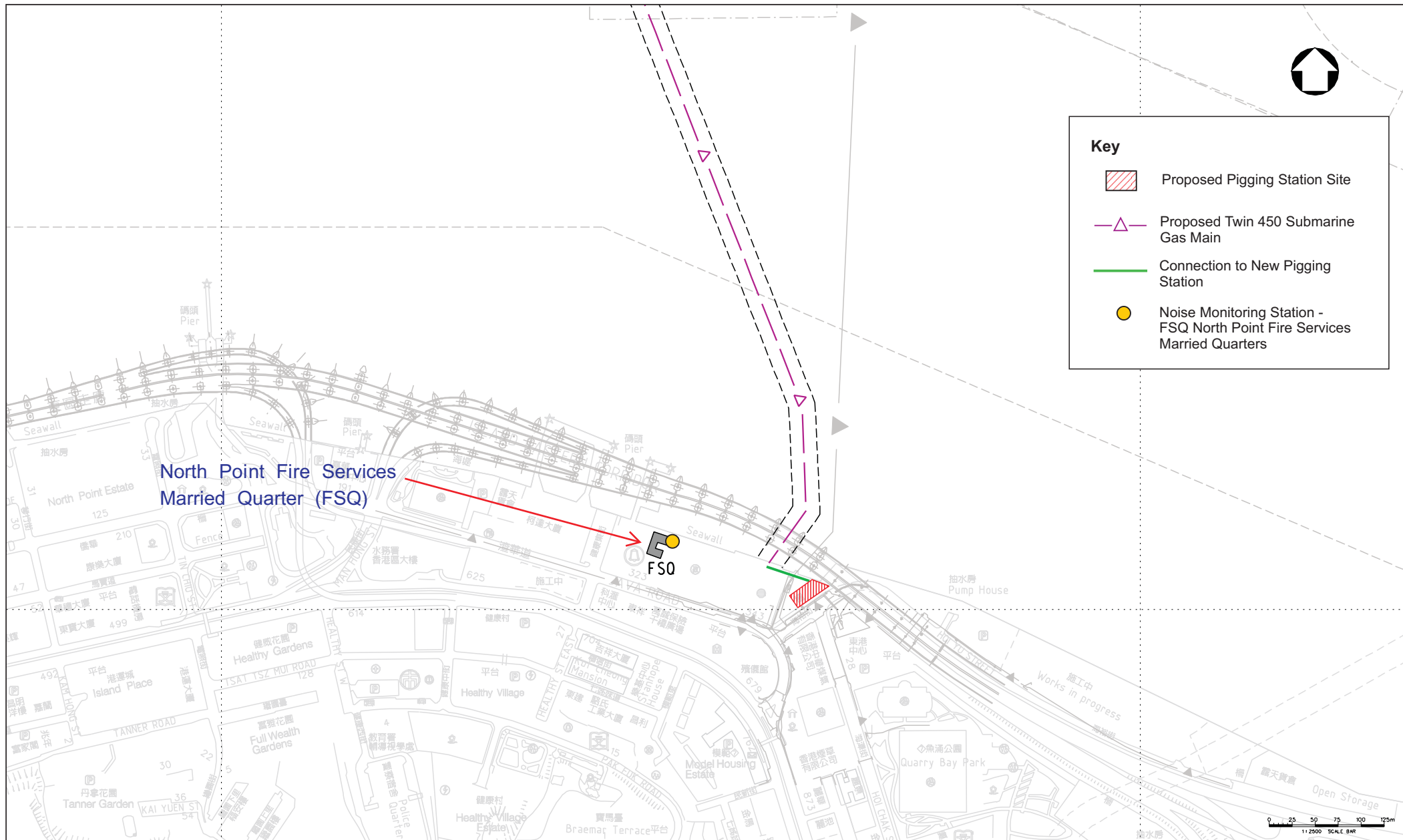
Kei To Secondary School (KTTS)





Key

-  Proposed Pigging Station Site
-  Proposed Twin 450 Submarine Gas Main
-  Connection to New Pigging Station
-  Noise Monitoring Station - FSQ North Point Fire Services Married Quarters



North Point Fire Services
Married Quarter (FSQ)

FSQ

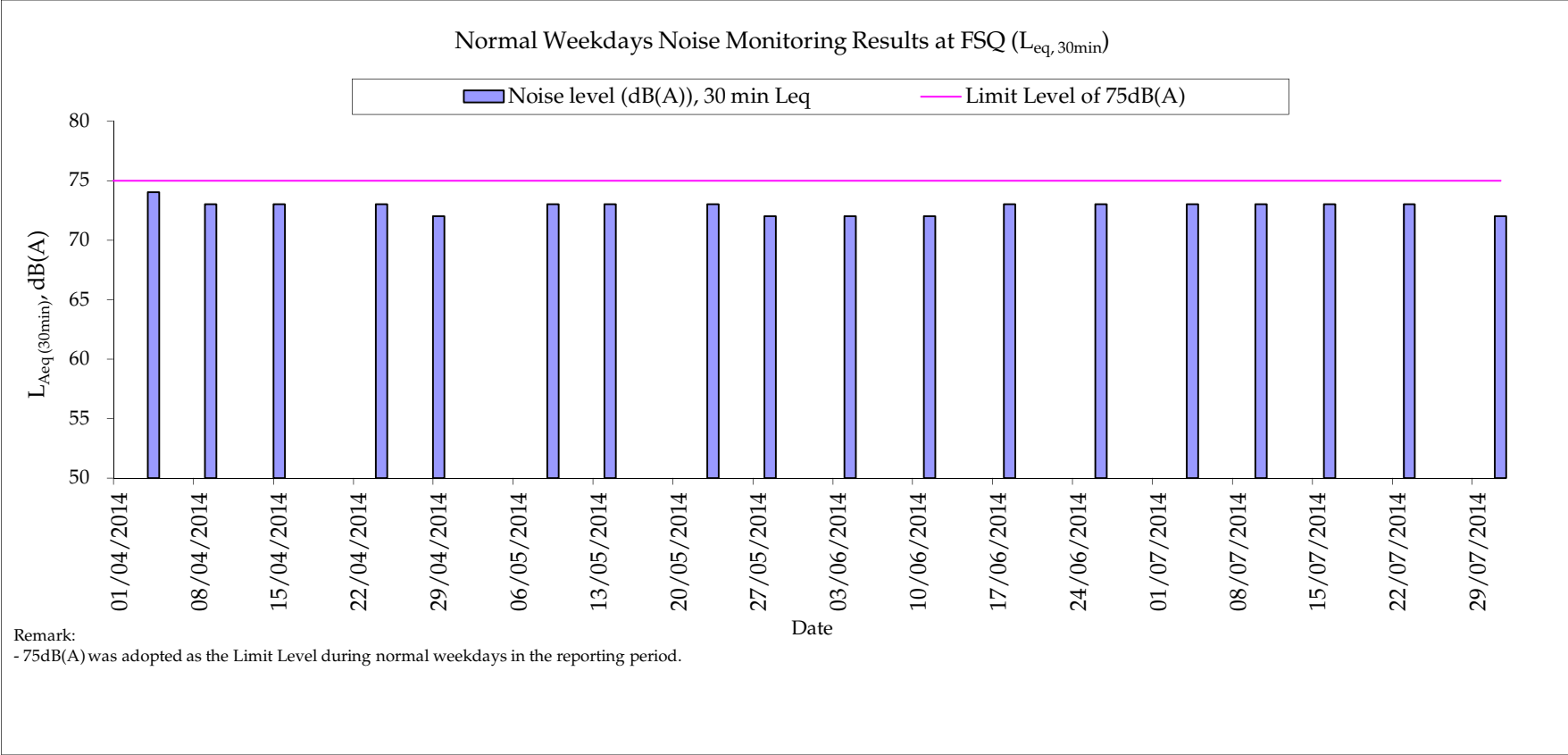
0 25 50 75 100 125m
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**Annex C3 Installation of Submarine Gas Pipelines and Associated Facilities
from To Kwa Wan to North Point for Former Kai Tak Airport Development
Impact Noise Monitoring Schedule (July 2014)**

