

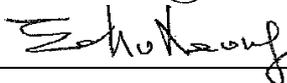
# China Harbour Engineering Company Limited

Contract No. HY/2010/02

## Hong Kong – Zhuhai – Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Works

### Annual Review Report for March 2017 to April 2018

[08/2019]

	Name	Signature
Prepared & Checked:	Y T Tang	
Reviewed, Approved and Certified:	Echo Leong (ETL)	

Version:	Rev. 0	Date: 20 August 2019
<p><b>Disclaimer</b></p> <p>This report is prepared for China Harbour Engineering Company Limited and is given for its sole benefit in relation to and pursuant to Contract No. HY/2010/02 Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities-Reclamation Works and may not be disclosed to, quoted to or relied upon by any person other than China Harbour Engineering Company Limited without our prior written consent. No person (other than China Harbour Engineering Company Limited) into whose possession a copy of this report comes may rely on this report without our express written consent and China Harbour Engineering Company Limited may not rely on it for any purpose other than as described above.</p>		

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23 August 2019

By Fax (3698 5999) and By Post

Ove Arup & Partners Hong Kong Ltd.  
Chief Resident Engineer's Office  
11 Tung Chung Waterfront Road, Tung Chung, Lantau  
Hong Kong

Attention: Mr. Seven Yau

Dear Sir,

**Re: Agreement No. CE 48/2011 (EP)  
Environmental Project Office for the  
HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities, and  
Tuen Mun-Chek Lap Kok Link – Investigation**

**Contract No. HY/2010/02 – HZMB HKBCF – Reclamation Works  
Annual EM&A Review Report for March 2017 to April 2018**

Reference is made to the Environmental Team's submission of the Annual EM&A Review Report for March 2017 to April 2018 certified by the ET Leader (ET's ref.: "60249820/C/RMKY19082001" dated 20 August 2019) and provided to us via e-mail on 20 August 2019.

We are pleased to inform you that we have no adverse comments on the captioned Annual EM&A Review Report for March 2017 to April 2018.

The ET Leader and the dolphin specialist of the ET are reminded that the EM&A report should never be regarded as a platform to express their own opinions towards a government topic, or to advocate his/her personal ideas, and also our verification to your report does not release any of your obligation in the EM&A manuals under the applicable Environmental Permit(s) for this project.

Thank you very much for your attention and please feel free to contact the undersigned should you require further information.

Yours faithfully,  
For and on behalf of  
Ramboll Hong Kong Limited



Ray Yan  
Independent Environmental Checker

c.c.	HyD	Mr. Cheng Pan	(By Fax: 3188 6614)
	HyD	Ms. Molly Kwan	(By Fax: 3188 6614)
	AECOM	Ms. Echo Leong	(By Fax: 2317 7609)
	CHEC	Mr. Lim Kim Chuan	(By Fax: 2578 0413)

Internal: DY, YH, HW, ENPO Site

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## EXECUTIVE SUMMARY

Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Works (here below, known as “the Contract”) mainly comprises reclamation at the northeast of the Hong Kong International Airport of an area of about 130-hectare for the construction of an artificial island for the development of the Hong Kong Boundary Crossing Facilities (HKBCF), and about 19-hectare for the southern landfall of the Tuen Mun - Chek Lap Kok Link (TMCLKL). It is a designated Project and is governed by the current permits for the Project, i.e. the amended Environmental Permits (EPs) issued on 11 April 2016 (EP-353/2009/K) and 13 March 2015 (EP-354/2009/D) (for TMCLKL Southern Landfall Reclamation only).

Ove Arup & Partners Hong Kong Limited (Arup) was appointed by Highways Department (HyD) as the consultants for the design and construction assignment for the Project’s reclamation works (i.e. the Engineer for the Contract).

China Harbour Engineering Company Limited (CHEC) was awarded by HyD as the Contractor to undertake the construction work of the Contract.

Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) for the Project.

AECOM Asia Co. Ltd. (AECOM) was appointed by CHEC to undertake the role of Environmental Team for the Contract for carrying out the environmental monitoring and audit (EM&A) works.

The construction phase of the Contract under the EPs was commenced on 12 March 2012 and will be tentatively completed by year 2018. The EM&A programme, including air quality, noise, water quality and dolphin monitoring and environmental site inspections, was commenced on 12 March 2012.

The EM&A programme of this Contract was completed by the end of April 2018, as such this report documents the findings of EM&A works conducted in the period between 1 March 2017 to 30 April 2018. For further information on confirming termination of EM&A programme and slightly longer reporting year, please refer to section 2.1.13. As informed by the Contractor, major activities in the reporting period were:-

### **Marine-base**

- Sloping Seawalls
- Rubble Mound Seawall
- Maintenance of silt curtain
- Maintenance of localized silt curtain
- Outfall installation
- Additional GI installation
- Construction of Permanent Seawall

### **Land-base**

- Surcharge removal & laying
- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Maintenance of Temporary Marine Access at Works Area WA2
- Reinstatement of seawall

A summary of monitoring and audit activities conducted in the reporting period\* is listed below:

24-hour Total Suspended Particulates (TSP) monitoring	34 sessions
1-hour TSP monitoring	34 sessions
Noise monitoring	27 sessions
Impact water quality monitoring	77 sessions
Impact dolphin monitoring	12 surveys
Joint Environmental site inspection	61 sessions

\*monitoring works between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF –Passenger Clearance Building.

## Breaches of Action and Limit Levels for Air Quality

1 action level exceedance of 24-Hour TSP was recorded at AMS3B on 28 November 2017; 2 action level exceedances of 24-Hour TSP were recorded at AMS3B on 23 December 2017 and 17 January 2018 respectively. 1 action level exceedance of 24-Hour TSP was recorded at AMS2 on 17 January 2018. After investigation, there is no adequate information to conclude the recorded action level exceedances are related to this Contract. No other 1-hour and 24-hour action and limit level exceedances was recorded at all monitoring stations by this Contract or Environmental Team of Contract No. HY/2013/01 in the reporting period. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of November 2017, December 2017 and January 2018.

All 1-Hour TSP results were below the Action and Limit Level in the reporting period.

### **Breaches of Action and Limit Levels for Noise**

For construction noise, no exceedance was recorded at all monitoring stations in the reporting year.

### **Breaches of Action and Limit Levels for Water Quality**

In March 2017, 1 action level exceedance of turbidity were recorded at both SR4(N) and IS8 during flood tide on 24 March 2017; 1 action level exceedance and 1 limit level exceedance of suspended solids were recorded at SR4(N) and IS8 respectively during flood tide on 24 March 2017; 1 action level exceedance of suspended solids were recorded at both SR4(N) and IS8 during ebb tide on 24 March 2017. The exceedances were considered unrelated to this Contract's activities after investigation. No other exceedance was recorded at all monitoring stations in the March 2017.

In April 2017, 1 action level exceedance of suspended solids was recorded at IS(Mf)11 during flood tide on 28 April 2017. The exceedance was considered unrelated to this Contract's activities after investigation; No other exceedance was recorded at all monitoring stations in the April 2017.

In July 2017, for impact water quality monitoring, 2 action level exceedances of suspended solids were recorded at SR3 during ebb tide on 12 July 2017 and at IS7 during flood tide on 14 July 2017 respectively. After investigation, it was concluded that those exceedance were unlikely to be contract related. No other exceedance was recorded at all monitoring stations in the July 2017.

In September 2017, total of 82 action level exceedances for dissolved oxygen and 4 limit level exceedances were recorded on 1, 6, 8, 11, 13, 15, 18, 22, 27 & 29 September 2017. 3 action level exceedances for turbidity were recorded at IS(Mf)11 on 6 September and at IS10(N) & IS(Mf)11 on 8 September 2017 during flood tide. Total of 4 action level exceedances for suspended solids were recorded at IS8, SR4(N) & SR6 on 6 September 2017 and at IS(Mf)11 on 8 September 2017 during flood tide, 1 limit level exceedance was recorded on 8 September 2017 at IS10(N) during flood tide. After investigation, it was concluded that those exceedance were unlikely related to this Contract. No other exceedance was recorded at monitoring stations in September 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of September 2017.

In October 2017, 2 action level exceedances of suspended solids were recorded at IS(Mf)11 and SR7 during flood tide on 20 October 2017. After investigation, it was concluded that those exceedances were unlikely to be contract related. No other exceedance was recorded at all monitoring stations in October 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of October 2017.

In November 2017, 6 action level exceedances of suspended solids were recorded at IS(Mf)11, IS(Mf)16 and SR7 during flood tide on 3, 6, 8 and 20 November 2017. After investigation, it was concluded that those exceedances were unlikely to be contract related. No other exceedance was recorded at all monitoring stations in November 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of November 2017.

In December 2017, 3 action level exceedances of suspended solids were recorded at SR7 during flood tide on 4 December 2017, and IS(Mf)9 during flood tide on 6 December 2017 and ebb tide on 11 December 2017 respectively. After investigation, it was concluded that those exceedance were unlikely related to this

Contract. No other exceedance was recorded at monitoring stations by Environmental Team of Contract No. HY/2013/01 in the December 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of December 2017.

In February 2018, 1 action level exceedance of suspended solids was recorded at SR7 during flood tide on 2 February 2018. After investigation, no marine-based work was conducted on the monitoring date as confirmed by the Contractor. It was concluded that the exceedance was unlikely to be contract related. No other exceedance was recorded at all monitoring stations by Environmental Team of Contract No. HY/2013/01 in the February 2018. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of February 2018.

In March 2018, for impact water quality monitoring, 1 action level exceedance of suspended solids at IS7 during flood tide on 21 March 2018. After investigation, no marine-based work was conducted on the monitoring date as confirmed by the contractor. It was concluded that the recorded exceedance not Contract-related. No other water quality exceedance was recorded at all monitoring stations by Environmental Team of Contract No. HY/2013/01 in March 2018. For level of exceedance, location and when exceedances were recorded, please refer to Appendix D of monthly EM&A report of March 2018.

In April 2018, for impact water quality monitoring, 3 action level exceedances of suspended solids at SR7 during flood tide on 18 and 23 April 2018, and at IS10(N) during flood tide on 20 April 2018. After investigation, no marine-based work was conducted on the monitoring dates as confirmed by the contractor. It was concluded that the recorded exceedances were not Contract-related. No other water quality exceedance was recorded at all monitoring stations by Environmental Team of Contract No. HY/2013/01 in the April 2018. For level of exceedance, location and when exceedances were recorded, please refer to Appendix D of monthly EM&A report of April 2018.

### **Triggering of Event and Action Plan for Impact Dolphin Monitoring**

Two (2) Limit Level exceedance of dolphin monitoring was recorded in the reporting period - March 2017 to May 2018 and June 2017 to August 2017. After investigation, it was concluded that the HZMB works is one of the contributing factors affecting the dolphins. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual marine contracts) cannot be quantified nor separate from the other stress factors. Event Action Plan for Impact Dolphin Monitoring was triggered. For investigation results please refer to Appendix L of the corresponding quarterly reports.

Impact dolphin monitoring results obtained between September 2017 and April 2018, at all transects are reported in the EM&A Report prepared for Contract No. HY/2013/01.

### **Implementation Status and Review of Environmental Mitigation Measures**

As informed by the premises owner of (AMS7A) - Chu Kong Air-Sea Union Transportation Co. LTD would not grant us the permission to install air quality monitoring equipment (High volume sampler) and conduct 1-hour TSP/24 hour TSP monitoring at the premises of Chu Kong Air-Sea Union Transportation Co. LTD after December 2015. In order to fulfil the EM&A requirement of this Contract, as permission to conduct impact air quality monitoring at the premise of Hong Kong SkyCity Marriott Hotel has been granted in December 2015, ET proposed relocation of air quality monitoring station (AMS7A) on 15 December 2015, with no further comment received from IEC on 15 December 2015 and no particular comment received from EPD on 21 December 2015, the impact air quality monitoring station AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) has been relocated to AMS7 (Hong Kong SkyCity Marriott Hotel) on 30 December 2015. The impact air quality monitoring for December 2015 was conducted before the relocation of AQM Station from AMS7A to AMS7. The impact air quality monitoring for were conducted at AMS7 (Hong Kong SkyCity Marriott Hotel) since January 2016, Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel will be adopted for this air quality monitoring location.

Due to the commencement of marine work of the Expansion of Hong Kong International Airport into a Three-Runway System (3RS Project), a large portion of works site boundary will be established at the northern part of the existing airport Island. The recent arrangement of works boundary of 3RS Project which delineates the boundary of the designated 3RS Project (for the indicative 3RS boundary, please refer to Figure 5). The

works area of 3RS project will affect several water quality monitoring stations and the dolphin monitoring transect lines which are being used for conducting monitoring under Contract No. HY/2010/02. The EM&A Programme for the HZMB HKBCF Project will therefore be affected. As a result, a proposal was prepared by ET in September 2016 in accordance with condition 5.1 of EP-353/2009/K and condition 4.1 of EP-354/2009/D, to relocate water quality monitoring stations from SR5, IS10, CS(Mf)3 and alternate the transect lines of impact dolphin monitoring 2, 3, 4, 5, 6 and 7. A revised proposal has been updated and sent to IEC/ENPO for their further review on 24 March 2017 and IEC/ENPO verified the revised proposal on the same date. The revised proposal has been sent to authority by project team for review and approval on 3 April 2017. The authority subsequently approved the proposal on 12 May 2017.

Due to substantial completion of marine works by the end of June 2017, it is anticipated that the remaining construction works under Contract No. HY/2010/02, which include ground investigation (GI) works, construction of temporary timber platform, removal of jetty and reinstatement of seawall at the western section, construction of outfall at the eastern seawall, would cause limited disturbance to water column and not to the seabed. In view of this, a proposal for change of EM&A programme/requirements was prepared by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D, to terminate water quality monitoring works at stations IS5, IS(Mf)6, IS8, SR4(N), SR5(N), SR6, SR10A, SR10B(N), CS4, CSA and CS6, and impact dolphin monitoring (line-transect vessel survey method) covering NEL and NWL when perimeter silt curtain under the Contract is completely removed and vessel traffic numbers average 10 per month for Contract No. HY/2010/02. A revised proposal has been updated and sent to IEC/ENPO for their further review on 15 August 2017 and IEC/ENPO verified the revised proposal on 16 August 2017. The revised proposal has been sent to authority by project team for review and approval on 21 August 2017. The authority subsequently approved the proposal on 7 September 2017.

As informed by IEC/ENPO on 27 December 2017, three water quality monitoring stations of SR3, SR10A and SR10B(N) were relocated due to topographical condition. Alternative water quality monitoring stations SR3(N), SR10A(N) and SR10B(N2) were justified and certified by the ET Leader of Contract No. HY/2013/01 on 8 November 2017, verified by IEC/ENPO on 13 November 2017. The proposal was submitted to the authority for review and approval on 29 November 2017. The authority subsequently approved the proposal on 22 December 2017. Relocation of water quality monitoring stations from SR3, SR10A and SR10B(N) to SR3(N), SR10A(N) and SR10B(N2) are adopted effective from 22 December 2017.

As informed by IEC/ENPO on 26 February 2018, air quality monitoring station AMS7 was relocated due to permission to carry out AQM at Hong Kong SkyCity Marriott Hotel could not be granted after the end of January 2018. Alternative air quality monitoring station AMS7B was justified and certified by ET Leader of Contract No. HY/2013/01 on 22 January 2018, verified by IEC/ENPO on 24 January 2018. The proposal was submitted to the authority for review and approval on 30 January 2018. Relocation of air quality monitoring stations from AMS7 to AMS7B is adopted effective from 6 February 2018 with the Authority's consent.