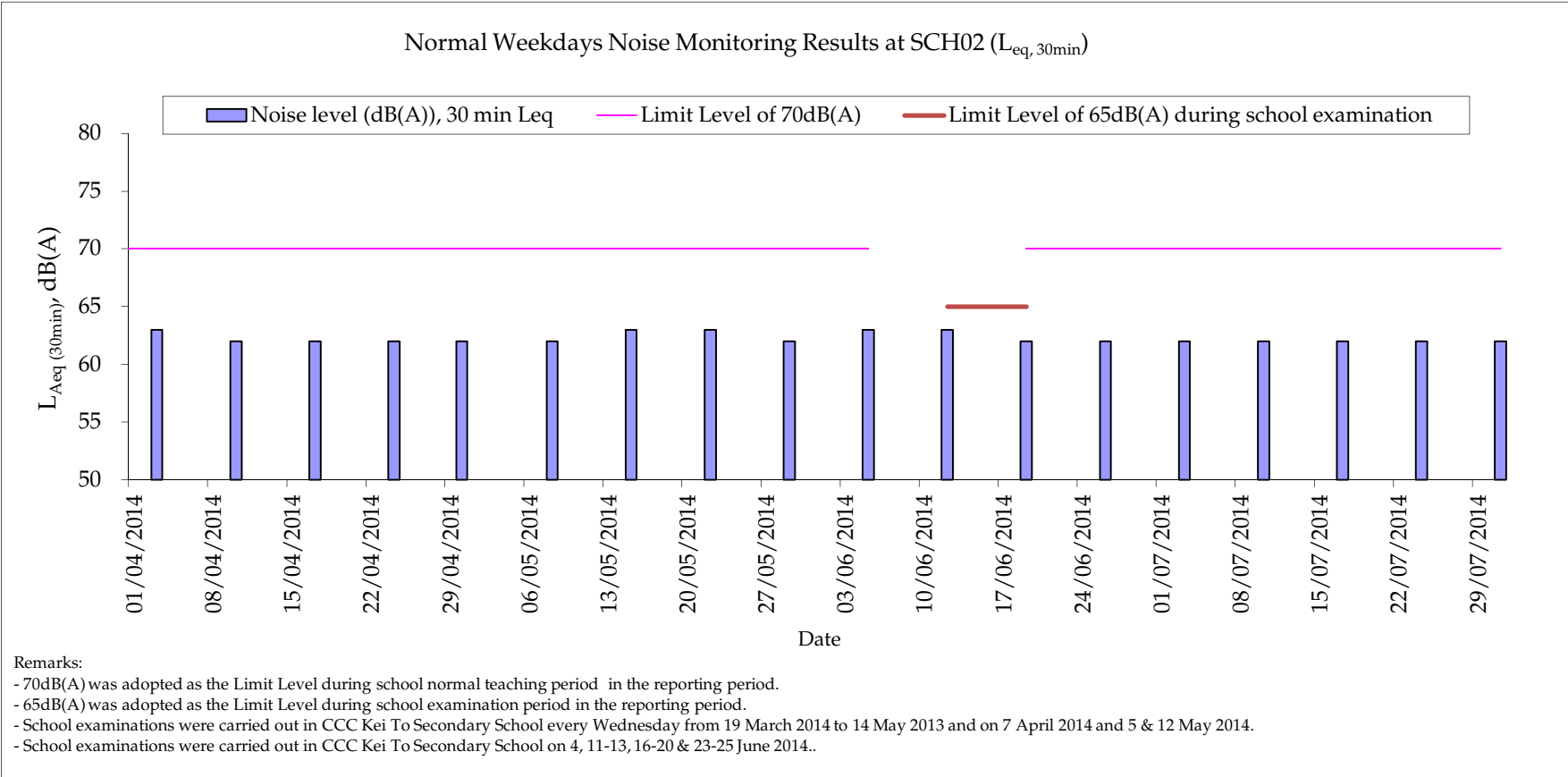
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Jul	02-Jul	03-Jul	04-Jul	05-Jul
		<i>public holiday</i>		Noise Monitoring at SCH02	Noise Monitoring at FSQ	
06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	11-Jul	12-Jul
				Noise Monitoring at SCH02 and FSQ		
13-Jul	14-Jul	15-Jul	16-Jul	17-Jul	18-Jul	19-Jul
			Noise Monitoring at FSQ	Noise Monitoring at SCH02		
20-Jul	21-Jul	22-Jul	23-Jul	24-Jul	25-Jul	26-Jul
			Noise Monitoring at FSQ	Noise Monitoring at SCH02		
27-Jul	28-Jul	29-Jul	30-Jul	31-Jul		
				Noise Monitoring at SCH02 and FSQ		

SCH02 Kei To Secondary School (KTTS) at To Kwa Wan
 FSQ North Point Fire Services Married Quarter

Annex C6 - Noise Monitoring Result



Annex C7 - Noise Monitoring Result



**Annex C8 Installation of Submarine Gas Pipelines and Associated Facilities
from To Kwa Wan to North Point for Former Kai Tak Airport Development
Impact Noise Monitoring Schedule (August 2014)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01-Aug	02-Aug
03-Aug	04-Aug	05-Aug	06-Aug	07-Aug	08-Aug	09-Aug
			Noise Monitoring at SCH02 and FSQ			
10-Aug	11-Aug	12-Aug	13-Aug	14-Aug	15-Aug	16-Aug
			Noise Monitoring at SCH02 and FSQ			
17-Aug	18-Aug	19-Aug	20-Aug	21-Aug	22-Aug	23-Aug
			Noise Monitoring at SCH02 and FSQ			
24-Aug	25-Aug	26-Aug	27-Aug	28-Aug	29-Aug	30-Aug
			Noise Monitoring at SCH02 and FSQ			
31-Aug						

SCH02 Kei To Secondary School (KTTS) at To Kwa Wan
 FSQ North Point Fire Services Married Quarter

Annex D

Event / Action Plans for
Marine Water Quality and
Air Borne Noise Monitoring

Event	Action			
	ET ⁽¹⁾	IEC ⁽¹⁾	ER ⁽¹⁾	Contractor(s)
Action Level				
Exceedance by one sampling day	<ol style="list-style-type: none"> 1. Repeat <i>in situ</i> measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform IEC and Contractor 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measure with IEC and Contractor; and 6. Repeat measurement on next day of exceedance 	<ol style="list-style-type: none"> 1. Discuss with ET and Contractor on the mitigations measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and 3. Assess the effectiveness of the implemented mitigation measures 	<ol style="list-style-type: none"> 1. Discuss with IEC on the proposed mitigation measures; and 2. Make agreement on the mitigation measures to be implemented 	<ol style="list-style-type: none"> 1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment 4. Consider changes of working methods; 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER; and 6. Implement the agreed mitigation measures.
Exceedance for two or more consecutive sampling days	<ol style="list-style-type: none"> 1. Repeat in-situ measurement to confirm finding; 2. Identify source(s) of impact; 3. Inform IEC and Contractor; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measure with IEC and Contractor; 	<ol style="list-style-type: none"> 1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and 3. Assess the effectiveness of the implemented mitigation measures 	<ol style="list-style-type: none"> 1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on mitigation measures to be implemented; and 3. Assess the effectiveness of the implemented mitigation measures 	<ol style="list-style-type: none"> 1. Inform the Engineer and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment 4. Consider changes of working methods; 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER within 3 working days; and

Event	Action			
	ET ⁽¹⁾	IEC ⁽¹⁾	ER ⁽¹⁾	Contractor(s)
	<p>6. Ensure mitigation measures are implemented</p> <p>7. Prepare to increase the monitoring frequency to daily; and</p> <p>8. Repeat measurement on next day of exceedance.</p>			6. Implement the agreed mitigation measures.
Limit Level				
Exceedance by one sampling day	<p>1. Repeat <i>in situ</i> measurement to confirm findings;</p> <p>2. Identify source(s) of impact;</p> <p>3. Inform IEC and Contractor and EPD</p> <p>4. Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>5. Discuss mitigation measure with IEC and Contractor;</p> <p>6. Repeat measurement on next day of exceedance</p> <p>7. Increase the monitoring frequency to daily until no exceedance of Limit Level</p>	<p>1. Discuss with ET and Contractor on the mitigations measures;</p> <p>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</p> <p>3. Assess the effectiveness of the implemented mitigation measures</p>	<p>1. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</p> <p>2. Request Contractor to critically review the working methods</p> <p>3. Make agreement on mitigation measures to be implemented; and</p> <p>4. Assess the effectiveness of the implemented mitigation measures</p>	<p>1. Inform the Engineer and confirm notification of the non-compliance in writing;</p> <p>2. Rectify unacceptable practice;</p> <p>3. Check all plant and equipment</p> <p>4. Consider changes of working methods;</p> <p>5. Discuss with ET and IEC and ER and propose mitigation measures to IEC and ER within 3 working days; and</p> <p>6. Implement the agreed mitigation measures.</p>
Exceedance two or more consecutive sampling days	<p>1. Repeat <i>in situ</i> measurement to confirm findings;</p> <p>2. Identify source(s) of impact;</p>	<p>1. Discuss with ET and Contractor on the mitigations measures;</p> <p>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</p>	<p>1. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</p> <p>2. Request Contractor to critically review the working methods</p>	<p>1. Inform the ER and confirm notification of the non-compliance in writing;</p> <p>2. Rectify unacceptable practice;</p>

Event	Action			
	ET ⁽¹⁾	IEC ⁽¹⁾	ER ⁽¹⁾	Contractor(s)
	3. Inform IEC and Contractor and EPD 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measure with IEC, ER and Contractor; 6. Ensure mitigation measures are implemented; and 7. Increase the monitoring frequency to daily until no exceedance of Limit Level for two consecutive days	3. Assess the effectiveness of the implemented mitigation measures	3. Make agreement on mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures; and 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit Level	3. Check all plant and equipment 4. Consider changes of working methods; 5. Discuss with ET and IEC and ER and propose mitigation measures to IEC and ER within 3 working days; 6. Implement the agreed mitigation measures; and 7. As directed by the Engineer, to slow down or to stop all to part of the marine work or construction activities.

Note: ⁽¹⁾ ET – Environmental Team, IEC – Independent Environmental Checker, ER – Engineer's Representative

Annex D2 **Event and Action Plan for Air-borne Noise Monitoring during Construction Phase**

Event	Action			
	ET ⁽¹⁾	IEC ⁽¹⁾	ER ⁽¹⁾	Contractor(s)
Action Level	<ol style="list-style-type: none"> 1. Notify IEC and the Contractor 2. Carry Out investigation 3. Report the results of investigation to IEC and the Contractor 4. Discuss with the Contractor and formulate remedial measures 5. Increase monitoring frequency to check mitigation measures 	<ol style="list-style-type: none"> 1. Review with analysed results submitted by ET 2. Review the proposed remedial measures by the Contractor and advise ER accordingly 3. supervise the implement of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor. 3. Require the Contractor to proposed remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC 2. Implement noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 1. Identify the source 2. Notify IEC, ER, EPD and the Contractor 3. Repeat measurement to confirm findings 4. Increase monitoring frequency 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET Leader and the Contractor on the potential remedial actions 2. Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise ER accordingly 3. Supervise the implement of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing 2. Notify the Contractor 3. Require the Contractor to proposed remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implemet the agreed proposals. 4. Resubmit proposals if problem still not under control. 5. Stop the relevant activity of works as determined by the ER until exceedance is abated.

Event	Action			Contractor(s)
	ET ⁽¹⁾	IEC ⁽¹⁾	ER ⁽¹⁾	
	7. Assess effectiveness of the Contractor's remedial actions and keep IEC, EPD and ER informed of the results			
	8. If exceedance stops, cease additional monitoring			
Note:	⁽¹⁾ ET – Environmental Team, IEC – Independent Environmental Checker, ER – Engineer's Representative			

Annex E

Implementation Schedule

ANNEX E SUMMARY OF MITIGATION MEASURE IMPLEMENTATION SCHEDULE

Environmental Protection Measures	Location	Timing	Status
Water Quality			
<u>Mitigation Measures for Dredging</u>			
<p>Although adverse water quality impact is not predicted during the construction phase, implementation of the following mitigation measures is recommended to minimise the potential SS impact from dredging activities:</p> <ul style="list-style-type: none"> Dredging shall be carried out by closed grab dredger to minimize release of sediment and other contaminants during dredging; The maximum production rate for dredging from the seabed for installation of the submarine gas pipelines shall not be more than 4,000m³ per day (and no more than 1 closed grab dredger); and Deployment of frame type silt curtain to fully enclose the grab while dredging works are in progress. An illustration of a typical configuration of frame type silt curtain is shown in EM&A manual Figure 3.10. <p>The frame type silt curtain shall be designed to enclose local pollution caused by the grab dredger and suspended by a steel frame mounted on the grab dredger and floating on water. This frame type silt curtain shall be fabricated from permeable, durable, abrasion resistant membrane like geotextiles and be mounted on a floating boom structure. The frame type silt curtain shall also extend to the seabed to cover the entire water column. Steel chain or ballast shall be attached to the bottom of the silt curtain. Mid-ballast may be added as necessary. The structure of the silt curtain shall be maintained by metal grids. The frame type silt curtain shall be capable or reducing sediment loss to outside by a factor of 4 (or about 75%).</p>	Construction Work Sites (Along the alignment of dredging)	During Marine Dredging works	N.A.
<u>Other Good Site Practices for Dredging</u>			
Other good site practices that shall be undertaken during dredging includes:			
<ul style="list-style-type: none"> all vessels shall be sized so that adequate clearance is maintained between vessels and the seabed in all tide conditions, to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; all barges / dredgers used shall be fitted with tight fitting seals to their bottom openings to prevent leakage of material; construction activities shall not cause foam, oil, grease, scum, litter or other objectionable matter to be present on the water within the site or dumping grounds; barges or hopper shall not be filled to a level that will cause the overflow of materials or polluted water during loading or transportation; and before commencement of dredging works, the holder of the Environmental Permit shall submit detailed proposal of the design and arrangement of the frame type silt curtain to EPD for approval. 			
<u>Effluent from Hydrostatic/ Commissioning Tests of the Gas Pipeline System</u>			
For hydrostatic testing of gas pipelines, the gas pipelines would be filled with potable water (a nearly incompressible liquid) and examined for leaks or permanent changes in shape with a specified test pressure. The test would be carried out at room temperature and dosing of chemicals into the water for testing is not required. Water used for testing shall be reused as far as possible (e.g. water	Construction Work Sites (General)	During Hydrostatic Tests	N.A.