As informed by the Contractor, major construction activities for Contract no. HY/2010/02 has been substantially completed and it is anticipated that potential environmental impact for remaining works which only include ad hoc minor maintenance/touch up works on seawall under the Contract would be insignificant. In view of this, a proposal for Termination of EM&A Programme was prepared and certified by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D to terminate the EM&A Programme for Contract no. HY/2010/02. The proposal has been sent to IEC/ENPO for their further review on 17 April 2018 and IEC/ENPO verified the proposal on 18 April 2018. The proposal has been sent to authority by project team on 19 April 2018. The proposal was subsequently approved by the authority.

Most of the recommended mitigation measures, as included in the EM&A programme, were implemented properly in the reporting period.

The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Contract. The EM&A programme effectively monitored the environmental impacts from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.

Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation

measures were implemented effectively.

**Complaint, Notification of Summons and Successful Prosecution**

Four (4) environmental complaints were received in the reporting year.

No summons or successful prosecution was received in the reporting year.

## 1. INTRODUCTION

### 1.1 Background

- 1.1.1 Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Work (here below, known as “the Contract”) mainly comprises reclamation at the northeast of the Hong Kong International Airport of an area of about 130-hectare for the construction of an artificial island for the development of the Hong Kong Boundary Crossing Facilities (HKBCF), and about 19-hectare for the southern landfall of the Tuen Mun - Chek Lap Kok Link (TMCLKL).
- 1.1.2 The environmental impact assessment (EIA) reports (Hong Kong – Zhuhai – Macao Bridge Hong Kong Boundary Crossing Facilities – EIA Report (Register No. AEIAR-145/2009) (HKBCFEIA) and Tuen Mun – Chek Lap Kok Link – EIA Report (Register No. AEIAR-146/2009) (TMCLKLEIA), and their environmental monitoring and audit (EM&A) Manuals (original EM&A Manuals), for the Project were approved by Environmental Protection Department (EPD) in October 2009.
- 1.1.3 EPD subsequently issued the Environmental Permit (EP) for HKBCF in November 2009 (EP-353/2009) and the Variation of Environmental Permit (VEP) in June 2010 (EP-353/2009/A), November 2010 (EP-353/2009/B), November 2011 (EP-353/2009/C), March 2012 (EP-353/2009/D), October 2012 (EP-353/2009/E), April 2013 (EP-353/2009/F), August 2013 (EP-353/2009/G), January 2015 (EP-353/2009/H), July 2015 (EP-353/2009/I), February 2016 (EP-353/2009/J) and April 2016 (EP-353/2009/K). Similarly, EPD issued the Environmental Permit (EP) for TMCLKL in November 2009 (EP-354/2009) and the Variation of Environmental Permit (VEP) in December 2010 (EP-354/2009/A), January 2014 (EP-354/2009/B), December 2014 (EP-354/2009/C) and March 2015 (EP-354/2009/D).
- 1.1.4 The Project is a designated Project and is governed by the current permits for the Project, i.e. the amended EPs issued on 11 April 2016 (EP-353/2009/K) and 13 March 2015 (EP-354/2009/D) (for TMCLKL Southern Landfall Reclamation only).
- 1.1.5 A Contract Specific EM&A Manual, which included all Contract-relation contents from the original EM&A Manuals for the Contract, was issued in May 2012.
- 1.1.6 Ove Arup & Partners Hong Kong Limited (Arup) was appointed by Highways Department (HyD) as the consultants for the design and construction assignment for the Project’s reclamation works (i.e. the Engineer for the Contract).
- 1.1.7 China Harbour Engineering Company Limited (CHEC) was awarded by HyD as the Contractor to undertake the construction work of the Contract.
- 1.1.8 Ramboll Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) for the Project.
- 1.1.9 AECOM Asia Co. Ltd. (AECOM) was appointed by CHEC to undertake the role of Environmental Team for the Contract for carrying out the EM&A works.
- 1.1.10 The construction phase of the Contract under the EPs was commenced on 12 March 2012 and will be tentatively completed by year 2018.
- 1.1.11 According to the Contract Specific EM&A Manual, there is a need of an EM&A programme including air quality, noise, water quality and dolphin monitoring and environmental site inspections. The EM&A programme of the Project commenced on 12 March 2012.

### 1.2 Scope of Report

- 1.2.1 This is the sixth Annual EM&A Review Report under the Contract No. HY/2010/02 Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Works. This report presents a summary of the environmental monitoring and audit works, list of activities and mitigation measures proposed by the ET for the Contract from 1 March 2017 and 30 April 2018.

### 1.3 Contract Organization

1.3.1 The Contract organization structure is shown in Appendix A. The key personnel contact names and numbers are summarized in Table 1.1.

**Table 1.1 Contact Information of Key Personnel**

Party	Position	Name	Telephone	Fax
<b>Engineer's Representative (ER)</b>  (Ove Arup & Partners Hong Kong Limited)	Chief Resident Engineer	Paul Appleton	3698 5889	3698 5999
<b>Engineer's Representative (ER)</b>  (Ove Arup & Partners Hong Kong Limited)	Senior Resident Engineer	Seven Yau	3698 5850	3698 5999
<b>IEC / ENPO</b>  (Ramboll Hong Kong Limited)	Independent Environmental Checker	Raymond Dai	3465 2888	3465 2899
	Environmental Project Office Leader	Y. H. Hui	3456 2850	3465 2899
<b>Contractor</b>  (China Harbour Engineering Company Limited)	Environmental Officer	Louie Chan	36932254	2578 0413
	24-hour Hotline	Alan C.C. Yeung	9448 0325	--
<b>ET</b>  (AECOM Asia Company Limited)	ET Leader	Echo Leong	3922 9280	2317 7609

### 1.4 Summary of Construction Works

1.4.1 The construction phase of the Contract under the EP commenced on 12 March 2012.

1.4.2 As informed by the Contractor, details of the major works carried out in the reporting year are listed below:-

#### **Marine-base**

- Sloping Seawalls
- Rubble Mound Seawall
- Maintenance of silt curtain
- Maintenance of localized silt curtain
- Outfall installation
- Additional GI installation
- Construction of Permanent Seawall

**Land-base**

- Surcharge removal & laying
- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Maintenance of Temporary Marine Access at Works Area WA2
- Reinstatement of seawall

1.4.3 The construction programme of the Contract is shown in Appendix B.

1.4.4 The general layout plan of the Contract site showing the detailed works areas is shown in Figure 1.

1.4.5 The environmental mitigation measures implementation schedule are presented in Appendix C.

## 2. SUMMARY OF EM&A PROGRAMME REQUIREMENTS

### 2.1 Monitoring Parameters

- 2.1.1 The Contract Specific EM&A Manual designated 4 air quality monitoring stations, 2 noise monitoring stations, 21 water monitoring stations (9 Impact Stations, 7 Sensitive Receiver Stations and 5 Control/Far Field Stations) to monitor environmental impacts on air quality, noise and water quality respectively. Pre-set and fixed transect line vessel based dolphin survey was required in two AFCD designated areas (Northeast and Northwest Lantau survey areas). The impact dolphin monitoring at each survey area should be conducted twice per month.
- 2.1.2 For impact air quality monitoring, monitoring locations AMS2 (Tung Chung Development Pier) and AMS7 (Hong Kong SkyCity Marriott Hotel) were set up at the proposed locations in accordance with Contract Specific EM&A Manual. The conditional omission of Monitoring Station AMS6 was effective since 19 November 2012. For monitoring location AMS3 (Ho Yu College), as proposed in the Contract Specific EM&A Manual, approval for carrying out impact monitoring could not be obtained from the principal of the school. Permission on setting up and carrying out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact air quality monitoring was conducted at site boundary of the site office area in Works Area WA2 (AMS3B) respectively. Same baseline and Action Level for air quality, as derived from the baseline monitoring data recorded at Ho Yu College, was adopted for this alternative air quality location.
- 2.1.3 For impact noise monitoring, monitoring locations NMS2 (Seaview Crescent Tower 1) was set up at the proposed locations in accordance with Contract Specific EM&A Manual. However, for monitoring location NMS3 (Ho Yu College), as proposed in the Contract Specific EM&A Manual, approval for carrying out impact monitoring could not be obtained from the principal of the school. Permission on setting up and carrying out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact noise monitoring was conducted at site boundary of the site office area in Works Area WA2 (NMS3B) respectively. Same baseline noise level, as derived from the baseline monitoring data recorded at Ho Yu College was adopted for this alternative noise monitoring location. Reference is made to ET's proposal of relocation of air quality monitoring station (AMS7) dated on 2 February 2015, with no further comment received from IEC on 2 February 2015 and no objection received from EPD on 5 February 2015, the impact air quality monitoring station AMS7 (Hong Kong SkyCity Marriott Hotel) has been relocated to AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) on 3 February 2015. Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel, was adopted for this alternative air quality location.
- 2.1.4 As informed by the premises owner of (AMS7A) - Chu Kong Air-Sea Union Transportation Co. LTD would not grant us the permission to install air quality monitoring equipment (High volume sampler) and conduct 1-hour TSP/24 hour TSP monitoring at the premises of Chu Kong Air-Sea Union Transportation Co. LTD after December 2015. In order to fulfil the EM&A requirement of this Contract, as permission to conduct impact air quality monitoring at the premise of Hong Kong SkyCity Marriott Hotel has been granted in December 2015, ET proposed relocation of air quality monitoring station (AMS7A) on 15 December 2015, with no further comment received from IEC on 15 December 2015 and no particular comment received from EPD on 21 December 2015, the impact air quality monitoring station AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) has been relocated to AMS7 (Hong Kong SkyCity Marriott Hotel) on 30 December 2015. The impact air quality monitoring for December 2015 was conducted before the relocation of AQM Station from AMS7A to AMS7. The impact air quality monitoring has been conducted at AMS7 (Hong Kong SkyCity Marriott Hotel) since 1 January 2016, Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel will be adopted for this air quality monitoring location.
- 2.1.5 In accordance with the Contract Specific EM&A Manual, twenty-one stations were designated for impact water quality monitoring. The nine Impact Stations (IS) were chosen on the basis of their proximity to the reclamation and thus the greatest potential for water quality impacts, the seven Sensitive Receiver Stations (SR) were chosen as they are close to the key sensitive receives and the

five Control/ Far Field Stations (CS) were chosen to facilitate comparison of the water quality of the IS stations with less influence by the Project/ ambient water quality conditions.

- 2.1.6 Due to safety concern and topographical condition of the original locations of SR4 and SR10B, alternative impact water quality monitoring stations, naming as SR4(N) and SR10B(N), were adopted, which are situated in vicinity of the original impact water quality monitoring stations (SR4 and SR10B) and could be reachable. Same baseline and Action Level for water quality, as derived from the baseline monitoring data recorded, were adopted for these alternative impact water quality monitoring stations.
- 2.1.7 The monitoring locations used during the reporting period are depicted in Figures 2, 3 and 4 respectively.
- 2.1.8 Due to the commencement of marine work of the Expansion of Hong Kong International Airport into a Three-Runway System (3RS Project), a large portion of works site boundary will be established at the northern part of the existing airport Island. The recent arrangement of works boundary of 3RS Project which delineates the boundary of the designated 3RS Project (for the indicative 3RS boundary, please refer to Figure 5). The works area of 3RS project will affect several water quality monitoring stations and the dolphin monitoring transect lines which are being used for conducting monitoring under Contract No. HY/2010/02. The EM&A Programme for the HZMB HKBCF Project will therefore be affected. As a result, a proposal was prepared by ET in September 2016 in accordance with condition 5.1 of EP-353/2009/K and condition 4.1 of EP-354/2009/D, to relocate water quality monitoring stations from SR5, IS10, CS(Mf)3 and alternate the transect lines of impact dolphin monitoring 2, 3, 4, 5, 6 and 7. A revised proposal has been updated and sent to IEC/ENPO for their further review on 24 March 2017 and IEC/ENPO verified the revised proposal on the same date. The revised proposal has been sent to authority by project team for review and approval on 3 April 2017. The authority subsequently approved the proposal on 12 May 2017.
- 2.1.9 Due to substantial completion of marine works by the end of June 2017, it is anticipated that the remaining construction works under Contract No. HY/2010/02, which include ground investigation (GI) works, construction of temporary timber platform, removal of jetty and reinstatement of seawall at the western section, construction of outfall at the eastern seawall, would cause limited disturbance to water column and not to the seabed. In view of this, a proposal for change of EM&A programme/requirements was prepared by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D, to terminate water quality monitoring works at stations IS5, IS(Mf)6, IS8, SR4(N), SR5(N), SR6, SR10A, SR10B(N), CS4, CSA and CS6, and impact dolphin monitoring (line-transect vessel survey method) covering NEL and NWL when perimeter silt curtain under the Contract is completely removed and vessel traffic numbers average 10 per month for Contract No. HY/2010/02. A revised proposal has been updated and sent to IEC/ENPO for their further review on 15 August 2017 and IEC/ENPO verified the revised proposal on 16 August 2017. The revised proposal has been sent to authority by project team for review and approval on 21 August 2017. The authority subsequently approved the proposal on 7 September 2017.
- 2.1.10 As informed by IEC/ENPO on 27 December 2017, three water quality monitoring stations of SR3, SR10A and SR10B(N) were relocated due to topographical condition. Alternative water quality monitoring stations SR3(N), SR10A(N) and SR10B(N2) were justified and certified by the ET Leader of Contract No. HY/2013/01 on 8 November 2017, verified by IEC/ENPO on 13 November 2017. The proposal was submitted to the authority for review and approval on 29 November 2017. The authority subsequently approved the proposal on 22 December 2017. Relocation of water quality monitoring stations from SR3, **SR10A** and SR10B(N) to SR3(N), SR10A(N) and SR10B(N2) are adopted effective from 22 December 2017.
- 2.1.11 As informed by IEC/ENPO on 26 February 2018, air quality monitoring station AMS7 was relocated due to permission to carry out AQM at Hong Kong SkyCity Marriott Hotel could not be granted after the end of January 2018. Alternative air quality monitoring station AMS7B was justified and certified by ET Leader of Contract No. HY/2013/01 on 22 January 2018, verified by IEC/ENPO on 24 January 2018. The proposal was submitted to the authority for review and approval on 30 January 2018. Relocation

of air quality monitoring stations from AMS7 to AMS7B is adopted effective from 6 February 2018 with the Authority's consent.

- 2.1.12 As informed by the Contractor, major construction activities for Contract no. HY/2010/02 has been substantially completed and it is anticipated that potential environmental impact for remaining works which only include ad hoc minor maintenance/touch up works on seawall under the Contract would be insignificant. In view of this, a proposal for Termination of EM&A Programme was prepared and certified by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D to terminate the EM&A Programme for Contract no. HY/2010/02. The proposal has been sent to IEC/ENPO for their further review on 17 April 2018 and IEC/ENPO verified the proposal on 18 April 2018. The proposal has been sent to authority by project team on 19 April 2018. The proposal was subsequently approved by the authority.
- 2.1.13 The monitoring locations used during the reporting year are depicted in Figures 2, 3 and 4 respectively.
- 2.1.14 The Contract Specific EM&A Manual also required environmental site inspections for air quality, noise, water quality, chemical, waste management, marine ecology and landscape and visual impact.

## 2.2 Environmental Quality Performance (Action/Limit Levels)

- 2.2.1 The environmental quality performance limits (i.e. Action and/or Limit Levels) of air, water quality and Chinese White Dolphin monitoring were derived from the baseline air, baseline water quality monitoring results at the respective monitoring stations and baseline Chinese White Dolphin monitoring respectively, while the environmental quality performance limits of noise monitoring were defined in the EM&A Manual.
- 2.2.2 The environmental quality performance limits of air quality, noise, water and Chinese White Dolphin monitoring are given in Appendix D.

## 2.3 Environmental Mitigation Measures

- 2.3.1 Relevant environmental mitigation measures were stipulated in the Particular Specification and EPs (EP-353/2009/K and EP-354/2009/D) (for TMCLKL Southern Landfall Reclamation only) for the Contractor to adopt. A list of environmental mitigation measures and their implementation statuses are given in Appendix C.

## 3. MONITORING RESULTS

### 3.1 Air Quality Monitoring

#### 3.1.1 Introduction

- 3.1.1.1. In accordance with the Contract Specific EM&A Manual, impact 1-hour Total Suspended Particulates (TSP) monitoring was conducted for at least three times every 6 days, while impact 24-hour TSP monitoring was carried out for at least once every 6 days at the 4 monitoring stations (AMS2, AMS3B, AMS6 and AMS7).
- 3.1.1.2. The monitoring locations for impact air quality monitoring are depicted in Figure 2. However, for AMS6 (Dragonair/CNAC (Group) Building), permission on setting up and carrying out impact monitoring works was sought, however, access to the premise has not been granted yet on this report issuing date.
- 3.1.1.3. Reference is made to ET's proposal of relocation of air quality monitoring station (AMS7) dated on 2 February 2015, with no further comment received from IEC on 2 February 2015 and no objection received from EPD on 5 February 2015, the impact air quality monitoring station AMS7 (Hong Kong SkyCity Marriott Hotel) has been relocated to AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) on 3 February 2015 and monitoring work at AMS7A commenced on 5 February

2015. Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel, was adopted for this alternative air quality location.

- 3.1.1.4. ET proposed relocation of air quality monitoring station (AMS7A) on 15 December 2015, with no further comment received from IEC on 15 December 2015 and no particular comment received from EPD on 21 December 2015. The impact air quality monitoring were conducted at AMS7 (Hong Kong SkyCity Marriott Hotel), Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel will be adopted for this air quality monitoring location.
- 3.1.1.5. As informed by IEC/ENPO on 26 February 2018, air quality monitoring station AMS7 was relocated due to permission to carry out AQM at Hong Kong SkyCity Marriott Hotel could not be granted after the end of January 2018. Alternative air quality monitoring station AMS7B was justified and certified by ET Leader of Contract No. HY/2013/01 on 22 January 2018, verified by IEC/ENPO on 24 January 2018. The proposal was submitted to the authority for review and approval on 30 January 2018. Relocation of air quality monitoring stations from AMS7 to AMS7B is adopted effective from 6 February 2018 with the Authority's consent.
- 3.1.1.6. The weather was mostly sunny and fine, with occasional cloudy and occasional rainy in the reporting period. The major dust source in the reporting period included construction activities from the Contract, as well as nearby traffic emissions.
- 3.1.1.7. The number of monitoring events and exceedances recorded in each month of the reporting period are presented in Table 3.1 and Table 3.2 respectively.
- 3.1.1.8. The baseline and impact air quality monitoring data are provided in the baseline monitoring report and monthly EM&A reports respectively. The graphical plots of the impact air quality monitoring results are provided in Appendix E. No specific trend of the monitoring results or existence of persistent pollution source was noted.

**Table 3.1 Summary of Number of Monitoring Events for 1-hr & 24-hr TSP Concentration**

Monitoring Parameter	Location	No. of monitoring events*
		Mar 17 – Apr 18
1-hr TSP	AMS2	102
	AMS3B	102
	AMS7/7B	102
24-hr TSP	AMS2	34
	AMS3B	34
	AMS7/7B	34

\*No. of monitoring events carried out under this Contract only. The rest of the monitoring events between September 2017 and April 2018 for 1-hour TSP and 24-hour TSP are reported in the EM&A Report prepared for Contract No. HY/2013/01.

**Table 3.2 Summary of Number of Exceedances for 1-hr & 24-hr TSP Monitoring**

Monitoring Parameter	Location	Level of Exceedance	Number of Exceedance
			Mar 17 – Apr 18
1-hr TSP	AMS2	Action	0
		Limit	0
	AMS3B	Action	0
		Limit	0
	AMS7/7B	Action	0
		Limit	0
<b>Total</b>			<b>0</b>
24-hr TSP	AMS2	Action	1
		Limit	0
	AMS3B	Action	3
		Limit	0
	AMS7/7B	Action	0
		Limit	0

	<b>Total</b>	<b>4</b>
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**3.1.2 Environmental Mitigation Measures**

3.1.2.1 Relevant Air mitigation measures, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of air quality mitigation measures is depicted in Appendix C.

**3.1.3 Summary of Actions Taken in the event of Non-Compliance**

3.1.3.1 Other than the mitigation measures implemented as mentioned in Appendix C, in the event of non-compliance, actions were taken in accordance with the Event-Action Plan in the EM&A Manual. The Contractor was notified immediately. Investigation was carried out within three working days of identification of non-compliance such as identifying the air pollution sources, checking the implementation status of the mitigation measures, etc., and measurement was repeated to confirm the investigation findings. Further investigation was carried out to identify the source of pollution when deemed necessary. In summary, no direct evidence between the exceedance at AMS2 and AMS3B and the Hong Kong Boundary Crossing Facilities - reclamation works could be established for all non-compliances and therefore no action was required to be taken.

**3.1.4 Review of Reasons for and the implications of Non-Compliance**

3.1.4.1 A total of 4 Action Level exceedance were recorded during the 24-hr TSP impact monitoring period. No exceedance of 1-hour TSP exceedance level was recorded at all monitoring station during the 1-hr TSP impact monitoring period. Investigation into the possible causes of each exceedance was undertaken and reported in the respective monthly EM&A reports

**3.1.5 Environmental Acceptability of the Contract**

**3.1.5.1 Trend of 1-hour and 24-hour TSP**

3.1.5.1.1 The 24-hour TSP monitoring results were well below the Action and Limit levels. The trend of TSP at AMS2, AMS3B and AMS7 were comparable to the baseline range and showed no noticeable deterioration of air quality during the impact monitoring period.

**3.1.5.2 Correlation between exceedances with possible dust generating activities**

3.1.5.2.1 Possible dust generating activities of the Contract did not cause any noticeable deterioration in air quality at Hong Kong Boundary Crossing Facilities – Reclamation Works. With proper implementation of air quality mitigation measures, the monitoring results showed no adverse air quality impact.

### 3.1.5.3 Comparison of EM&A results with EIA predictions

**Table 3.3 Maximum Predicted TSP concentrations under the “Mitigated” scenario**

ASR	Location	Predicted Daily Concentrations*		Average Impact 1-hour TSP Levels#, $\mu\text{g}/\text{m}^3$	Average Impact 24-hour TSP Levels#, $\mu\text{g}/\text{m}^3$
		1-hour	24-hour		
AMS7/AMS7B	Hong Kong SkyCity Marriott Hotel	344	92	71	46

\*Extracted from Table 5-8 of the EIA report

# Both average Impact 1-hour TSP Levels and average Impact 24-hour TSP Levels were calculated using monitoring data obtained by this Contract between March 2017 to August 2017. Monitoring works and monitoring data between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF –Passenger Clearance Building.

3.1.5.3.1 At 1-hour and 24-hour TSP monitoring station at AMS7/AMS7B, the average 24-hour TSP levels recorded in the EM&A programme were in similar magnitude as the Daily dust level predicted in the EIA.

#### 3.1.6 Practicality and Effectiveness of the EIA process and the EM&A programme

3.1.6.1 Monitoring and auditing of air quality was recommended for the construction phase of the Project in the EIA to ensure no exceedance of the TSP standard at the sensitive receiver.

3.1.6.2 The air quality monitoring methodology was effective in monitoring the air quality impacts of the Contract. Baseline monitoring of 1-hour and 24-hour TSP helped to determine the ambient TSP levels at the sensitive receiver prior to commencement of construction works. During periods when there were possible dust generating construction activities, impact monitoring of 24-hour TSP helped to determine whether the Contract caused unacceptable air quality impacts on the sensitive receiver. As the scope of the Contract mainly includes reclamation works during the reporting period and dust generation from the construction activities such as wind erosion and sand filling is the key concern during the construction phase. The monitoring of TSP was therefore considered to be cost effective for the Contract.

3.1.6.3 All recommended mitigation measures were applicable to the Contract. As discussed above, the Contract did not cause unacceptable air quality impacts. However, as the nature of the Contract is reclamation works of approximately 130 hectares of land in size, some mitigation measures in practice were generally focused on dust generating activities only. Nevertheless, the mitigation measures implemented were effective and efficient in controlling air quality impacts.

3.1.6.4 Monitoring and audit of 24-hour TSP levels had ensured that any deterioration in air quality was readily detected and timely actions taken to rectify any non-compliance. Assessment and analysis of 24-hour TSP results collected throughout the baseline and impact monitoring periods also demonstrated the environmental acceptability of the Contract. Weekly site inspections had ensured that the EIA recommended air quality mitigation measures were effectively implemented. The EM&A program is considered to be cost effective.

#### 3.1.7 Conclusion

3.1.7.1 Air quality monitoring for the Contract was conducted during the baseline and impact monitoring periods. Key construction activities including sloping seawalls, rubble mound seawall, maintenance of silt curtain, outfall installation, additional GI installation, reinstatement of seawall, surcharge removal & laying, construction of permanent seawall, maintenance works of site office, works of public works regional laboratory at works area and maintenance of temporary marine access. The trend of 1-Hour TSP and 24-hour TSP was comparable to the baseline range and showed no noticeable deterioration of air quality

during the monitoring period. Although exceedances were recorded, they were isolated and short-term events. There is no evidence of long-term deteriorating trend.

- 3.1.7.2 The average 24-hour TSP levels recorded at AMS7 in EM&A programme were in similar magnitude with the Daily dust level predicted in the EIA. No TSP level was predicted by the Project EIA at AMS2 and AMS3B and therefore, no comparison of EM&A data with EIA predictions could be made. Air quality mitigation measures implemented were effective in controlling air quality impacts.

### 3.2 Noise Monitoring

#### 3.2.1 Introduction

3.2.1.1 Impact noise monitoring was conducted at the 2 monitoring stations (NMS2 and NMS3B) for at least once per week during 07:00 – 19:00 in the reporting period.

3.2.1.2 The monitoring locations used during the reporting period are depicted in Figure 2.

3.2.1.3 Major noise sources during the noise monitoring included construction activities of the Contract and nearby traffic noise.

3.2.1.4 The number of impact noise monitoring events and exceedances are summarized in Table 3.4 and Table 3.5 respectively.

**Table 3.4 Summary of Number of Monitoring Events for Impact Noise**

Monitoring Parameter	Location	No. of monitoring events
		Mar 17- April 18
Noise	NMS2	27
	NMS3B	27

\*Only no. of monitoring events carried out under this Contract is reported. The rest of the monitoring events between September 2017 and April 2018 for construction noise monitoring are reported in the EM&A Report prepared for Contract No. HY/2013/01.

**Table 3.5 Summary of Number of Monitoring Exceedances for Impact Noise**

Monitoring Parameter	Location	Level of Exceedance	No. of Exceedance(s)
Noise	NMS2	Action	0
		Limit	0
	NMS3B	Action	0
		Limit	0
	<b>Total</b>		

3.2.1.5 The graphical plots of the trends of the monitoring results are provided in Appendix F. No specific trend of the monitoring results or existence of persistent pollution source was noted.

#### 3.2.2 Environmental Mitigation Measures

3.2.2.1. Relevant noise mitigation measures, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of noise mitigation measures is depicted

in Appendix C. Construction Noise Permits were applied and complied with when construction works were carried out during restricted hours.

### 3.2.3 Non-compliance (exceedances) of the Environmental Quality Performance Limits (Action and Limit Levels)

#### 3.2.3.1 Summary of Non-compliance (Exceedances)

3.2.3.1.1 Table 3.5 summarised the number exceedance recorded at each monitoring station throughout the impact monitoring period. There was no exceedance recorded at both NMS2 and NMS3B.

#### 3.2.3.2 Summary of Actions Taken in the event of Non-Compliance

3.2.3.2.1 No event of non-compliance of construction noise was recorded in the reporting period.

#### 3.2.3.3 Review of Reasons for and the implications of Non-Compliance

3.2.3.3.1 No event of non-compliance of construction noise was recorded in the reporting period.

3.2.3.3.2 In summary, the average impact noise levels recorded in the reporting period were generally within the range of the predicted construction noise levels in the Project EIA.

### 3.2.4 Environmental Acceptability of the Contract

#### 3.2.4.1 Trend of Measured Noise Level (Leq)

3.2.4.1.1 All the noise monitoring results for all monitoring stations were below the Action and Limit levels. The trend showed no noticeable noise impact from the Contract during the impact monitoring period.

#### 3.2.4.2 Correlation between exceedances with possible noise generating activities

3.2.4.2.1 No Exceedance was recorded for all monitoring stations. The impact noise levels recorded were generally similar to the predicted construction noise levels in the Project EIA.

### 3.2.5 Comparison of EM&A results with EIA predictions

3.2.5.1 The EIA predicted that noise emitted by the use of Powered Mechanical Equipment (PME) on site would be the major source of noise impact during construction. The Construction Noise Impact at Noise Sensitive Receivers are summarised in Table 3.6 (extracted from Table 6-9 of the EIA Report).

**Table 3.6 Construction Noise Impact at Noise Sensitive Receivers**

NSR	Location	Predicted Noise Levels, dB(A)	
		Total Noise Impacts, dB(A)	Criterion, dB(A)
NMS2	Seaview Crescent Tower 1	74	75

3.2.5.2 During the construction period of the Contract, no exceedances were received in the impact monitoring period. The measured impact noise levels of the Contract for each monitoring station are summarised in Table 3.7 for comparison with EIA.

**Table 3.7 Summary of Construction Noise Monitoring Results in the Reporting Period**

NSR	Location	Average <sup>#</sup> , dB(A), Leq,30 mins	Range <sup>#</sup> , dB(A), Leq,30 mins	Limit Level, dB(A), Leq,30 mins
NMS2	Seaview Crescent Tower 1	67	63 – 69*	75
NMS3B	Site Boundary of Site Office Area at Works Area WA2	66	53 – 69*	70

\* +3dB(A) Façade correction included

# Both average and range of construction noise were calculated using monitoring data obtained by this Contract between March 2017 to August 2017. Monitoring works and monitoring data between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF – Passenger Clearance Building.

3.2.5.3 The average impact noise levels recorded in EM&A during impact monitoring were all within the range of the predicted construction noise levels in the EIA Report.

### 3.2.6 **Practicality and Effectiveness of the EIA process and the EM&A programme**

3.2.6.1 Monitoring and auditing of noise was recommended for the construction phase of the Project in the EIA process to ensure compliance with the appropriate criterion at the receivers.

3.2.6.2 The noise monitoring methodology was effective in monitoring the noise impacts of the Contract. Baseline noise monitoring determined the ambient noise levels at the sensitive receivers prior to commencement of construction works. During periods when possible noise generating construction activities were on-going, impact noise monitoring would determine whether the Contract caused adverse noise impacts on the sensitive receivers. The monitoring methodology which focus on  $L_{eq30}$  minute therefore considered to be cost effective for the Contract.

3.2.6.3 Noise mitigation measures recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to implement during the construction phase of the Project. The list of noise mitigation measures is depicted in Appendix C. All recommended mitigation measures were applicable to the Contract. As discussed above, the Contract did not cause adverse noise impacts to the receivers. Therefore, the mitigation measures implemented were effective and efficient in controlling noise impacts.

3.2.6.4 Monitoring and audit of noise levels ensured that any noise impact to the receivers would readily be detected and timely actions could be taken to rectify any non-compliance. Assessment and analysis of noise results collected throughout the baseline and impact monitoring periods also demonstrated the environmental acceptability of the Contract. Weekly site inspections ensured that the EIA recommended noise mitigation measures were effectively implemented. The EM&A program is considered to be cost effective.