Environmental Protection Measures	Location	Timing	Status
<p>spray for dust suppression on site). To ensure compliance with the standards for effluent discharged into the inshore waters or marine waters of Victoria Harbour WCZ as shown in Tables 9a and 9b of the TM-DSS, sedimentation tanks with sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m³ capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity shall be flexible and suited to applications where the influent is pumped.</p>			
<p>Surface Runoff, Sewage and Wastewater from Construction Activities Appropriate measures shall be implemented to control runoff and prevent high loads of SS from entering the marine environment. Proper site management is essential to minimize surface runoff and sewage effluents.</p> <ul style="list-style-type: none"> • Construction site runoff shall be prevented or minimised in accordance with the guidelines stipulated in the EPD's Practice Note for Professional Persons, Construction Site Drainage (ProPECC PN 1/94). All discharges from the construction site shall be controlled to comply with the standards for effluents discharged into the Victoria Harbour WCZ under the TM-DSS. Good housekeeping and stormwater best management practices, as detailed below, shall be implemented to ensure all construction runoff complies with WPCO standards and no unacceptable impact on the WSRs as a result of construction of the proposed submarine gas pipelines; • Sedimentation tanks with sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m³ capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity shall be flexible and able to handle multiple inputs from a variety of sources and suited to applications where the influent is pumped; • Manholes (including newly constructed ones) shall always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the storm runoff being directed into foul sewers; • All vehicles and plant shall be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and located wheel washing bay shall be provided at every site exit, and wash-water shall have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road shall be paved with sufficient backfill toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains; • Precautions shall be taken at any time of year when rainstorms are likely. Actions shall be taken when a rainstorm is imminent or forecast. Actions to be taken during or after rainstorms are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention shall be paid to the control of silty surface runoff during storm events, particularly for areas located near steep slopes; • Fuel tanks and storage areas shall be provided with locks and be located on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank, to prevent spilled fuel oils from reaching the coastal waters of the Victoria Harbour and Western and Eastern Buffer WCZs; • Portable chemical toilets shall be used to handle construction workforce sewage prior to discharge to the existing trunk sewer. Sufficient numbers of portable toilets shall be provided by a licensed contractor to serve the construction workers. The Contractor should also be responsible for waste disposal and maintenance practices. 	Construction Work Sites (General)	Construction period	Δ
<p>Waste Management</p> <p>Good Site Practices Adverse impacts related to waste management are not expected to arise, provided that good site practices are strictly followed. Recommendations for good site practices during the construction activities include:</p>	Construction Work Sites (General)	Construction period	Δ

Environmental Protection Measures	Location	Timing	Status
<ul style="list-style-type: none"> Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site Training of site personnel in proper waste management and chemical handling procedures, separation of chemical wastes with appropriate treatment which is mentioned in Section 4.6.5 Provision of sufficient waste disposal points and regular collection of waste Barges filled with dredged sediment shall be towed away immediately for disposal. In doing so, odour is not anticipated to be an issue to distant sensitive receivers Well planned delivery programme for offsite disposal such that adverse impact from transporting sediment material is not anticipated Well maintained PME should be operated on site Regular cleaning and maintenance of the drainage systems for construction of the landing points Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers 			
<p><u>Waste Reduction Measures</u> Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:</p> <ul style="list-style-type: none"> Sort C&D material from demolition and decommissioning of the existing facilities to recover recyclable portions such as metals; Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal; Encourage collection of aluminium cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the work force; Proper storage and site practices to minimise the potential for damage or contamination of construction materials; and Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste. 	Construction Work Sites (General)	Construction period	Δ
<p><u>C&D Material</u> In order to minimise impacts resulting from collection and transportation of C&D material for off-site disposal, the excavated materials shall be reused on-site as backfilling material and for landscaping works as far as practicable. Surplus C&D material generated from excavation works shall be disposed of at public fill reception facilities for other beneficial uses. Other mitigation requirements are listed below:</p> <ul style="list-style-type: none"> A Waste Management Plan shall be prepared; 	Construction Work Sites (General)	Construction period	√

Environmental Protection Measures	Location	Timing	Status
<ul style="list-style-type: none"> A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) shall be proposed; and In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills, and to control fly-tipping, a trip-ticket system (e.g. ETWB TCW No. 31/2004) shall be included. 			
<p>General Refuse General refuse shall be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector shall be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area shall be provided to reduce the occurrence of 'wind blown' light material.</p>	Construction Work Sites (General)	Construction period	Δ
<p>Chemical Waste Good quality containers compatible with the chemical wastes shall be used, and incompatible chemicals shall be stored separately. Appropriate labels shall be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes, to either the approved Chemical Waste Treatment Centre, or another licensed facility.</p>	Construction Work Sites (General)	Construction period	Δ
<p>Marine Dredged Sediment During transportation and disposal of the dredged marine sediments, the following measures shall be taken to minimise potential impacts on water quality:</p> <ul style="list-style-type: none"> Bottom opening of barges shall be fitted with tight fitting seals to prevent leakage of material. Excess material shall be cleaned from the decks and exposed fittings of barges and dredgers before the vessel is moved; Monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as specified by the EPD; and Barges or hopper barges shall not be filled to a level that would cause the overflow of materials or sediment laden water during loading or transportation. The use of 300 m³ geosynthetic container, with outer woven fabric tensile strength of 200 kN/m and seam strength of 140 kN/m for effective method for contained disposal which meets ETWB TCW No. 34/2002 requirements for assuring negligible loss of contaminants to marine environment during disposal. Allocation of marine disposal sites and all necessary permits shall be applied from relevant authorities for disposal of dredged sediment. Project Proponent will obtain confirmation from CEDD/Marine Fill Committee (MFC) on the disposal options before commencement of the Project. 	Construction Work Sites (Along the alignment of dredging)	During Marine Dredging works	√
<p>Marine Ecology Placement of a second silt curtain between the dredger and the To Kwa Wan breakwater. The silt curtain shall be 75m long. This curtain shall be moved along with the dredger as the work progresses. The curtain shall be arranged so that at least 15m of the curtain shall extend past the dredger in each direction. This curtain shall remain in a suitable position between the dredger and the corals until the dredger is 250m from the corals.</p>	Proposed dredging near To Kwa Wan breakwaters	Construction period	√
<p>Hazard to Life</p> <ul style="list-style-type: none"> Proper general traffic management measures. Minimisation of works activity footprint – dredging and backfilling. Safety provision during dredging and backfilling. Liaison with relevant Government Departments before and during construction stage. Requirements during the submarine pipe pulling. 	Construction Work Sites	Construction period	√
Risk mitigation measures to prevent the damage of submarine pipeline during operation will be adopted. They are listed as follows:	Construction Work	Construction	N.A.