### 3.2.7 **Conclusion**

3.2.7.1 The trend of  $L_{eq}$  was comparable to the baseline range and showed no noticeable noise impact during the impact monitoring period. Although exceedance was recorded, there was no evidence of long-term increasing trend. The average impact noise levels recorded in EM&A programme were all lower than the construction noise levels predicted in the EIA.

### 3.3 Water Quality Monitoring

#### 3.3.1 Introduction

3.3.1.1 Impact water quality monitoring was conducted 3 times per week during mid-ebb and mid-flood tides at 21 water monitoring stations (9 Impact Stations, 7 Sensitive Receiver Stations and 5 Control/Far Field Stations).

3.3.1.2 The monitoring locations used during the reporting period are depicted in Figure 3A to Figure 3D.

3.3.1.3 Number of impact water quality monitoring events and exceedances recorded in the reporting period at each impact station are summarized in Table 3.8 and Table 3.9 respectively.

**Table 3.8 Summary of Number of Monitoring Events for Impact Water Quality**

Monitoring Parameter	Tide	No. of monitoring events	
		Mar 17 – Apr 18	
Water Quality	Mid-Ebb	77	
	Mid-Flood	77	

\*monitoring works between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF –Passenger Clearance Building.

**Table 3.9 Summary of Water Quality Exceedances in Mar 17 – Apr 18**

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
IS5	Action	0	0	(1) 1 Sep 2017	(1) 1 Sep 2017	0	0	0	0	(1) 1 Sep 2017	(1) 1 Sep 2017
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)6	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS7	Action	(1) 8 Sep 2017	0	(1) 8 Sep 2017	0	0	0	0	(2) 14 Jul 2017, 21 Mar 2018	(2) 8 Sep 2017	(2) 14 Jul 2017, 21 Mar 2018
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	(1) 24 Mar 2017	(1) 24 Mar 2017	(1) 6 Sep 2017	(1) 24 Mar 2017	(2) 24 Mar, 6 Sep 2017
	Limit	0	0	0	0	0	0	0	(1) 24 Mar 2017	0	(1) 24 Mar 2017
IS(Mf)9	Action	0	(3) 8, 11, 22 Sep 2017	0	(1) 13 Sep 2017	0	0	(1) 11 Dec 2017	(1) 6 Dec 2017	(1) 11 Dec 2017	(5) 8, 11, 13, 22 Sep, 6 Dec 2017
	Limit	0	0	0	0	0	0	0	0	0	0

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
IS10/ IS10(N)	Action	(5) 8, 11, 13, 22, 29 Sep 2017	(3) 8, 11, 22 Sep 2017	(6) 1, 15, 18, 22, 27, 29 Sep 2017	(4) 1, 11, 15, 29 Sep 2017	0	(1) 8 Sep 2017	0	(1) 20 Apr 2018	(11) 1, 8, 11, 13, 15, 18 22, 27, 29 Sep 2017	(9) 8, 11, 22 Sep 2017, 20 Apr 2018
	Limit	0	0	0	0	0	0	0	(1) 8 Sep 2017	0	(1) 8 Sep 2017
IS(Mf)11	Action	(3) 11, 15, 22 Sep 2017	(5) 8, 11, 13, 15, 22 Sep 2017	(4) 1, 11, 18, 29 Sep 2017	(4) 1, 8, 11, 29 Sep 2017	0	(2) 6, 8 Sep 2017	0	(5) 28 Apr, 8 Sep, 20 Oct, 3, 8 Nov 2017	(7) 1, 11, 15, 18, 22, 29 Sep 2017	(16) 28 Apr, 1, 8, 11, 13, 15, 22, 29 Sep, 20 Oct, 3, 8 Nov 2017
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)16	Action	(1) 8 Sep 2017	(3) 8, 11, 22 Sep 2017	(5) 8, 11, 13, 18, 29 Sep 2017	(2) 11, 13 Sep 2017	0	0	0	(1) 6 Nov 2017	(6) 8, 11, 13, 18, 29 Sep 2017	(6) 8, 11, 13, 22 Sep, 6 Nov 2017
	Limit	0	0	0	0	0	0	0	0	0	0
IS17	Action	(3) 8, 11, 15 Sep 2017	(5) 8, 11, 13, 22, 29 Sep 2017	(7) 1, 6, 8, 11, 13, 15, 27 Sep 2017	(3) 8, 11, 13 Sep 2017	0	0	0	0	(10) 1, 6, 8, 11, 13, 15, 27 Sep 2017	(8) 8, 11, 13, 22, 29 Sep 2017
	Limit	0	0	0	0	0	0	0	0	0	0
SR3/ SR3(N)	Action	(2) 8, 22 Sep 2017	(1) 8 Sep 2017	0	0	0	0	(1) 12 Jul 2017	0	(3) 12 Jul, 8, 22 Sep 2017	(1) 8 Sep 2017
	Limit	0	0	0	0	0	0	0	0	0	0
SR4(N)	Action	0	0	0	0	0	(1) 24 Mar 2017	(1) 24 Mar 2017	(2) 24 Mar, 6 Sep 2017	(1) 24 Mar 2017	(3) 24 Mar, 6 Sep 2017

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
	Limit	0	0	0	0	0	0	0	0	0	0
SR5/ SR5(N)	Action	0	0	(1) 1 Sep 2017	0	0	0	0	0	(1) 1 Sep 2017	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR6	Action	0	(1) 6 Sep 2017	0	0	0	0	0	(1) 6 Sep 2017	0	(2) 6 Sep 2017
	Limit	0	0	0	0	0	0	0	0	0	0
SR7	Action	(1) 11 Sep 2017	(3) 8, 11, 22 Sep 2017	0	0	0	0	0	(8) 20 Oct, 3, 6, 20 Nov, 4 Dec 2017, 2 Feb, 18, 23 Apr 2018	(1) 11 Sep 2017	(11) 8, 11, 22 Sep, 20 Oct, 3, 6, 20 Nov, 4 Dec 2017, 2 Feb, 18, 23 Apr 2018
	Limit	0	0	0	0	0	0	0	0	0	0
SR10A/ SR10A(N)	Action	0	0	0	(1) 6 Sep 2017	0	0	0	0	0	(1) 6 Sep 2017
	Limit	(1) 6 Sep 2017	(1) 6 Sep 2017	0	0	0	0	0	0	(1) 6 Sep 2017	(1) 6 Sep 2017
SR10B(N)/ SR10B(N2)	Action	0	0	0	(1) 6 Sep 2017	0	0	0	0	0	(1) 6 Sep 2017
	Limit	(1) 6 Sep 2017	(1) 6 Sep 2017	0	0	0	0	0	0	(1) 6 Sep 2017	(1) 6 Sep 2017
<b>Total</b>	<b>Action</b>	<b>16</b>	<b>24</b>	<b>25</b>	<b>17</b>	<b>0</b>	<b>5</b>	<b>4</b>	<b>22</b>	<b>113</b>	
	<b>Limit</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>	

Note: S: Surface;  
 M: Mid-depth;

3.3.1.4 Please refer to the monthly EM&A report (March 2017 to April 2018) accordingly for the details of the captioned exceedances.

3.3.1.5 The graphical plots of the trends of the monitoring results are provided in Appendix G. No specific trend of the monitoring results or existence of persistent pollution source was noted.

### 3.3.2 Environmental Mitigation Measures

3.3.2.1 Relevant water quality mitigation measures, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of water quality mitigation measure is depicted in Appendix C.

### 3.3.3 Non-compliance (exceedances) of the Environmental Quality Performance Limits (Action and Limit Levels)

#### 3.3.3.1 Summary of Non-compliance (Exceedances)

3.3.3.1.1 Table 3.9 summarised the number of dissolved oxygen, turbidity and suspended solids exceedances recorded at each sensitive receiver station throughout the impact monitoring period. A total of 118 exceedances were recorded during the reporting period with 112 Action level exceedances and 6 Limit level exceedances.

### 3.3.4 Review of Reasons for and the implications of Non-Compliance

3.3.4.1 Twenty five (25) Action Level exceedances and two (2) Limit Level exceedances of measured suspended solids (SS) values (in mg/L) were recorded during the reporting period. After investigation, all impact water quality exceedances were considered not related to this Contract. For details of investigation please refer to monthly EM&A Report of this Contract.

3.3.4.2 After review of the investigation results of the water quality exceedances (for detail of investigations please refer to section 4 of monthly EM&A report (Mar 17 to Apr 18), ambient conditions were considered to have effects on the water quality monitoring results. Exceedances were considered to be due local effects in the vicinity of the monitoring station where exceedance was recorded and after investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

### 3.3.5 Environmental Acceptability of the Contract

#### 3.3.5.1 Trend of water quality

##### Dissolved Oxygen

3.3.5.1.1 The dissolved oxygen levels recorded in the impact monitoring period showed a seasonal trend in which lower DO levels were recorded during the wet season and higher DO levels were recorded during the dry season. One reason for this seasonal trend may have been the increase in water temperature during the wet season leading to a decrease in the solubility of oxygen in water and vice versa during the dry season. The trend of dissolved oxygen levels was presented in Appendix G. Although action and limit levels of DO levels were triggered in September 2017, they were concluded not related to this Contract's construction activities after investigations were carried out according the Event and Action Plan of corresponding approved EM&A manual. Furthermore the trend of dissolved oxygen levels at each monitoring stations in Appendix G did not show any noticeable deterioration of dissolved oxygen levels.

##### Turbidity

3.3.5.1.2 The turbidity levels of each impact monitoring station was shown similar with that of control stations of each tide. The trend of turbidity levels of each monitoring station was shown in Appendix G. Turbidity levels of all monitoring stations were lower than the Action Level during the monitoring period.

##### Suspended Solids

3.3.5.1.3 The trend of suspended solid levels of each impact monitoring station was shown similar with that of control stations of each tide. The trend of suspended solid levels of each monitoring station was shown

in Appendix G. Despite few isolated events, suspended solids levels of all monitoring stations were still lower than the Action Level during the monitoring period.

### 3.3.6 Correlation between exceedances with possible marine construction activities

3.3.6.1 With proper implementation of water quality mitigation measures, marine construction activities of the Contract were not observed to cause any unacceptable water quality impacts to the sensitive receiver stations.

**Table 3.10 Summary of number of water quality exceedances per monitoring month**

Month (mm/yy)	Imported Fill* m <sup>3</sup> /month	Depth averaged DO	Depth averaged Turbidity	Depth averaged SS	Total
03/17	20,601.3	0	2	4	6
04/17	39,960.7	0	0	1	1
05/17	22,430.7	0	0	0	0
06/17	0	0	0	0	0
07/17	0	0	0	2	2
08/17	0	0	0	0	0
09/17	0	86	3	5	94
10/17	0	0	0	2	2
11/17	0	0	0	6	6
12/17	0	0	0	3	3
01/18	0	0	0	0	0
02/18	0	0	0	1	1
03/18	0	0	0	1	1
04/18	0	0	0	3	3

\*Only marine filling is counted

3.3.6.2 As shown in Table 3.10, there was no apparent correlation between the filling rates and the number of water quality exceedances recorded per monitoring day.

3.3.6.3 For dissolved oxygen, the numbers of dissolved oxygen exceedances show no noticeable deterioration of dissolved oxygen or correlation between filling rate and dissolved oxygen exceedance.

3.3.6.4 For turbidity, the numbers of turbidity exceedances show no noticeable deterioration of turbidity or correlation between filling rate and turbidity exceedance.

3.3.6.5 For suspended solids, the numbers of suspended solids exceedances show no noticeable deterioration of suspended solid or correlation between filling rate and suspended exceedance.

3.3.6.6 The trend did not show any correlation between water quality impact and the filling rates during the impact monitoring period.

3.3.6.7 With proper implementation of water quality mitigation measures and additional mitigation measures, marine construction activities of the Contract were not observed to cause any unacceptable water quality impacts to the sensitive receiver stations.

### 3.3.7 Comparison of EM&A results with EIA predictions

3.3.7.1 Results from the sensitive receiver stations were compared with the EIA predictions for the sensitive receivers in the following manner:

- WSR 27 - San Tau Beach SSSI with SR3
- WSR 22c- Tai Ho Wan Inlet (outside) with SR4(N)
- WSR 25 - Cooling water intake at HK International Airport with SR5

Dissolved oxygen (DO)

- 3.3.7.2 According to Section 9.10.7.4 of the EIA Report, the dissolved oxygen depletion from the loss of sediment to suspension during the construction of the reclamation for HKBCF was calculated to be 0.4 mg/L at WSR25. Since, as stated in the Table 9.6a of the EIA report the DO of the NW Western water is generally high with average ranges between 5.7 – 6.8 mg/L and depletion will not be detrimental to the ecological systems of the area. The average Depth averaged DO record at SR5 is 7.1 mg/L in Apr 2017 when the filling rate/month is the highest during the reporting period and therefore no significant dissolved oxygen depletion from was noted during impact monitoring.
- 3.3.7.3 The baseline dissolved oxygen levels and the level of depletion during impact monitoring at each sensitive receiver are summarised in Tables 3.11.

**Table 3.11 Comparison of depth averaged dissolved oxygen levels (Surface & Mid-depth, Bottom depth) during baseline and impact monitoring period (mgL<sup>-1</sup>)**

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Monitoring Depth	Baseline mean		Impact mean (Apr 2017)		Depletion during Impact Monitoring	
			Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
SR3	SR3/SR3(N)*	Surface & mid	6.8	6.7	7.5	7.4	-0.7	-0.7
		Bottom	-	6.2	-	-	-	-
SR4 <sup>^</sup>	SR4(N)**	Surface & mid	6.1	6.3	7.5	7.3	-1.4	-1.0
		Bottom	6.0	6.2	7.4	7.3	-1.4	-1.1
SR5	SR5/SR5(N)	Surface & mid	6.4	6.3	7.3	7.1	-0.9	-0.8
		Bottom	6.1	6.1	7.2	7.0	-1.1	-0.9
SR6	SR6	Surface & mid	6.6	6.5	7.4	7.1	-0.8	-0.6
		Bottom	6.2	6.1	7.3	7.0	-1.1	-0.9
SR7	SR7	Surface & mid	6.3	6.0	7.3	7.3	-1.0	-1.3
		Bottom	6.1	5.9	7.1	7.2	-1.0	-1.3
SR10A	SR10A/SR10A(N)	Surface & mid	6.0	6.0	7.2	7.2	-1.2	-1.2
		Bottom	5.7	5.8	7.1	7.1	-1.4	-1.3
SR10B <sup>^</sup>	SR10B(N)/SR10B(N2)	Surface & mid	6.1	6.0	7.2	7.4	-1.1	-1.4
		Bottom	6.2	5.8	7.1	7.3	-0.9	-1.5

<sup>^</sup>Due to safety issue, the water quality monitoring location of SR4 has been changed to SR4(N) and water quality monitoring location of SR10B has been changed as SR10B(N) during impact monitoring.

\*Only mid-depth station of DO were monitored at SR3 in mid-ebb during baseline monitoring, in both mid-ebb and mid-flood during impact monitoring as the water depth less than 3m.

\*\* The mid-depth station of DO was omitted at SR4(N) during impact monitoring as the water depth is less than 6m.

- 3.3.7.4 Comparing baseline averaged dissolved oxygen levels with EM&A results; no significant depletion was found at all sensitive receiver locations. There was no adverse effect on dissolved oxygen concentrations as a result of the filling works of the Contract as the depleted dissolved oxygen concentrations did not breach the Water Quality Objectives nor did they exceed the AL levels adopted for the Contract.

Suspended solids (SS)

- 3.3.7.5 The EIA determined the acceptability of elevations in suspended sediment concentrations based on the Water Quality Objectives. The Water Quality Objectives for suspended sediments for the North Western Water Control Zones were defined as being an allowable elevation of 30% above the background. The ambient and tolerance values for suspended sediment concentrations in the vicinity of sensitive receivers adopted in Table 9.11 of the EIA Report are presented in Table 3.12.

**Table 3.12 Ambient and Tolerance Values for Suspended Sediment Concentrations (mgL<sup>-1</sup>) in the Vicinity of Sensitive Receivers adopted in the EIA**

Sensitive Receiver in EIA Report	Associated EPD Station	Ambient value (90th Percentile)		Tolerance value (30% Tolerance)	
		Dry Season	Wet Season	Dry Season	Wet Season
WSR 27	NM5,6,8	8.3	5.6	2.5	1.7
WSR 22c	NM1,2,3	5.5	3.7	1.7	1.1
WSR 25	NM1,2,3	5.5	3.7	1.7	1.1

3.3.7.6 The use of single layer silt curtain system has been modelled in the 2012 mitigated scenario. The predicted suspended sediment concentrations under the 2012 mitigated scenario of the Contract as shown in Table 9.21 in the EIA Report are summarised in Table 3.13.

**Table 3.13 Calculated Elevations in Suspended Sediment Concentrations at Sensitive Receivers (mgL<sup>-1</sup>) under the 2012 mitigated scenario from the EIA**

Sensitive Receiver in EIA Report	Associated Location during Impact Monitoring	Calculated Elevations	
		Dry Season	Wet Season
WSR 27	SR3	0.0	0.0
WSR 22c	SR4(N)	0.1	0.0
WSR 25	SR5/ SR5(N)	3.0	2.7

3.3.7.7 For suspended solids, as the baseline monitoring was conducted in October 2011 which is the transitional season or just the start of dry season while no data were recorded in the wet season, direct comparison with the EIA predictions could not be made. The comparison of EM&A results with baseline results in the following paragraphs was based on the criteria of acceptability of 30 percent elevations above the background as defined in the Water Quality Objectives which was also used in scenario predictions in the EIA.

3.3.7.8 Baseline water quality monitoring for the Contract was conducted during the transitional season. The mean baseline suspended solids level at each sensitive receiver and 30 percent of the baseline mean are presented in Table 3.14.

**Table 3.14 Baseline suspended solids levels and 30% of baseline mean (mgL<sup>-1</sup>)**

Associated Location in Baseline Report	Baseline mean		30% of baseline mean	
	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
SR3	14.0	16.3	4.2	4.9
SR4	11.3	12.2	3.4	3.7
SR5	10.6	11.9	3.2	3.6
SR6	11.9	11.9	3.6	3.6
SR7	11.4	10.4	3.4	3.1
SR10A	10.2	10.2	3.1	3.1
SR10B	11.5	11.1	3.5	3.3

3.3.7.9 The average elevations in suspended solids concentrations of July 2016 were compared with the baseline levels are provided in Table 3.15.

**Table 3.15 Average suspended solids levels at sensitive receivers (mgL<sup>-1</sup>) in Apr 2017**

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Impact SS Mean (in Apr 2017)			
		Mid-ebb	Elevation	Mid-flood	Elevation
SR3	SR3/SR3(N)	8.8	-5.2	8.0	-8.3
SR4	SR4(N)*	9.2	-2.1	8.8	-3.4
SR5	SR5/ SR5(N)	7.7	-2.9	8.7	-3.2
SR6	SR6	7.4	-4.5	7.4	-4.5
SR7	SR7	7.8	-3.6	7.8	-2.6
SR10A	SR10A/SR10A(N)	5.9	-4.3	5.8	-4.4
SR10B	SR10B(N)*/SR10B(N)2	6.0	-5.5	5.9	-5.2

\*Due to safety issue, the water quality monitoring location of SR4 & SR10B have been changed to SR4(N) & SR10B(N) respectively during impact monitoring.

#monitoring works between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF –Passenger Clearance Building.

3.3.7.10 With the highest filling rate in Apr 2017, the elevations in suspended solids levels were below 30 percent of the baseline suspended solids levels at all stations. Regional influences would have effects on the deterioration in water quality than activities at the work site. Exceedances were considered to be due local effects in the vicinity of the monitoring station where exceedance was recorded and after investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

### 3.3.8 Practicality and Effectiveness of the EIA process and the EM&A programme

3.3.8.1 Monitoring and audit of water quality was recommended for the construction phase of the Contract in the EIA process to ensure any deterioration in water quality would be readily detected and timely action could be taken to rectify the situation.

3.3.8.2 Baseline water quality monitoring determined the ambient water quality in the region prior to commencement of construction works. Impact water quality monitoring helped to determine whether the Contract would cause unacceptable water quality impacts on the sensitive receivers.

3.3.8.3 Water quality mitigation measures were recommended in the EIA and a list of water quality mitigation measures were stipulated in the EM&A Manual for the Contractor to implement during the construction phase of the Project. The list of water quality mitigation measures is depicted in Appendix C. All recommended mitigation measures were applicable to the Contract. Precautionary measures including installation of silt curtains were also implemented to prevent migration of suspended solids towards the sensitive receivers. Monitoring results showed that water quality at sensitive receivers was affected by regional water quality influenced by tidal and climatic conditions, local impacts from the vicinity of the receivers. As discussed above, the Contract was not observed to cause unacceptable water quality impacts to the sensitive receivers. Therefore, the mitigation measures implemented were effective and efficient in controlling water quality impacts.

3.3.8.4 Monitoring and audit of water quality ensured that any water quality impacts to the receivers would be readily detected and timely actions could be taken to rectify any non-compliance. Assessment and analysis of water quality results collected throughout the baseline, impact and post-Contract monitoring periods also demonstrated the environmental acceptability of the Contract. Weekly site inspections

ensured that the EIA recommended and additional water quality mitigation measures were effectively implemented.

### 3.3.9 Conclusion

- 3.3.9.1 Water quality monitoring for the Contract was conducted during the baseline and impact monitoring periods. For suspended solids levels, a total of 28 exceedances were recorded. Assessment indicated that there was no correlation between the filling rates and the number of water quality exceedances recorded. Exceedances were considered to be due local effects in the vicinity of the monitoring station where exceedance was recorded and after investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.
- 3.3.9.2 The DO and SS levels recorded at SR3, SR4 (N) and SR5/ SR5(N) were in similar magnitude as predicted in the Project EIA. No comparison could be made from SR6 to SR10B(N)/SR10B(N2) as predictions were not made in the Project EIA. For turbidity, as no prediction was made in the Project EIA, no comparison could be made. With the implementation of water quality mitigation measures recommended in the EIA and additional water quality mitigation measures implemented during the EM&A programme, marine construction activities of the Contract did not cause any unacceptable water quality impacts to the sensitive receivers.

### 3.4 Dolphin Monitoring

#### 3.4.1 Introduction

- 3.4.1.1 In accordance with the requirements specified in Section 9.3 of the EM&A Manual, monthly vessel-based surveys were conducted to monitor impacts on the Indo-Pacific humpback or Chinese white dolphin (*Sousa chinensis*). The surveys were conducted in the areas known as NEL and NWL and travelled the transect lines depicted in Figure 4A and Figure 4B.
- 3.4.1.2 The total transect length for NEL and NWL combined is approximately 111km although some Contract and other works at times have caused temporary truncation of some lines, particularly lines 1,2,9 and 10. Due to the presence of deployed silt curtain systems at the site boundaries of the Contract, some of the transect lines shown in Figure 5 could not be fully surveyed during the regular survey. Transect 10 is reduced from 6.4km to approximately 3.6km in length due to the HKBCF construction site.
- 3.4.1.3 Coordinates for transect lines 1, 2, 7, 8, 9 and 1 have been updated in respect to the Proposal for Alteration of Transect Line for Dolphin Monitoring approved by EPD on 19 August 2015. Therefore the total transect length for both NEL and NWL combined is reduced to approximately 108km.
- 3.4.1.4 Due to the commencement of marine work of the Expansion of Hong Kong International Airport into a Three-Runway System (3RS Project), a large portion of works site boundary will be established at the northern part of the existing airport Island. The recent arrangement of works boundary of 3RS Project which delineates the boundary of the designated 3RS Project (for the indicative 3RS boundary, please refer to Figure 5). The works area of 3RS project will affect several water quality monitoring stations and the dolphin monitoring transect lines which are being used for conducting monitoring under Contract No. HY/2010/02. The EM&A Programme for the HZMB HKBCF Project will therefore be affected. As a result, a proposal was prepared by ET in September 2016 in accordance with condition 5.1 of EP-353/2009/K and condition 4.1 of EP-354/2009/D, to relocate water quality monitoring stations from SR5, IS10, CS(Mf)3 and alternate the transect lines of impact dolphin monitoring 2, 3, 4, 5, 6 and 7. A revised proposal has been updated and sent to IEC/ENPO for their further review on 24 March 2017 and IEC/ENPO verified the revised proposal on the same date. The revised proposal has been sent to authority by project team for review and approval on 3 April 2017. The authority subsequently approved the proposal on 12 May 2017.
- 3.4.1.5 Surveys were conducted twice per month, using combined line transect and photo-identification techniques. The research team comprised qualified and experienced researchers and Marine Mammal Observers (MMO). The Dolphin Monitoring for this Contract ceased in August 2017 therefore, this report includes survey data from March – August 2017, inclusive. Monitoring works and monitoring data between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF –Passenger Clearance Building.

#### 3.4.2 Environmental Mitigation Measures

- 3.4.2.1 Relevant mitigation measures for dolphins, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of mitigation measures for dolphins is depicted in Appendix C.

#### 3.4.3 Summary of Actions Taken in the event of Non-Compliance

- 3.4.3.1 The enhanced EAP for CWD monitoring with numerical AL/LL were implemented in the reporting period.
- 3.4.3.2 Two (2) Limit level exceedances were recorded in the reporting year for impact dolphin monitoring. And the Event Action Plan was triggered (Table 3.16)

Table 3.16 Summary of the STG/ANI Quarterly Values

Quarterly period <sup>^</sup>		STG*	ANI**	Level Exceeded
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March 2017- May 2017	NEL	0	0	Limit Level
	NWL	0.5	2.9	
June 2017- August 2017	NEL	0	0	Limit Level
	NWL	1.6	5.1	

\* STG represents groups of dolphins (recorded on effort)

\*\* ANI represents number of individual dolphins (recorded on effort)

^The Dolphin Monitoring for this Contract ceased in August 2017 therefore, this report includes survey data from March – August 2017, inclusive. Monitoring works and monitoring data between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF –Passenger Clearance Building.

### 3.4.4 Summary of Survey Effort and Dolphin Sightings

3.4.4.1 Vessel- based surveys were conducted monthly from March 2017 to August 2017. Only six (6) months of surveys were completed due to contract phase cessation and change of responsibility of implementation of environmental monitoring after August 2017. A total of 24 survey days were completed between March 2017-August 2017 (Appendix H: Table 1). A total of 1215.3km were completed of which 1190.1 km were conducted under favourable conditions (defined as Beaufort Sea State 3 or better and with visibility of >1km) (Appendix H: Table 2). In the first year of impact monitoring (2012-13), 49 survey days were completed (total travelled 2627.5km; under favourable conditions 2601.4km). In the second year of impact monitoring (2013-14), 50 survey days were completed (total travelled 2667.1km; 2595.4km under favourable conditions). In the third year of impact monitoring (2014-15), 48 survey days were completed (total travelled 2641.7km; 2637.1km conducted under favourable conditions). In the fourth year of impact monitoring (2015-16), 48 survey days were completed (total travelled 2615.7km; 2572 km conducted under favourable conditions). In the fifth year of impact monitoring (2016-17), 48 survey days were completed (total travelled 2619.7km; 2520.9 km conducted under favourable conditions). In all years, >98% of the track length covered was completed under favourable conditions. Between March-August 2017, a total of 20 dolphin sightings were recorded, 8 as on effort and 12 as opportunistic (Appendix H: Figure 1). In the first year of impact monitoring, a total of 203 dolphin sightings were recorded, 145 as on effort and 58 as opportunistic. In the second year, a total of 135 dolphin sightings were recorded, 91 on effort and 44 opportunistic. In the third year, a total of 72 dolphin sightings were recorded, 46 on effort and 26 opportunistic. In the fourth year, a total of 43 dolphin sightings were recorded, 26 on effort and 17 opportunistic. In the fifth year, a total of 50 dolphin sightings were recorded, 32 on effort and 18 opportunistic. The total number of sightings has decreased between each year of impact monitoring, with a slight increase shown in this reporting period, i.e., 50 sightings this reporting period compared to 43 sightings in 2015-16. As this report only covers the first 6 months of the monitoring year, direct yearly comparisons cannot be made (Table 3.17).

Table 3.17 Summary of All Dolphin Impact Monitoring Sightings from Year 1 (March 2012 – February 2013) to the Current Year (Mar 2017 – August 17) of the HKBCF Reclamation Works Project

Year	Total Sightings
2012-13	203
2013-14	135
2014-15	72
2015-16	43
2016-17	50
March 17 – August 2017*	20

\* Monitoring works and monitoring data between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF –Passenger Clearance Building.

#### 3.4.5 Distribution

3.4.5.1. Sightings of dolphins were divided into two quarterly periods. The highest number of sightings were made between June – August 2017, 15 sightings cf. to the five (5) sightings recorded during the first quarter of the monitoring period. One sightings was made in the NEL section of the survey area and the rest were in NWL or in waters to the south of NWL (Appendix H: Figure 2). In NWL and adjacent waters, dolphins were consistently distributed in areas of rocky, reefy shoreline or where there was a marked depth contour. These areas are the Sha Chau and Lung Kwu Chau Marine Protected Area (SCLKCMPA), the adjacent maritime border of Hong Kong SAR and the Peoples Republic of China (PRC) and the Tai O area. Since long term monitoring has been initiated by AFCD, there has been a regular and year-round occurrence of dolphins in these areas of northern Lantau.

#### 3.4.6 Encounter Rate

3.4.6.1. Encounter rates of “on effort” sightings (i.e. groups) per area per the periods March-May and June-August, 2017, were calculated<sup>1</sup>. For NWL, March-May dolphin encounter rates were much lower than June—August (Appendix H: Figure 3). Within NWL, quarterly encounter rates ranged from 3 to 6 groups (Year 1); 5 to 9 groups (Year 2); 2 to 4 groups (Year 3); one group (Year 4) and 1 to 2 groups (Year 5) per 100km on effort (figures rounded). The average encounter rate for 2017 in NWL is 2 groups (figure rounded) which is similar to year 5 results. Years 3 and 4 of construction works recorded the lowest encounter rates.

#### 3.4.7. Group Size

3.4.7.1. The majority of all sightings recorded were of less than 5 individuals (70%). Larger groups were seen in southern NWL and in, or adjacent to, SCLKCMP. There was no seasonal pattern although with so few sightings, patterns may be difficult to discern. Of the six (6) groups sighted that comprised five (5) or more individuals, two were noted as exhibiting multiple behavior which incorporated feeding, two (2) groups were feeding and two (2) were travelling. Groups of five or more were sighted in both quarters (Appendix H: Figure 4).