Environmental Protection Measures	Location	Timing	Status
<ul style="list-style-type: none"> The submarine gas pipeline will be covered by armour rock, damage from anchor drop could be prevented. 	Sites	period	
Landscape			
Screening of construction works by hoardings/noise barriers around Works area in visually unobtrusive colours, to screen Works.	Construction Work Sites	Construction period	N.A.
Hydroseeding or sheeting of soil stockpiles with visually unobtrusive material (in earth tone).	Construction Work Sites	Construction period	N.A.
Ensure no run-off into the harbour adjacent to the site.	Construction Work Sites	Construction period	N.A.
Cultural Heritage			
A Monitoring Brief shall be conducted as set out in Appendix H2 of the EIA. This can be done in parallel with the monitoring of barge loading as set out in section 4.6.	Construction Work Sites	Construction period	√
Noise			
Construction Noise Impact from Test before Backfilling and Hydrostatic/ Commissioning Test The total maximum allowable SWL of the test before backfilling and hydrostatic/ commissioning test is ranged from 112-126 dB(A) at different location and period, the Contractor shall strictly follow the specification listed above to meet the noise criteria and closely liaise with the schools nearby before carrying out the activities. Noise mitigation measures including the use of movable noise barriers and/ or noise enclosure to block the direct line of sight to the receivers, installation of mufflers and/ or silencers on the machine(s) should be implemented if necessary.	Construction Work Sites (Landmain work)	Construction period	√
Using Quiet PME The use of quiet PME recognized by the Noise Control Authority for the purpose of CNP application can effectively reduce the noise generated from the construction plants. Quiet PME are construction plants and equipments that are notably quieter, more environmental friendly and efficiently. The noise level reduction ranges from 5 – 10 dB(A) depending on the type of equipment used. The Contractor should note the required procedures involved in application of the QPME. A list of QPME recommended is list in Table 10.11 of the EIA report.	Construction Work Sites (Along the alignment of dredging and landmain works)	Construction period	√
Using Movable Noise Barriers Movable noise barriers to be erected near to the construction plants would reduce the noise levels for commonly 5 – 10 dB(A) depending on the types of items of PME and materials of the barriers. It is recommended that the Contractor should screen noisy works and noise from stationary items of PME whenever practicable.	Construction Work Sites (Landmain work)	Construction period	√
Good Site Practices Good site practice and noise management can significantly reduce the impact of construction site activities on nearby NSRs. The following package of measures shall be followed during construction: <ul style="list-style-type: none"> The Contractor shall adopt the Code of Practice on Good Management Practice to Prevent Violation of the Noise Control Ordinance (Chapter 400) (for Construction Industry) published by EPD; The Contractor shall observe and comply with the statutory and non-statutory requirements and guidelines; Before commencing any work, the Contractor shall submit to the Engineer Representative for approval the method of working, equipment and noise mitigation measures intended to be used at the site; The Contractor shall devise and execute working methods to minimise the noise impact on the surrounding sensitive uses, and provide experienced personnel with suitable training to ensure that those methods are implemented; Unused equipment shall be turned off. Number of operating PME shall be kept to a minimum and the parallel use of noisy equipment / machinery shall be avoided; 	Construction Work Sites (Along the alignment of dredging and landmain works)	Construction period	√

Environmental Protection Measures	Location	Timing	Status
<ul style="list-style-type: none"> Regular maintenance of all plant and equipment; and Material stockpiles and other structures shall be effectively utilised as noise barriers, where practicable. 			
Construction Dust			
<u>Mitigation Measures for Fugitive Dust</u>	Construction Work Sites (General)	Construction period	√
To mitigate fugitive dust impact, all dust control measures recommended in the Air Pollution Control (Construction Dust) Regulation, where applicable, shall be implemented. Relevant dust control measures include:			
<ul style="list-style-type: none"> The works area for site clearance shall be sprayed with water before, during and after the operation so as to maintain the entire surface wet; Restricting heights from which materials are to be dropped, as far as practicable to minimise the fugitive dust arising from unloading/ loading; Immediately before leaving a construction site, all vehicles shall be washed to remove any dusty materials from the bodies and wheels. However, all spraying of materials and surfaces should avoid excessive water usage; Where a vehicle leaving a construction site is carrying a load of dusty materials, the load shall be covered entirely by clean impervious sheeting to ensure that the dusty materials will not leak from the vehicle; Any stockpile of dusty materials shall be covered entirely by impervious sheeting; and/or placed in an area sheltered on the top and 4 sides; and All dusty materials shall be sprayed with water immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. 			

Remark:

- √ Compliance of Mitigation Measures
- <> Compliance of Mitigation but need improvement
- x Non-compliance of Mitigation Measures
- Δ Deficiency of Mitigation Measures but rectified by the Contractor
- N.A. Not Applicable

Annex F

Calibration Reports for Monitoring Equipment

Annex F1 Water Quality Monitoring Equipment

Equipment	Model	Last Calibration Date	Next Calibration Date
Salinity, DO, Temperature Measuring Meter	YSI Pro 2030 (S/N: 12A 100554)	18 June 2014	18 September 2014
Turbidity Meter	HACH Model 2100Q Turbidimeter (S/N: 11110 C 014260)	7 April 2014 7 July 2014	7 July 2014 7 October 2014

Annex F2 Noise Monitoring Equipment

Monitoring Station ID	Monitoring Equipment	Model & Serial No.	Last Calibration Date	Next Calibration Date
FSQ and SCH02	Calibrator	Rion NC-73 (S/N 10997142)	12 July 2013	12 July 2014
			28 June 2014	28 June 2015
	Sound Level Meter	Rion NL-52 (S/N 00131627)	17 March 2014	17 March 2015
		Rion NL-18 (S/N 00360030)	12 July 2013	12 July 2014
		Rion NL-52 (S/N 00331805)	5 July 2014	5 July 2015



Internal Calibration Report of Dissolved Oxygen Meter

Equipment Ref. No. : <u>ET/EW/008/006</u>	Manufacturer : <u>YSI</u>
Model No. : <u>Pro 2030</u>	Serial No. : <u>12A 100554</u>
Date of Calibration : <u>18/06/2014</u>	Calibration Due Date : <u>17/09/2014</u>

Temperature Verification

Ref. No. of Reference Thermometer : ET/0521/008
Ref. No. of Water Bath : ---

		Temperature (°C)		
Reference Thermometer reading	Measured	20.0	Corrected	19.6
DO Meter reading	Measured	19.5	Difference	0.1

Standardization of sodium thiosulphate (Na₂S₂O₃) solution

Reagent No. of Na ₂ S ₂ O ₃ titrant	CPE/012/4.5/001/8	Reagent No. of 0.025N K ₂ Cr ₂ O ₇	CPE/012/4.4/001/27
		Trial 1	Trial 2
Initial Vol. of Na ₂ S ₂ O ₃ (ml)		0.00	10.20
Final Vol. of Na ₂ S ₂ O ₃ (ml)		10.20	20.35
Vol. of Na ₂ S ₂ O ₃ used (ml)		10.20	10.15
Normality of Na ₂ S ₂ O ₃ solution (N)		0.02451	0.02463
Average Normality (N) of Na ₂ S ₂ O ₃ solution (N)		0.02457	
Acceptance criteria, Deviation		Less than ± 0.001N	

Calculation: Normality of Na₂S₂O₃, N = 0.25 / ml Na₂S₂O₃ used

Linearity Checking

*Determination of dissolved oxygen content by Winkler Titration **

Purging Time (min)	2		5		10	
	1	2	1	2	1	2
Initial Vol. of Na ₂ S ₂ O ₃ (ml)	0.00	11.90	23.80	0.00	7.70	12.80
Final Vol. of Na ₂ S ₂ O ₃ (ml)	11.90	23.80	31.40	7.70	12.80	17.80
Vol. (V) of Na ₂ S ₂ O ₃ used (ml)	11.90	11.90	7.60	7.70	5.10	5.00
Dissolved Oxygen (DO), mg/L	7.85	7.85	5.01	5.08	3.36	3.30
Acceptance criteria, Deviation	Less than + 0.3mg/L		Less than + 0.3mg/L		Less than + 0.3mg/L	