#### 3.4.8. Habitat Use

3.4.8.1. The EM&A Manuel stipulated that surveys be conducted in such a way as to be comparable to the baseline survey for this Contract (September -November 2011) and to the long term annual monitoring conducted by AFCD. As such, analyses of density per survey effort (DPSE) and sightings per survey effort (SPSE) were calculated in accordance with the methodology detailed in AFCD reports (AFCD, 2012<sup>2</sup>). The survey areas are divided into 1km x 1km squares and the relative number of sightings and densities are calculated for each block. NEL has 55 blocks and NWL has 90 blocks (only blocks of more than 0.75km<sup>2</sup> are included). For the period March – August 2017, DPSE was calculated in six categories, ranging from low use (< 20 DPSE), moderate use (20.1-60 DPSE) and high use (> 60 DPSE). NEL had no dolphin encounters within its boundaries. Within NWL, 2% of its area was categorized as high use; 2% as moderate use and 96% as low use (Appendix H: Figure 5).

3.4.8.2. For the period March – August 2017, SPSE was calculated in six categories, ranging from low use (< 5 SPSE), moderate use (5.1-15 SPSE) and high use (> 15 SPSE). NEL had no dolphin encounters within its boundaries. Within NWL, 1% of its area was calculated as high use, 6% as moderate use and 93% as low use (Appendix H: Figure 6).

<sup>1</sup> The same calculation as implemented in the AFCD Annual Monitoring Reports was used; [(total ‘on effort’ sightings/total track conducted in Beaufort Sea State 3 or better)\*100] for both NEL and NWL separately and for the two areas combined.

<sup>2</sup> Agriculture, Fisheries and Conservation Department (AFCD) 2012. *Annual Marine Mammal Monitoring Programme April 2011-March 2012.* ) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

- 3.4.8.3. DPSE and SPSE rates for March – August 2017 are not directly comparable to yearly density maps, however, the yearly density maps for March 2012 to February 2017 show a gradual decline in habitat use in NWL and NEL (Appendix H: Figure 7).

#### 3.4.9. Mother and Calf Pairs

3.4.9.1. No mother and calf pairs were recorded during the monitoring period March – August 2017

#### 3.4.10. Activities

3.4.10.1. Five distinctive behavioural categories were defined; “feeding”, “travelling” and “multiple” (more than one behaviour was observed at one time), “other” and “unknown” (Appendix H: Figure 8). Travelling was the most frequently observed activity in March-May 2017. Multiple activities, including both travelling and feeding behavior, and feeding behaviour accounted for more than 50% of the observed behaviour in June – August 2017 (Appendix H: Figure 9). Again, it is noted that as sightings numbers become less, patterns can be difficult to interpret with confidence.

3.4.10.2. In 2012-13, the area of Lung Kwu Chau in NWL was highlighted as an important feeding area as it was again in 2013-14, 2014-15, 2015-16, 2016-17 and this reporting period. The area to the south of NWL is also important for feeding/surface active behaviours. As the impact monitoring progresses, a decreasing trend in the overall number of dolphin sightings in NEL and mid NWL has become apparent with sightings localized to areas known to be important for feeding, i.e., SCLKCMP and Tai O (Appendix H: Figure 10). The behaviours recorded between March – August 2017 are consistent with those recorded previously in this monitoring (Appendix H: Figure 11).

#### 3.4.11. Photo-Identification Catalogue

3.4.11.1. A total of 134 dolphins comprise the photo identification catalogue established specifically for this HZMB Contract (Appendix H: Table 3). Not all dolphins photographed are identifiable as only individuals with unambiguous marks, cuts, wounds, injuries and/or pigmentation or with uniquely shaped fins can be included in the photo-identification catalogue.

#### 3.4.12 Dolphin Abundance

3.4.12.1 As the monitoring period is only six(6) months, an annual abundance estimate cannot be calculated.

#### 3.4.13 Environmental Acceptability of the Contract

3.4.13.1 It was recognised in the EIA that the HZMB is adjacent to several areas of importance to the dolphin population of Hong Kong. As such, it was stipulated in the EM&A Manual for the HKBCF that a suitable analytical technique be proposed and implemented so that significant changes could be detected. A multi-parameter spatial (sometimes known as predictive) model was proposed and reviewed by management authorities and analyses developed as and when data has been made available. The purpose of the model was to make predictions of future habitat use, derived from baseline information, and compare these predictions to actual observations. Environmental covariates, such as salinity, temperature, depth, etc., which may also be drivers of dolphin habitat use, were also tested within spatial models so as to either eliminate or incorporate any influence these may have. The model thus incorporated environmental variables salinity, temperature, turbidity, depth, tidal state, time of day, as well as information associated with the sighting, e.g., group size, behavior, boat association. Following a meeting in October 2015, ENPO suggested that the information regarding density surface modelling presented in Quarterly EM&A Reports and Annual EM&A Review Reports be provided as a separate report with details for review before incorporating it into the EM&A reports. This ET agreed all such data and results be removed and provided separately.

#### 3.4.14 Summary

3.4.14.1. The variable nature of habitat use, group size, behavior, mother and calf occurrence and encounter rates by small delphinids and the ability to detect significant change in small populations is a challenge faced by many research studies. Historical data from AFCD also shows such variability (in AFCD annual monitoring reports). A view of individual distribution and behavioural activities for the reporting year do show that areas of importance, such as Lung Kwu Chau, are still being frequented, behavioural

activities appear similar to that known from pre construction information, although travelling frequency appears to be on the increase, and that at least one calf identified in 2012-13 has survived to 2016-17. In 2013-14, an emerging trend for decreased use of NEL was noted and no sightings were seen in NEL in 2016-17. A single, opportunistic sighting was made in NEL during this monitoring period. In addition, a decrease in sightings in the mid-section of NWL is also noted.

#### 3.4.15 Verification of Impact Statements Stated in EIA and Supporting Documentation

- 3.4.15.1 The statements made in the EIA and supporting documents are descriptive and do not provide a quantitative framework against which to compare data gathered during impact monitoring for the purposes of verifying impact on CWD. Further, some statements made pertain only to the operational phase of HZMB (that is, when all in water construction works are completed) and not the explicit impacts of the many different construction activities which are required to construct HZMB. In the interests of thoroughness, any impact statements made in key documents relevant to HKBCF are extracted here and commented on with regards to the data gathered from this the reporting year of construction activities at HKBCF.
- 3.4.15.2 The EIA report for HZMB<sup>3</sup> makes several statements with regards to impact on cetaceans during the construction phase in sections pertaining to water quality and bioaccumulation:
- 3.4.15.3 Construction Phase: In section 10.6.4.25 of the EIA report, it is stated that, “Project has low potential to cause increased sewage discharge, therefore this potential impact is insignificant. The potential water quality impacts due to site runoff, sewage from workforce and wastewater from various construction activities, and accidental spillage would be controlled through the implementation of suitable mitigation measures, including temporary drainage system, chemical toilets, etc”
- 3.4.15.4 Contract has largely maintained water quality objectives as described in the EM&A Manual. The exceedances noted were short in duration and localised to the Project site. These incidents were short in duration and when the Contractor was notified, actions were promptly taken and no further exceedances were noted.
- 3.4.15.5 In Section 10.6.4.37 of the EIA report, it is stated that, “Thus insignificant bioaccumulation impacts from the construction of HKBCF and HKLR are predicted for CWD (except perhaps with the exception of silver – as per 10.6.4.32)”
- 3.4.15.6 It is noted that for both of the above impact predictions to be investigated more thoroughly, long term trends in pathogens and toxin loads in CWD should be analysed. This has recently been completed for the Pearl River Delta (PRD) population of CWD and it is noted that both bioaccumulation and biomagnification are significantly higher than populations elsewhere (Gui *et al* 2014<sup>4</sup>). There has been no updated toxin analyses of Chinese white dolphin in the reporting year.
- 3.4.15.7 In Section 10.7.2.8 of the EIA report, it is stated that, “164 ha of sea area (138 ha reclamation and 26 ha works area) will be lost during construction due to HKBCF reclamation near the northeast Airport Island. Although the sea area is only utilised by limited number of individual CWD, it is of moderate ecological value due to the close proximity of the dolphin hotspot at the Brothers Islands. Moderate impact is anticipated and mitigation measures are required. As the habitat loss due to construction would largely be carried forward to the operational phase and become permanent habitat loss, mitigation measures for operational phase (see Section 10.7.4) will mitigate this impact as well.”
- 3.4.15.8 At HKBCF, moderate impact is anticipated but the degree or type of impact is not quantified in any numerical, spatial or temporal scale. In the second year of construction activities at HKBCF there was an emerging pattern of decreased habitat use as indicated by encounter rate and number and type of “high” density cells in NEL. As anticipated in the second year (2013-14) report, this became more apparent in the third year (2014-2015) and NEL recorded no sightings in year four (2015-16) although a single sighting adjacent to HKBCF was made by MMO and site staff in November 2015 and again,

<sup>3</sup> Ove Arup & Partners Hong Kong Ltd 2009 HZMB – HKBCF & HKLR EIA Report. 24037-REP-125-01 Pages 83-5, 97, 115

<sup>4</sup> Gui, D., Yu, R., He, X., Tu, Q., Chen, L. and Wu, Y. Bioaccumulation and biomagnification of persistent organic pollutants in Indo-Pacific humpback dolphins (*Sousa chinensis*) from the Pearl River Estuary, China. *Chemosphere* 114:106-113

in January 2017, audio recordings of dolphins were made adjacent to the newly designated marine protected area at the Brothers Islands. AFCD data indicate that higher than usual dolphin mortality has been recorded from 2014-15. Again, it is suggested that appropriate review of these data should be conducted to investigate any possible relationship with both anthropogenic activities and natural processes in the dolphins habitat. The impact of “permanent habitat loss” as a result of the HKBCF reclamation (Section 10.7.4. of the EIA), is stated to be fully mitigated by the establishment of a Marine Protected Area after the construction phase of the Project is completed. This predication cannot be assessed until the HZMB operational phase starts and the Marine Park Area is fully established. The Brothers Marine Protected Area was designated in December 2016.

- 3.4.15.9 The Ecological Baseline Survey<sup>5</sup> defines an Impact Index which is used to predict impact for each area through which the HZMB structure passes. HKBCF is located in the area defined as the “Northeast Lantau Section (NELS) – from the eastern edge of the airport platform to its connection to the North Lantau Highway”.
- 3.4.15.10 It is noted that this report states (Section 5.7.10) that “it is imperative that cumulative impacts along the whole alignment [of HZMB] are thoroughly assessed”.
- 3.4.15.11 A reference to cumulative impacts is made in Section 10.7.6 of the EIA. Section 10.7.6.3 is relevant to HKBCF. This refers only to the cumulative impact of the permanent loss of CWD habitat and no other impacts of either the construction or operational phase of the HZMB Contract. Nonetheless, the conclusion of this section states that the setting up of a marine park “effectively mitigates” CWD habitat loss. As such, this prediction cannot be verified until such a time as a marine park is established.
- 3.4.15.12 A cumulative assessment has been published using data gathered prior to the initiation of HKBCF construction activities (Marcotte *et al*, 2015<sup>6</sup>). This assessment notes that the increase in high speed ferry traffic has been concomitant to a significant decrease in dolphins sighted in NEL and adjacent NWL waters. Several other threats were considered in this study, however, high speed ferries were the most significant impact. Therefore, this study showed a significant decline in dolphins in NEL and adjacent areas was ongoing for a decade prior to commencement of HKBCF activities. The high speed ferry traffic has continued to increase in the area as HKBCF and other Projects have commenced<sup>7</sup>.
- 3.4.16 Practicality and Effectiveness of the EM&A Programme
- 3.4.16.1 Monitoring and auditing of marine mammals was recommended for the construction phase of HKBCF to evaluate impact on marine mammals.
- 3.4.16.2 Combined line transect and photo-identification methodologies have been used as part of the AFCD long term monitoring programme for over 15 years. As such, a long term data set can be used to establish trends in population distribution and abundance over the long term.
- 3.4.16.3 The AFCD annual monitoring reports for the period 2011-2012, 2012-13, 2013-14, 2014-15, 2015-16 and 2016-17 have all stated that a significant decline had been detected in population abundance in the NEL area over the last decade. Only long term inter annual abundance estimates can be used to detect such changes. This decline was noted prior to construction had begun at HKBCF and has now been attributed to high speed ferries by an independent study (see Section 3.4.6.4.2).
- 3.4.17 Conclusion
- 3.4.17.1 Between March and August 2017 dolphins were only recorded once in NEL and many parts of NWL are no longer frequently used.
- 3.4.17.2 Marine mammal monitoring was conducted between March and August 2017 in accordance with EM&A Manuel methodologies. These methodologies have been invaluable in the past in determining both

<sup>5</sup> Agreement No. MW 01/2003. Hong Kong- Zhuhai- Macao Bridge: Hong Kong Section and the North Lantau Highway Connection: Ecological Baseline Survey. Final 9 Month Ecological Baseline Survey Report the (p 42 – 43)

<sup>6</sup> Marcotte, D., Hung, S. K., & Caquard, S. 2015. Mapping cumulative impacts on Hong Kong's pink dolphin population. *Ocean & Coastal Management*, 109, 51-63

<sup>7</sup> [http://www.mardep.gov.hk/en/publication/pdf/portstat\\_1\\_y\\_d2.pdf](http://www.mardep.gov.hk/en/publication/pdf/portstat_1_y_d2.pdf)

broad scale and long term patterns of distribution, abundance, association, habitat use and behavioral activities. There is historically much variation in these parameters and most observations to date have concurred with observations documented previously with the now emerging trend of decreased habitat use within NEL. As AFCD Monitoring has reported a significant decline in this area prior to HKBCF construction activities, it is difficult to distinguish how much HKBCF activities may have influenced this existing decline.

- 3.4.17.3 Two (2) Limit level exceedances were recorded in the reporting year for impact dolphin monitoring. After investigation, it was concluded that the HZMB works is one of the contributing factors affecting the dolphins. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual marine contracts) cannot be quantified nor separate from the other stress factors. For investigation results please refer to Appendix L of the corresponding quarterly reports.

### 3.5 Environmental Site Inspection and Audit

#### 3.5.1 Site Inspection

3.5.1.1 Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Contract. In the reporting period, 61 site inspections were carried out. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.

3.5.1.2 Particular observations during the site inspections are described below:

##### *Air Quality*

3.5.1.3 Dust was observed during excavation, the Contractor was reminded to spray water or dust suppression chemical before, during and immediately after the operation so as to maintain the entire surface wet. (Reminder)

3.5.1.4 Dark smoke emission from plant/equipment and vessels and from an excavator were observed, the Contractor was reminded that dark smoke emission from plant/equipment shall be avoided. Emission of dark smoke was no longer observed in subsequent site inspection in the reporting period. The Contractor was reminded to ensure proper implementation of air quality mitigation measures and smoke emission from plant/equipment shall be avoided. (Closed)

3.5.1.5 Dust was observed during the operation of excavator for road finishing works. The Contractor was reminded to provide effective dust suppression mechanism. No dust was observed near excavator at the concerned area from photo record provided by the Contractor. (Closed)

3.5.1.6 Dust was observed on 30 Mar 2017 during the transport of dusty materials. The Contractor was reminded to spray water or other dust suppression chemical prior to loading, unloading or transport of dusty materials. The Contractor subsequently sprayed water to the dusty materials. (Closed)

3.5.1.7 It was observed that a discolored NRMM labels was affixed on the side of a drilling rig machines, excavator, boring machines and on generator near Portion B and excavator at Portion A. The Contractor was reminded to affix appropriate NRMM labels on the machines. The Contractor subsequently provided NRMM label to the machine. (Closed)

3.5.1.8 Inappropriate size of NRMM label affixed onto the drilling rig machine on the working platform in the vicinity of Portion E1 and onto the boring machine on the working platform in the vicinity of Portion C1a was observed. The contractor was reminded to affix an appropriate NRMM label with size of at least 200mm in width and 130 mm in height. The Contractor subsequently affixed appropriate NRMM label on the concerned drilling rig machine and as informed by the contractor, the concerned boring machine has been removed. (Closed)

3.5.1.9 The Contractor was reminded to provide effective dust suppression mechanism by spraying water or dust suppression chemical during operation of excavate work. (Reminder)

3.5.1.10 Dark smoke emission was observed from derrick lighter barge (利航 8) at Portion A. The Contractor was reminded that smoke emission from plant/equipment should be avoided. As informed by Contractor, the concerned barge has been removed from the site. (Closed)

3.5.1.11 Generator (Airman SDG25) without NRMM label was observed on jack- up barge, Fugro Kingstown and drilling machine without NRMM label was observed on jack-up barge, B40529VSNIFE. The Contractor was reminded to check and confirm if NRMM label is required or available for the concerned

PME. As informed by the Contractor, the concerned generator was removed from barge and the Contractor subsequently affixed appropriate NRMM label on the concerned drilling machine. (Closed).

- 3.5.1.12 The Contractor was reminded to spray water regularly to exposed soil at outfall works area to reduce dust impact. (Reminder).

#### **Noise**

- 3.5.1.13 Acoustic mat was not provided to generator placed on ship deck of Mytilus, the Contractor was reminded to provide appropriate acoustic decoupling measures. The Contractor subsequently rectified the situation by providing acoustic decoupling measures to the concerned generator. (Closed)

#### **Water Quality**

- 3.5.1.14 It was observed that silt curtain near Portion E2 was disconnected. The Contractor was reminded to reinstall silt curtain at the concerned area and provide maintenance regularly. (Reminder)
- 3.5.1.15 It was observed that silt curtain near Portion E1 was disconnected on 29 June 2017. The Contractor was reminded to reinstall silt curtain at the concerned area and provide maintenance regularly. As informed by Contractor silt curtain at the concerned area has been removed. (Closed)
- 3.5.1.16 It was observed that silt curtain around the outfall of Portion B was disconnected on 17 and 24 August 2017, the Contractor was reminded to reinstate the silt curtain at the concerned area and provide maintenance regularly. According to the Contractor, silt curtain around the outfall of Portion B was reinstated and properly maintained. (Closed)
- 3.5.1.17 Stagnant water and general refuse were observed at site entrance and Portion B. The Contractor was reminded to clean stagnant water regularly to keep the site clean and tidy. (Reminder)
- 3.5.1.18 Disconnected silt curtain was observed at Portion A. The Contractor was reminded to reinstate concerned silt curtain and provide regular maintenance. The Contractor subsequently rectified the adverse observation (Closed)

#### **Chemical and Waste Management**

- 3.5.1.19 Chemical containers were placed on bare ground or on the edge of drip tray and on ship deck of Chun Ming 98, 83 and 18, the Contractor was reminded to place all chemical containers on drip tray properly to retain leakage, if any. The Contractor subsequently remove the chemical containers from the location. The Contractor was reminded chemical containers should be put inside drip trays as a preventive measure. (Closed)
- 3.5.1.20 The Contractor was reminded to provide drip tray to equipment that use petrol or other chemical as fuel to avoid leakage, if any. (Reminder)
- 3.5.1.21 The Contractor was reminded to clear leaked water on ground and replace the flawed drip tray to prevent leakage, if any. (Reminder)
- 3.5.1.22 Oil Spillage was observed from derrick lighter along the pathway on ship deck of Chun Ming 68, the Contractor was reminded to clear all leaked oil as chemical waste, provide adequate spill kits and repair derrick lighter at once before using. The Contractor subsequently rectified the situation. (Closed)
- 3.5.1.23 Oil Spillage were observed on ship deck of Chun Ming 18 on 27 Apr 2017 and leaking from a generator at Portion E2 on 11 May 2017, the Contractor was reminded to clear all leaked oil as chemical waste

and dispose of as chemical waste. The Contractor subsequently cleaned the leaked oil with spill kit provided on barge and removed the generator from concerned area respectively. (Closed)

- 3.5.1.24 The Contractor was reminded to clear spilled oil or chemical retained on drip tray to prevent chemical leakage. (Reminder)
- 3.5.1.25 The Contractor was reminded to clear water retained on drip tray after rainfall to prevent spillage, if any. (Reminder)
- 3.5.1.26 The Contractor was reminded to clear leaked oil on the lid of containers and water retained on drip tray of drilling rig (Lam D90) to prevent spillage or mixing with general site runoff. (Reminder)
- 3.5.1.27 The Contractor was reminded to clean up the site and dispose general refuse properly. (Reminder)
- 3.5.1.28 Spilled oil from generator was observed retaining on drip tray at Portion B. The Contractor was reminded to clear spilled oil. The Contractor subsequently cleared the oil retained on drip tray. (Reminder)
- 3.5.1.29 General refuse were observed at outfall area of Portion B. The Contractor was reminded to keep the site clean and tidy. The Contractor subsequently cleared general refuse at outfall area of Portion B. (Reminder)
- 3.5.1.30 The Contractor was reminded to clear oil retained in drip tray on Chun Ming 98 and dispose as chemical waste. (Reminder)
- 3.5.1.31 Oil stain was observed. The Contractor should repair the concerned excavator at once before using and provide regular inspection and maintenance. (The Contractor subsequently carried out rectification, closed)
- 3.5.1.32 Oil stain was observed on 8 February 2018. The Contractor should repair the concerned excavator at once before using and provide regular inspection and maintenance. As informed by the Contractor, the concerned excavator was repaired. (Closed)
- 3.5.1.33 The Contractor was reminded to clear general refuse observed at the entrance of site office at WA2 and keep the site clean and tidy on 26 April 2018. (reminder)

#### ***Landscape and Visual Impact***

- 3.5.1.34 No relevant adverse impact was observed in the reporting period.

#### ***Others***

- 3.5.1.35 Environmental Permit was not observed on Furgo Kingstown, the Contractor was reminded to affix valid Environmental Permit on barge for Contract No. HY/2010/02. The Contractor subsequently provided valid Environmental Permit on barge. (Closed)
- 3.5.1.36 Rectifications of remaining identified items are undergoing by the Contractor. Follow-up inspections on the status on provision of mitigation measures will be conducted to ensure all identified items are mitigated properly.

#### **4. ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS**

##### **4.1 Summary of Solid and Liquid Waste Management**

- 4.1.1 The Contractor registered as a chemical waste producer for this Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting.
- 4.1.2 As advised by the Contractor, 63,124.6m<sup>3</sup> of inert C&D Materials generated and reused in other Projects; 231,560.5m<sup>3</sup> of surplus surcharge exported to Macau; 82,992.7m<sup>3</sup> of Imported fill; 5,852kg paper/cardboard packaging 292.5m<sup>3</sup> other C&D waste such as general refuse were generated and disposed of in the reporting period. Summary of waste flow table is detailed in Appendix I.
- 4.1.3 The Contractor is advised to properly maintain on site C&D materials and wastes collection, sorting and recording system, dispose of C&D materials and wastes at designated ground and maximize reuse / recycle of C&D materials and wastes. The Contractor is reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly.
- 4.1.4 The Contractor is reminded that chemical waste containers should be properly treated and stored temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.
- 4.1.5 After checking with the Contractor, surcharge material was removed off site to Macau from 27 April 2016 and it is continued in the reporting period. 231,560.5m<sup>3</sup> of surplus surcharge was exported to Macau during the reporting period. The Contractor was reminded to ensure consistency in quantities in case of any C&D material disposed off-site and/or no surcharge material removed off site

#### **5. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES**

##### **5.1 Implementation Status of Environmental Mitigation Measures**

- 5.1.1 A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in Appendix C. Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.
- 5.1.2 As informed by the premises owner of (AMS7A) - Chu Kong Air-Sea Union Transportation Co. LTD would not grant us the permission to install air quality monitoring equipment (High volume sampler) and conduct 1-hour TSP/24 hour TSP monitoring at the premises of Chu Kong Air-Sea Union Transportation Co. LTD after December 2015. In order to fulfil the EM&A requirement of this Contract, as permission to conduct impact air quality monitoring at the premise of Hong Kong SkyCity Marriott Hotel has been granted in December 2015, ET proposed relocation of air quality monitoring station (AMS7A) on 15 December 2015, with no further comment received from IEC on 15 December 2015 and no particular comment received from EPD on 21 December 2015, the impact air quality monitoring station AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) has been relocated to AMS7 (Hong Kong SkyCity Marriott Hotel) on 30 December 2015. The impact air quality monitoring for December 2015 was conducted before the relocation of AQM Station from AMS7A to AMS7. The impact air quality monitoring for were conducted at AMS7 (Hong Kong SkyCity Marriott Hotel) since January 2016, Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel will be adopted for this air quality monitoring location.
- 5.1.3 Due to the commencement of marine work of the Expansion of Hong Kong International Airport into a Three-Runway System (3RS Project), a large portion of works site boundary will be established at the northern part of the existing airport Island. The recent arrangement of works boundary of 3RS Project which delineates the boundary of the designated 3RS Project (for the indicative 3RS boundary, please refer to Figure 5). The works area of 3RS project will affect several water quality monitoring stations and the dolphin monitoring transect lines which are being used for conducting monitoring under Contract No. HY/2010/02. The EM&A Programme for the HZMB HKBCF Project will therefore be affected. As a result, a proposal was prepared by ET in September 2016 in accordance with condition 5.1 of EP-353/2009/K and condition 4.1 of EP-354/2009/D, to relocate water quality monitoring stations

from SR5, IS10, CS(Mf)3 and alternate the transect lines of impact dolphin monitoring 2, 3, 4, 5, 6 and 7. A revised proposal has been updated and sent to IEC/ENPO for their further review on 24 March 2017 and IEC/ENPO verified the revised proposal on the same date. The revised proposal has been sent to authority by project team for review and approval on 3 April 2017. The authority subsequently approved the proposal on 12 May 2017.

- 5.1.4 Due to substantial completion of marine works by the end of June 2017, it is anticipated that the remaining construction works under Contract No. HY/2010/02, which include ground investigation (GI) works, construction of temporary timber platform, removal of jetty and reinstatement of seawall at the western section, construction of outfall at the eastern seawall, would cause limited disturbance to water column and not to the seabed. In view of this, a proposal for change of EM&A programme/requirements was prepared by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D, to terminate water quality monitoring works at stations IS5, IS(Mf)6, IS8, SR4(N), SR5(N), SR6, SR10A, SR10B(N), CS4, CSA and CS6, and impact dolphin monitoring (line-transect vessel survey method) covering NEL and NWL when perimeter silt curtain under the Contract is completely removed and vessel traffic numbers average 10 per month for Contract No. HY/2010/02. A revised proposal has been updated and sent to IEC/ENPO for their further review on 15 August 2017 and IEC/ENPO verified the revised proposal on 16 August 2017. The revised proposal has been sent to authority by project team for review and approval on 21 August 2017. The authority subsequently approved the proposal on 7 September 2017.
- 5.1.5 As informed by IEC/ENPO on 27 December 2017, three water quality monitoring stations of SR3, SR10A and SR10B(N) were relocated due to topographical condition. Alternative water quality monitoring stations SR3(N), SR10A(N) and SR10B(N2) were justified and certified by the ET Leader of Contract No. HY/2013/01 on 8 November 2017, verified by IEC/ENPO on 13 November 2017. The proposal was submitted to the authority for review and approval on 29 November 2017. The authority subsequently approved the proposal on 22 December 2017. Relocation of water quality monitoring stations from SR3, SR10A and SR10B(N) to SR3(N), SR10A(N) and SR10B(N2) are adopted effective from 22 December 2017.
- 5.1.6 As informed by IEC/ENPO on 26 February 2018, air quality monitoring station AMS7 was relocated due to permission to carry out AQM at Hong Kong SkyCity Marriott Hotel could not be granted after the end of January 2018. Alternative air quality monitoring station AMS7B was justified and certified by ET Leader of Contract No. HY/2013/01 on 22 January 2018, verified by IEC/ENPO on 24 January 2018. The proposal was submitted to the authority for review and approval on 30 January 2018. Relocation of air quality monitoring stations from AMS7 to AMS7B is adopted effective from 6 February 2018 with the Authority's consent.
- 5.1.7 As informed by the Contractor, major construction activities for Contract no. HY/2010/02 has been substantially completed and it is anticipated that potential environmental impact for remaining works which only include ad hoc minor maintenance/touch up works on seawall under the Contract would be insignificant. In view of this, a proposal for Termination of EM&A Programme was prepared and certified by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D to terminate the EM&A Programme for Contract no. HY/2010/02. The proposal has been sent to IEC/ENPO for their further review on 17 April 2018 and IEC/ENPO verified the proposal on 18 April 2018. The proposal has been sent to authority by project team on 19 April 2018. The proposal was subsequently approved by the authority.
- 5.1.8 After review, no floating grout production was in operation at any time in reporting period for Contract No. HY/2010/02. Condition 3.26A of EP-353/2009/K for Contract No. HY/2010/02 is complied with during the reporting period.
- 5.1.9 Most of the recommended mitigation measures, as included in the EM&A programme, were implemented properly in the reporting period.
- 5.1.10 The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Contract. The EM&A programme effectively monitored the environmental impacts

from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.

- 5.1.11 Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.

## **6. SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT**

### **6.1 Summary of Exceedances of the Environmental Quality Performance Limit**

#### **6.1.1 For impact air quality monitoring**

6.1.1.1 1 action level exceedance of 24-Hour TSP was recorded at AMS3B on 28 November 2017; 2 action level exceedances of 24-Hour TSP were recorded at AMS3B on 23 December 2017 and 17 January 2018 respectively. 1 action level exceedance of 24-Hour TSP was recorded at AMS2 on 17 January 2018. After investigation, there is no adequate information to conclude the recorded action level exceedances are related to this Contract. No other 1-hour and 24-hour action and limit level exceedances were recorded at all monitoring stations by this Contract or Environmental Team of Contract No. HY/2013/01 in the reporting period. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of November 2017, December 2017 and January 2018.

6.1.1.2 For impact air quality monitoring, all 1-Hour TSP results were below the Action and Limit Level in the reporting period.

#### **6.1.2 For construction noise**

6.1.2.1 No exceedance was recorded at all monitoring stations in the reporting period.

#### **6.1.3 For impact water quality monitoring,**

6.1.3.1 In March 2017, 1 action level exceedance of turbidity were recorded at both SR4(N) and IS8 during flood tide on 24 March 2017; 1 action level exceedance and 1 limit level exceedance of suspended solids were recorded at SR4(N) and IS8 respectively during flood tide on 24 March 2017; 1 action level exceedance of suspended solids were recorded at both SR4(N) and IS8 during ebb tide on 24 March 2017. The exceedances were considered unrelated to this Contract's activities after investigation. No other exceedance was recorded at all monitoring stations in the March 2017.

6.1.3.2 In April 2017, 1 action level exceedance of suspended solids was recorded at IS(Mf)11 during flood tide on 28 April 2017. The exceedance was considered unrelated to this Contract's activities after investigation; No other exceedance was recorded at all monitoring stations in the April 2017.

6.1.3.3 In July 2017, for impact water quality monitoring, 2 action level exceedances of suspended solids were recorded at SR3 during ebb tide on 12 July 2017 and at IS7 during flood tide on 14 July 2017 respectively. After investigation, it was concluded that those exceedance were unlikely to be contract related. No other exceedance was recorded at all monitoring stations in the July 2017.

6.1.3.4 In September 2017, total of 82 action level exceedances for dissolved oxygen and 4 limit level exceedances were recorded on 1, 6, 8, 11, 13, 15, 18, 22, 27 & 29 September 2017. 3 action level exceedances for turbidity were recorded at IS(Mf)11 on 6 September and at IS10(N) & IS(Mf)11 on 8 September 2017 during flood tide. Total of 4 action level exceedances for suspended solids were recorded at IS8, SR4(N) & SR6 on 6 September 2017 and at IS(Mf)11 on 8 September 2017 during flood tide, 1 limit level exceedance was recorded on 8 September 2017 at IS10(N) during flood tide. After investigation, it was concluded that those exceedance were unlikely related to this Contract. No other exceedance was recorded at monitoring stations in September 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of September 2017.