Calculation: DO (mg/L) = V x N x 8000/298

Purging time, min	DO meter reading, mg/L			Winkler Titration result *, mg/L			Difference (%) of DO Content
	1	2	Average	1	2	Average	
2	7.68	7.72	7.70	7.85	7.85	7.85	1.93
5	5.12	5.14	5.13	5.01	5.08	5.05	1.57
10	3.28	3.24	3.26	3.36	3.30	3.33	2.12
Linear regression coefficient				0.9979			



Performance Check of Salinity Meter

Equipment Ref. No. : ET/EW/008/006 Manufacturer : YSI
Model No. : Pro 2030 Serial No. : 12A 100554
Date of Calibration : 18/06/2014 Due Date : 17/09/2014

Ref. No. of Salinity Standard used (30ppt)

S/001/5


Salinity Standard (ppt)	Measured Salinity (ppt)	Difference %
30.0	29.7	-1.0


(*) Difference (%) = (Measured Salinity – Salinity Standard value) / Salinity Standard value x 100

Acceptance Criteria

Difference : -10 % to 10 %

The salinity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Checked by : 

Approved by : 



Performance Check of Turbidity Meter

Equipment Ref. No. : ET/0505/010 Manufacturer : HACH
Model No. : 2100Q Serial No. : 11110 C 014260
Date of Calibration : 07/04/2014 Due Date : 06/07/2014

Theoretical Value of Turbidity Standard (NTU)	Measured Value (NTU)	Difference % *
20	19.5	-2.50
100	103	3.00
800	792	-1.00


(*) Difference = (Measured Value – Theoretical Value) / Theoretical Value x 100

Acceptance Criteria

Difference : -5 % to 5 %

The turbidity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Prepared by : 

Checked by : 



Performance Check of Turbidity Meter

Equipment Ref. No. : ET/0505/010 Manufacturer : HACH
Model No. : 2100Q Serial No. : 11110 C 014260
Date of Calibration : 07/07/2014 Due Date : 06/10/2014

Ref. No. of Turbidity Standard used (4000NTU)

005/6.1/001/6

Theoretical Value of Turbidity Standard (NTU)	Measured Value (NTU)	Difference % *
20	20.2	1.00
100	104	4.00
800	794	-0.75

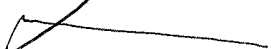
(*) Difference = (Measured Value – Theoretical Value) / Theoretical Value x 100

Acceptance Criteria

Difference : -5 % to 5 %

The turbidity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Prepared by : 

Checked by : 

Certificate of Calibration

校正證書

Certificate No. : C134307
證書編號**ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-1709)**

Description / 儀器名稱 : Sound Level Calibrator
Manufacturer / 製造商 : Rion
Model No. / 型號 : NC-73
Serial No. / 編號 : 10997142
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C
Line Voltage / 電壓 : ---
Relative Humidity / 相對濕度 : (55 ± 20)%

TEST SPECIFICATIONS / 測試規範

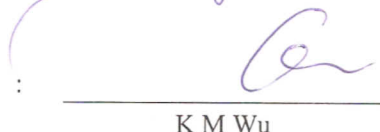
Calibration check

DATE OF TEST / 測試日期 : 12 July 2013**TEST RESULTS / 測試結果**

The results apply to the particular unit-under-test only.
All results are within 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
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By
測試
K C LeeCertified By
核證
K M WuDate of Issue
簽發日期

15 July 2013

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所書面批准。

Certificate of Calibration

校正證書

Certificate No. : C134307
證書編號

- 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	C133632
CL281	Multifunction Acoustic Calibrator	DC130171
TST150A	Measuring Amplifier	C120886

- 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	93.7	± 0.5	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.988	1 kHz ± 2 %	± 1

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

Note :

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.

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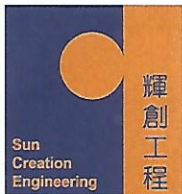
Sun Creation Engineering Limited – Calibration & Testing Laboratory

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

輝創工程有限公司 – 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel 電話: 2927 2606 Fax 傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com



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. : C143980

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC14-1497)

Date of Receipt / 收件日期 : 23 June 2014

Description / 儀器名稱 : Sound Level Calibrator

Manufacturer / 製造商 : Rion

Model No. / 型號 : NC-73

Serial No. / 編號 : 10997142

Supplied By / 委託者 : Envirotech Services Co.

Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

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 : 28 June 2014

TEST RESULTS / 測試結果

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

All results are within manufacturer's specification.

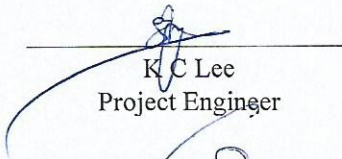
The results are detailed in the subsequent page(s).

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

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

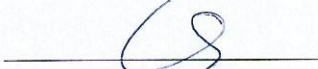
Tested By :

測試


K C Lee
Project Engineer

Certified By :

核證


K M Wu
Engineer

Date of Issue :

簽發日期

2 July 2014

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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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

輝創工程有限公司 - 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606

Fax/傳真: 2744 8986

E-mail/電郵: callab@suncreation.com

Website/網址: www.suncreation.com



Certificate of Calibration 校正證書

Certificate No. : C143980
證書編號

- 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 :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL130	Universal Counter	C143868
CL281	Multifunction Acoustic Calibrator	DC130171
TST150A	Measuring Amplifier	C141558

- 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	93.7	± 0.5	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.987	1 kHz ± 2 %	± 1

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

Note :

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.

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Certificate of Calibration

校正證書

Certificate No. : C141622

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC14-0645)

Date of Receipt / 收件日期 : 11 March 2014

Description / 儀器名稱 : Sound Level Meter

Manufacturer / 製造商 : Rion

Model No. / 型號 : NL-52

Serial No. / 編號 : 00131627

Supplied By / 委託者 : Envirotech Services Co.

Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,

Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (55 ± 20)%

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 17 March 2014

TEST RESULTS / 測試結果

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

All results are within manufacturer's specification.

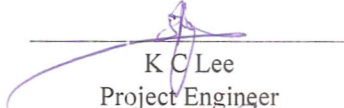
The results are detailed in the subsequent page(s).

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, USA
- Fluke Everett Service Center, USA
- Rohde & Schwarz Laboratory, Germany

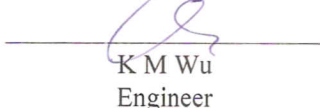
Tested By

測試


K C Lee
Project Engineer

Certified By

核證


K M Wu
Engineer

Date of Issue

簽發日期

20 March 2014

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. : C141622
證書編號

- 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 was performed before the test.
- 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	C140016
CL281	Multifunction Acoustic Calibrator	DC130171

- Test procedure : MA101N.

- Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.1	± 1.1

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L _A	A	Fast	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

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

- 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.1	Ref.
			Slow			94.1	± 0.3

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. : C141622
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	A	Fast	94.00	63 Hz	67.8	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.5
					250 Hz	85.4	-8.6 ± 1.4
					500 Hz	90.8	-3.2 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.6
					4 kHz	95.1	+1.0 ± 1.6
					8 kHz	93.0	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.6	-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)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	C	Fast	94.00	63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.1	0.0 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.6
					4 kHz	93.3	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.7	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 04663

- Mfr's Spec. : IEC 61672 Class 1

- 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)

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

Note :

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.

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Certificate of Calibration 校正證書

Certificate No. : C134309
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-1709)

Description / 儀器名稱 : Precision Integrating Sound Level Meter
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-18
Serial No. / 編號 : 00360030
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

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

DATE OF TEST / 測試日期 : 12 July 2013

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification. (after adjustment)
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
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By : 
測試 : K C Lee

Certified By : 
核證 : K M Wu

Date of Issue : 15 July 2013
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.

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Certificate of Calibration

校正證書

Certificate No. : C134309
證書編號

- 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 internal standard (After Adjustment) was performed before the test from 6.1.2 to 6.4.
- 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	C130019
CL281	Multifunction Acoustic Calibrator	DC130171

- Test procedure : MA101N.

- Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

- 6.1.1.1 Before Adjustment

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	* 93.1	± 0.7

* Out of Mfr's Spec.

- 6.1.1.2 After Adjustment

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.1	± 0.7

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
60 - 120	LA	A	Fast	94.00	1	94.2 (Ref.)
				104.00		104.2
				114.00		114.2

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

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. : C134309
證書編號

6.2 Time Weighting

6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.1	Ref.
			Slow			94.1	± 0.1

6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
50 - 110	LA	A	Fast	106.00	Continuous	106.0	Ref.
	LAmx				200 ms	105.1	-1.0 ± 1.0
	LA	Slow	Continuous		106.0	Ref.	
	LAmx		500 ms		102.4	-4.1 ± 1.0	

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LA	A	Fast	94.00	31.5 Hz	54.4	-39.4 ± 1.5
					63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.7	-16.1 ± 1.0
					250 Hz	85.3	-8.6 ± 1.0
					500 Hz	90.7	-3.2 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	95.3	$+1.2 \pm 1.0$
					4 kHz	95.1	$+1.0 \pm 1.0$
					8 kHz	93.0	$-1.1 (+1.5 ; -3.0)$
					12.5 kHz	89.8	$-4.3 (+3.0 ; -6.0)$

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。

Certificate of Calibration

校正證書

Certificate No. : C134309

證書編號

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LC	C	Fast	94.00	31.5 Hz	91.0	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.1	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.3	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Integrating Time	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
50 - 110	LAeq	A	10 sec.	4	1	1/10	110	100	100.0	± 0.5
								90	90.0	± 0.5
								80	79.5	± 1.0
								70	69.7	± 1.0
								1/10 ²		
1/10 ³										
			5 min.			1/10 ⁴				

Remarks : - UUT Microphone Model No. : UC-53A & S/N : 307435

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 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)
 Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

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

Note :

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.

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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. : C144069
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC14-1633) Date of Receipt / 收件日期 : 27 June 2014

Description / 儀器名稱 : Sound Level Meter
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-52
Serial No. / 編號 : 00331805
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 5 July 2014


TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

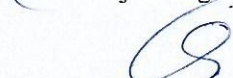
The test equipment used for calibration are traceable to National Standards via :

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

Tested By
測試


K C Lee
Project Engineer

Certified By
核證


K M Wu
Engineer

Date of Issue : 7 July 2014
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.

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Certificate of Calibration

校正證書

Certificate No. : C144069
證書編號

1. 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.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C140016
CL281	Multifunction Acoustic Calibrator	DC130171

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.1	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L _A	A	Fast	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

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

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.1	Ref.
			Slow			94.1	± 0.3

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. : C144069

證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	A	Fast	94.00	63 Hz	67.8	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.5
					250 Hz	85.4	-8.6 ± 1.4
					500 Hz	90.8	-3.2 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.6
					4 kHz	95.1	+1.0 ± 1.6
					8 kHz	93.0	-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)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _C	C	Fast	94.00	63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.5
					250 Hz	94.1	0.0 ± 1.4
					500 Hz	94.1	0.0 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.6
					4 kHz	93.3	-0.8 ± 1.6
					8 kHz	91.2	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.7	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 04870

- Mfr's Spec. : IEC 61672 Class 1

- 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)

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

Note :

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所書面批准。

Annex G

QA/QC Results for Suspended Solids Testing

QA/QC Results of Laboratory Analysis of Total Suspended Solids

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
03/07/2014	97.6	FC1S-1	0.00	FWM2S-2	107.0
	104.7	FWM2M-1	0.00	FWM5M-2	103.8
	93.8	FWM5B-1	9.52	FC4B-2	100.0
	98.4	EC1S-1	0.00	EWM2S-2	97.1
	99.0	EWM2M-1	0.00	EWM5M-2	99.0
	94.8	EWM5B-1	9.52	EC4B-2	95.1

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
05/07/2014	104.9	FC1S-1	0.00	FWM2S-2	104.9
	96.8	FWM2M-1	0.00	FWM5M-2	102.0
	101.4	FWM5B-1	0.00	FC4B-2	94.2
	100.2	EC1S-1	9.52	EWM2S-2	93.3
	104.3	EWM2M-1	0.00	EWM5M-2	98.0
	98.3	EWM5B-1	9.52	EC4B-2	94.0

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
08/07/2014	98.5	FC1S-1	9.52	FWM2S-2	102.9
	102.7	FWM2M-1	0.00	FWM5M-2	102.9
	92.7	FWM5B-1	0.00	FC4B-2	102.0
	107.6	EC1S-1	9.52	EWM2S-2	98.0
	103.9	EWM2M-1	0.00	EWM5M-2	106.7
	94.2	EWM5B-1	9.52	EC4B-2	106.9

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
10/07/2014	101.7	FC1S-1	0.00	FWM2S-2	102.0
	100.4	FWM2M-1	0.00	FWM5M-2	101.9
	103.7	FWM5B-1	9.52	FC4B-2	108.0
	94.2	EC1S-1	0.00	EWM2S-2	107.8
	98.8	EWM2M-1	0.00	EWM5M-2	105.9
	94.2	EWM5B-1	0.00	EC4B-2	106.7

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
12/07/2014	105.2	FC1S-1	8.70	FWM2S-2	97.1
	94.3	FWM2M-1	0.00	FWM5M-2	101.0
	102.0	FWM5B-1	0.00	FC4B-2	102.0
	107.0	EC1S-1	9.52	EWM2S-2	103.8
	96.3	EWM2M-1	0.00	EWM5M-2	98.1
	100.0	EWM5B-1	8.70	EC4B-2	98.0

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
15/07/2014	106.2	FC1S-1	0.00	FWM2S-2	101.0
	107.2	FWM2M-1	0.00	FWM5M-2	100.0
	93.3	FWM5B-1	0.00	FC4B-2	99.0
	100.6	EC1S-1	8.70	EWM2S-2	97.1
	94.0	EWM2M-1	0.00	EWM5M-2	100.0
	101.5	EWM5B-1	0.00	EC4B-2	94.2

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
17/07/2014	95.5	FC1S-1	0.00	FWM2S-2	104.9
	103.4	FWM2M-1	9.52	FWM5M-2	94.0
	102.3	FWM5B-1	0.00	FC4B-2	97.1
	97.6	EC1S-1	9.52	EWM2S-2	92.3
	104.0	EWM2M-1	0.00	EWM5M-2	103.0
	105.2	EWM5B-1	0.00	EC4B-2	100.0

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
19/07/2014	99.4	FC1S-1	9.52	FWM2S-2	104.8
	94.9	FWM2M-1	0.00	FWM5M-2	96.1
	96.9	FWM5B-1	0.00	FC4B-2	95.1
	100.6	EC1S-1	0.00	EWM2S-2	102.0
	106.5	EWM2M-1	0.00	EWM5M-2	101.0
	94.0	EWM5B-1	0.00	EC4B-2	98.0

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
22/07/2014	100.4	FC1S-1	0.00	FWM2S-2	106.0
	101.6	FWM2M-1	9.52	FWM5M-2	93.0
	97.9	FWM5B-1	0.00	FC4B-2	94.1
	101.0	EC1S-1	0.00	EWM2S-2	100.0
	101.6	EWM2M-1	0.00	EWM5M-2	101.0
	104.1	EWM5B-1	0.00	EC4B-2	96.1

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
24/07/2014	104.8	FC1S-1	0.00	FWM2S-2	106.0
	98.4	FWM2M-1	9.52	FWM5M-2	106.0
	106.9	FWM5B-1	0.00	FC4B-2	98.0
	107.6	EC1S-1	0.00	EWM2S-2	96.0
	99.4	EWM2M-1	0.00	EWM5M-2	95.1
	107.1	EWM5B-1	0.00	EC4B-2	94.1

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
26/07/2014	99.8	FC1S-1	9.52	FWM2S-2	100.0
	106.9	FWM2M-1	0.00	FWM5M-2	95.0
	93.2	FWM5B-1	8.70	FC4B-2	99.0
	104.7	EC1S-1	0.00	EWM2S-2	101.0
	99.4	EWM2M-1	0.00	EWM5M-2	100.0
	93.4	EWM5B-1	8.00	EC4B-2	101.0

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
29/07/2014	100.2	FC1S-1	0.00	FWM2S-2	102.0
	99.6	FWM2M-1	9.52	FWM5M-2	107.7
	103.8	FWM5B-1	0.00	FC4B-2	94.1
	101.9	EC1S-1	0.00	EWM2S-2	101.0
	100.4	EWM2M-1	9.52	EWM5M-2	95.1
	101.4	EWM5B-1	0.00	EC4B-2	106.0

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
31/07/2014	95.0	FC1S-1	0.00	FWM2S-2	102.0
	94.3	FWM2M-1	0.00	FWM5M-2	105.9
	98.4	FWM5B-1	9.52	FC4B-2	102.0
	107.9	EC1S-1	0.00	EWM2S-2	101.0
	103.5	EWM2M-1	0.00	EWM5M-2	101.0
	93.3	EWM5B-1	0.00	EC4B-2	96.1

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Sampling Date	QC Sample	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @

Note: (*) % Recovery of QC sample should be between 80% to 120%.
 (#) % Error of Sample Duplicate should be between 0% to 10%.
 (@) % Recovery of Sample Spike should be between 80% to 120%.
 (**) % Error of Sample Duplicate >10% but invalid due to sample results less than MDL.

Annex H

Waste Flow Table

The installation of submarine gas pipelines and associated facilities from To Kwa Wan to North Point for former Kai Tak Airport

Monthly Summary Waste Flow Table for Year 2012-2014

Month	Actual Quantities of Inert C&D Materials Generated Monthly (see Note 1)						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Broken Concrete (see Note 2)	Reused in the Contract	Reused in other Projects	Disposed at Public Fill	Stockpiling	General refuse	Vegetation / Rubbish	Disposal at Landfill	Chemical Waste Recycling (see Note 3)	Recycling of Rubbish
	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in'000kg / '000L)	(in '000kg)
Jun 12	858.93	858.93	150	0	8.93	700	0	0	0	0	0
Jul 12	398.16	398.16	150	0	98.16	150	0	0	0	0	0
Aug 12	316.12	316.12	290	0	25.87	0	0.25	0.5	0	0	0.5
Sep 12	136.5	136.5	80.5	0	56.1	0	0.5	0.5	0	0	0.5
Oct 12	82.39	82.39	30	0	52.39	0	0.2	0.3	0	0	0.2
Nov 12	71.23	71.23	44.84	0	26.39	0	0.1	0.1	0	0	0.1
Dec 12	168.22	168.22	95.35	0	72.87	0	0.15	0.15	0	0	0.15
Jan 13	1872.19	469.54	106.92	0	1765.27	0	0.5	0.06	0.51	0	0.05
Feb 13	1838.82	477.36	238.68	0	1480.8	119.34	0.04	0	0	0.2	0
Mar 13	473.94	473.94	57.6	0	377.94	38.4	1.24	0	1.24	0	0
Apr 13	210.07	166.07	66.96	0	99.11	0	0.5	0	0	0	0
May 13	253.8	253.8	192.6	0	0	61.2	2.06	0	2.56	0	0
Jun 13	172.8	172.8	45.07	0	57.71	70.02	7.27	0	7.27	0	0
Jul 13	151.57	151.57	41.18	0	92.39	18	0.96	0	0.96	0	0
Aug 13	575.18	575.18	41.18	0	516	18	2.63	0	2.63	0	0
Sep 13	615.37	0	0	0	597.37	18	5.74	0	0	0	0
Oct 13	706.56	0	0	0	688.56	18	2.98	0	0	0	0
Nov 13	525.56	0	60.31	0	435.25	30	0	0	0	0	0
Dec 13	231.54	0	21.09	0	210.45	0	2.91	0	2.91	0	0

Month	Actual Quantities of Inert C&D Materials Generated Monthly (see Note 1)						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Broken Concrete (see Note 2)	Reused in the Contract	Reused in other Projects	Disposed at Public Fill	Stockpiling	General refuse	Vegetation / Rubbish	Disposal at Landfill	Chemical Waste Recycling (see Note 3)	Recycling of Rubbish
	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in'000kg / '000L)	(in '000kg)
Jan 14	231.54	0	126.6	0	104.94	0	3.46	0	3.46	0	0
Feb 14	115.00	0	75.92	0	9.08	30	4.25	0	0	0	0
Mar 14	37.80	0	30.00	0	0	7.8	4.25	0	0	0	0
Apr 14	0	0	0	0	0	0	1.07	0	0	0	0
May 14	27	0	27	0	0	0	1.12	0	0	0	0
Jun 14	36	0	36	0	0	0	2.34	0	0	0	0
Sub-total	10106.29	4771.81	2007.80	0	6775.58	1278.76	44.52	1.61	21.54	0.20	1.50
Jul 14	28.8	0	28.8	0	0	0	0.2	0	0	0	0
Total	10135.09	4771.81	2036.60	0	6775.58	1278.76	44.72	1.61	21.54	0.20	1.50

- Notes: (1) If necessary, use the conversion factor: 1 full load of dumping truck being equivalent to 6.5 m³ by volume.
(2) Broken concrete for recycling into aggregates.
(3) For chemical waste, the actual quantities of empty paint cans will be in kilogram (kg) and spent lubrication oil will be in litre (L).

Annex I

Cumulative Complaint and
Summons/Prosecutions
Log

Annex I Cumulative Complaint and Summons/Prosecutions Log

Reporting Month	Number of Complaints in Reporting Month	Number of Summons/Prosecutions in Reporting Month
June 2012	0	0
July 2012	0	0
August 2012	0	0
September 2012	0	0
October 2012	0	0
November 2012	0	0
December 2012	0	0
January 2013	0	0
February 2013	0	0
March 2013	0	0
April 2013	0	0
May 2013	0	0
June 2013	0	0
July 2013	0	0
August 2013	0	0
September 2013	0	0
October 2013	0	0
November 2013	0	0
December 2013	0	0
January 2014	0	0
February 2014	0	0
March 2014	0	0
April 2014	0	0
May 2014	0	0
June 2014	0	0
July 2014	0	0
Overall Total	0	0