6.1.3.5 In October 2017, 2 action level exceedances of suspended solids were recorded at IS(Mf)11 and SR7 during flood tide on 20 October 2017. After investigation, it was concluded that those exceedances were unlikely to be contract related. No other exceedance was recorded at all monitoring stations in

October 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of October 2017.

- 6.1.3.6 In November 2017, 6 action level exceedances of suspended solids were recorded at IS(Mf)11, IS(Mf)16 and SR7 during flood tide on 3, 6, 8 and 20 November 2017. After investigation, it was concluded that those exceedances were unlikely to be contract related. No other exceedance was recorded at all monitoring stations in November 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of November 2017.
- 6.1.3.7 In December 2017, 3 action level exceedances of suspended solids were recorded at SR7 during flood tide on 4 December 2017, and IS(Mf)9 during flood tide on 6 December 2017 and ebb tide on 11 December 2017 respectively. After investigation, it was concluded that those exceedance were unlikely related to this Contract. No other exceedance was recorded at monitoring stations by Environmental Team of Contract No. HY/2013/01 in December 2017. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of December 2017.
- 6.1.3.8 In February 2018, 1 action level exceedance of suspended solids was recorded at SR7 during flood tide on 2 February 2018. After investigation, no marine-based work was conducted on the monitoring date as confirmed by the Contractor. It was concluded that the exceedance was unlikely to be contract related. No other exceedance was recorded at all monitoring stations by Environmental Team of Contract No. HY/2013/01 in the February 2018. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of February 2018.
- 6.1.3.9 In March 2018, for impact water quality monitoring, 1 action level exceedance of suspended solids at IS7 during flood tide on 21 March 2018. After investigation, no marine-based work was conducted on the monitoring date as confirmed by the contractor. It was concluded that the recorded exceedance not Contract-related. No other water quality exceedance was recorded at all monitoring stations by Environmental Team of Contract No. HY/2013/01 in March 2018. For level of exceedance, location and when exceedances were recorded, please refer to Appendix D of monthly EM&A report of March 2018.
- 6.1.3.10 In April 2018, for impact water quality monitoring, 3 action level exceedances of suspended solids at SR7 during flood tide on 18 and 23 April 2018, and at IS10(N) during flood tide on 20 April 2018. After investigation, no marine-based work was conducted on the monitoring dates as confirmed by the contractor. It was concluded that the recorded exceedances were not Contract-related. No other water quality exceedance was recorded at all monitoring stations by Environmental Team of Contract No. HY/2013/01 in April 2018. For level of exceedance, location and when exceedances were recorded, please refer to Appendix D of monthly EM&A report of April 2018.
- 6.1.4 **For dolphin monitoring**
- 6.1.4.1 Two (2) Limit level exceedances were recorded in the reporting period for impact dolphin monitoring. The investigation results showed that although no unacceptable changes in environmental parameters of this Contract have been measured. Event and Action Plan for Impact Dolphin Monitoring was triggered. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related solely to Contract works. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual contracts) cannot be quantified nor separate from the other stress factors. Please also refer to the attachment for full investigation result. For investigation results please refer to Appendix L of the corresponding quarterly reports.
- 6.1.5 Cumulative statistics on exceedances is provided in Appendix J.

## **7. SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS**

### **7.1 Summary of Environmental Complaints, Notification of Summons and Successful Prosecutions**

- 7.1.1 One environmental complaint was received on 27 March 2017, and the complainant complained that a very loud sound was intermittently heard by the Complainant since 10pm on 26 March and such loud sound was heard by the complainant until midnight. It was suspected that the sound came from the Hong Kong-Zhuhai-Macao Bridge (HZMB) construction works near the artificial island. In addition, a large area of pollution was observed on sea in the morning of the day the complainant made the complaint. It was suspected that was caused by the HZMB construction works. After investigation, there is no adequate information to conclude the complaint is related to this Contract. Nevertheless, the Contractor was reminded to continue to fully maintain all noise and water quality mitigation measures.
- 7.1.2 One environmental complaint was received on 17 April 2017, the organization which made the complaint, Green Sense, complained that “muddy water was observed at area surrounding the Hong Kong-Zhuhai-Macao Bridge (HZMB) artificial island, it is suspected that there were overflow muddy water from the artificial island. Tam Hoi-pong of Green Sense stated that there should not be too much muddy water if reclamation was conducted according to the EIA report. He suspected that there are problems of reclamation works, silt curtain have not effectively screen out the mud and sand, the construction works is not ideal and unable to ensure water quality. After investigation, there is no adequate information to conclude the complaint is related to this Contract. Nevertheless, the Contractor was reminded to continue to fully maintain all water quality mitigation measures.
- 7.1.3 A complaint was forwarded to us by ENPO on 27 October 2017; the complainant complained that yellowish muddy water was discharged into the sea from construction site location C3 of the artificial island of the Hong Kong-Zhuhai-Macao Bridge and this has been persist for one week. After investigation, there is no adequate information to conclude the complaint is related to this Contract.
- 7.1.4 A complaint was forwarded to us by ENPO on 23 November 2017; the complainant complained that, on Hong Kong- Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Artificial Island, due to watering was not provided to all areas, large amount of fugitive dust was generated, especially at the toll kiosks. After investigation, there is no adequate information to conclude the complaint is related to this Contract.
- 7.1.5 Total of four (4) environmental complaints were received in the reporting period. The Environmental Complaint Handling Procedure is annexed in Figure 5.
- 7.1.6 No notification of summons and successful prosecutions is noted during the reporting period.
- 7.1.7 Statistics on complaints, notifications of summons and successful prosecutions are summarized in Appendix J.

## 8. REVIEW OF THE VALIDITY OF THE EIA PREDICTION

- 8.1 1 Action level exceedances of 24-Hour TSP were recorded at AMS3B on 23 December 2017 and 17 January 2018 respectively. 1 action level exceedance of 24-Hour TSP was recorded at AMS2 on 17 January 2018. After investigation, there is no adequate information to conclude the recorded action level exceedances are related to this Contract. No other 1-hour and 24-hour action and limit level exceedances was recorded at all monitoring stations in the reporting period. For level of exceedance, location and when exceedances were recorded, please refer to Appendix E of monthly EM&A report of November 2017, December 2017 and January 2018. All other air quality monitoring results in the reporting period were below the Action Levels established in the baseline air quality monitoring carried out in November 2011. The result was in line with the Environmental Impact Assessment (EIA) prediction that dust generation would be controlled and would not exceed the acceptable criteria, with proper implementation of the recommended dust mitigation measures.
- 8.2 No noise monitoring exceedance was recorded in the reporting period. This is generally in line with the EIA and ERR prediction that with the implementation of noise mitigation measures, the construction noise from the Contract works will meet the stipulated criterion at the residential NSRs and at a majority of the education institutions as predicted by the EIA.
- 8.3 For impact water quality monitoring, 40 action and 4 limit level exceedances of DO (S&M); 42 action level exceedances of DO (Bottom); 5 action level exceedances of Turbidity; 22 action level exceedances and 2 limit level exceedances of SS were recorded at measured suspended solids values (in mg/L) and they were considered not related to the Contract works, considering all the rest of water quality monitoring results in the reporting period were below the Action Levels established in the baseline water quality monitoring carried out in November 2011. The result was in line with the Environmental Impact Assessment (EIA) prediction that water quality impact would be controlled and would not exceed the acceptable criteria, with proper implementation of the recommended water quality mitigation measures.

## 9. REVIEW OF ENVIRONMENTAL IMPLEMENTATION STATUS

- 9.1 The impact air quality, noise and water quality monitoring programme ensured that any environmental impact to the receivers would be readily detected and timely actions could be taken to rectify any non-compliance. The environmental monitoring results indicated that the construction activities in general were in compliance with the relevant environmental requirements and were environmentally acceptable. The weekly site inspection ensured that all the environmental mitigation measures recommended in the EIA were effectively implemented. Despite the minor deficiencies found during site audits, the Contractor had taken appropriate actions to rectify deficiencies within reasonable timeframe. Therefore, the effectiveness and efficiency of the mitigation measures were considered high in most of the time.
- 9.2 For all the parameters under monitoring as mentioned in Section 3, the measured levels were in line with the EIA predictions generally. This indicates that the mitigation measures were effectively implemented.
- 9.3 Frequency of watering per day on exposed soil was checked; with reference to the record provided by the Contract, watering was conducted at least 8 times per day on reclaimed land. The frequency of watering is the mainly refer to water truck. Sprinklers are only served to strengthen dust control measure for busy traffic at the entrance of Portion D. As informed by the Contractor, during the malfunction period of sprinkler, water truck will enhance watering at such area. The Contractor was reminded to ensure provision of watering of at least 8 times per day on all exposed soil
- 9.4 Due to the commencement of marine work of the Expansion of Hong Kong International Airport into a Three-Runway System (3RS Project), a large portion of works site boundary will be established at the northern part of the existing airport Island. The recent arrangement of works boundary of 3RS Project which delineates the boundary of the designated 3RS Project (for the indicative 3RS boundary, please refer to Figure 5). The works area of 3RS project will affect several water quality monitoring stations and the dolphin monitoring transect lines which are being used for conducting monitoring under Contract No. HY/2010/02. The EM&A Programme for the HZMB HKBCF Project will therefore be affected. As a result, a proposal was prepared by ET in September 2016 in accordance with condition 5.1 of EP-353/2009/K and condition 4.1 of EP-354/2009/D, to relocate water quality monitoring stations from SR5, IS10, CS(Mf)3 and alternate the transect lines of impact dolphin monitoring 2, 3, 4, 5, 6 and 7. A revised proposal has been updated and sent to IEC/ENPO for their further review on 24 March 2017 and IEC/ENPO verified the revised proposal on the same date. The revised proposal has been sent to authority by project team for review and approval on 3 April 2017. The authority subsequently approved the proposal on 12 May 2017.
- 9.5 Due to substantial completion of marine works by the end of June 2017, it is anticipated that the remaining construction works under Contract No. HY/2010/02, which include ground investigation (GI) works, construction of temporary timber platform, removal of jetty and reinstatement of seawall at the western section, construction of outfall at the eastern seawall, would cause limited disturbance to water column and not to the seabed. In view of this, a proposal for change of EM&A programme/requirements was prepared by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D, to terminate water quality monitoring works at stations IS5, IS(Mf)6, IS8, SR4(N), SR5(N), SR6, SR10A, SR10B(N), CS4, CSA and CS6, and impact dolphin monitoring (line-transect vessel survey method) covering NEL and NWL when perimeter silt curtain under the Contract is completely removed and vessel traffic numbers average 10 per month for Contract No. HY/2010/02. A revised proposal has been updated and sent to IEC/ENPO for their further review on 15 August 2017 and IEC/ENPO verified the revised proposal on 16 August 2017. The revised proposal has been sent to authority by project team for review and approval on 21 August 2017. The authority subsequently approved the proposal on 7 September 2017.
- 9.6 As informed by IEC/ENPO on 27 December 2017, three water quality monitoring stations of SR3, SR10A and SR10B(N) were relocated due to topographical condition. Alternative water quality monitoring stations SR3(N), SR10A(N) and SR10B(N2) were justified and certified by the ET Leader of Contract No. HY/2013/01 on 8 November 2017, verified by IEC/ENPO on 13 November 2017. The

proposal was submitted to the authority for review and approval on 29 November 2017. The authority subsequently approved the proposal on 22 December 2017. Relocation of water quality monitoring stations from SR3, SR10A and SR10B(N) to SR3(N), SR10A(N) and SR10B(N2) are adopted effective from 22 December 2017.

- 9.7 As informed by IEC/ENPO on 26 February 2018, air quality monitoring station AMS7 was relocated due to permission to carry out AQM at Hong Kong SkyCity Marriott Hotel could not be granted after the end of January 2018. Alternative air quality monitoring station AMS7B was justified and certified by ET Leader of Contract No. HY/2013/01 on 22 January 2018, verified by IEC/ENPO on 24 January 2018. The proposal was submitted to the authority for review and approval on 30 January 2018. Relocation of air quality monitoring stations from AMS7 to AMS7B is adopted effective from 6 February 2018 with the Authority's consent.
- 9.8 As informed by the Contractor, major construction activities for Contract no. HY/2010/02 has been substantially completed and it is anticipated that potential environmental impact for remaining works which only include ad hoc minor maintenance/touch up works on seawall under the Contract would be insignificant. In view of this, a proposal for Termination of EM&A Programme was prepared and certified by ET in accordance with Condition 5.1 of EP-353/2009/K and Condition 4.1 of EP-354/2009/D to terminate the EM&A Programme for Contract no. HY/2010/02. The proposal has been sent to IEC/ENPO for their further review on 17 April 2018 and IEC/ENPO verified the proposal on 18 April 2018. The proposal has been sent to authority by project team on 19 April 2018. The proposal was subsequently approved by the authority.

## **10. REVIEW OF EM&A PROGRAMME**

- 10.1 The environmental monitoring methodology was considered well established as the monitoring results were found in line with the EIA predictions.
- 10.2 As effective follow up actions were promptly taken once exceedances were recorded, no further exceedance occurred for each case. The EM&A programme was considered successfully and adequately conducted during the course of the reporting period.

## 11. COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

### 11.1 Comments on mitigation measures

11.1.1 According to the environmental site inspections performed in the reporting period, the following recommendations were provided:

### 11.2 Air Quality Impact

- All working plants and vessels on site should be regularly inspected and properly maintained to avoid dark smoke emission.
- All vehicles should be washed to remove any dusty materials before leaving the site.
- Haul roads should be sufficiently dampened to minimize fugitive dust generation.
- Wheel washing facilities should be properly maintained and reviewed to ensure properly functioning.
- Temporary exposed slopes and open stockpiles should be properly covered.
- Enclosure should be erected for cement debagging, batching and mixing operations.
- Water spraying should be provided to suppress fugitive dust for any dusty construction activity.

### 11.3 Construction Noise Impact

- Quieter powered mechanical equipment should be used as far as possible.
- Noisy operations should be oriented to a direction away from sensitive receivers as far as possible.
- Proper and effective noise control measures for operating equipment and machinery on-site should be provided, such as erection of movable noise barriers or enclosure for noisy plants. Closely check and replace the sound insulation materials regularly
- Vessels and equipment operating should be checked regularly and properly maintained.
- Noise Emission Label (NEL) shall be affixed to the air compressor and hand-held breaker operating within works area.
- Better scheduling of construction works to minimize noise nuisance.

### 11.4 Water Quality Impact

- Regular review and maintenance of silt curtain systems, drainage systems and desilting facilities in order to make sure they are functioning effectively.
- Construction of seawall should be completed as early as possible.
- Regular inspect and review the loading process from barges to avoid splashing of material.
- Silt, debris and leaves accumulated at public drains, wheel washing bays and perimeter u-channels and desilting facilities should be cleaned up regularly.
- Silty effluent should be treated/ desilted before discharged. Untreated effluent should be prevented from entering public drain channel.
- Proper drainage channels/bunds should be provided at the site boundaries to collect/intercept the surface run-off from works areas.
- Exposed slopes and stockpiles should be covered up properly during rainstorm.

#### 11.5 Chemical and Waste Management

- All types of wastes, both on land and floating in the sea, should be collected and sorted properly and disposed of timely and properly. They should be properly stored in designated areas within works areas temporarily.
- All chemical containers and oil drums should be properly stored and labelled.
- All plants and vehicles on site should be properly maintained to prevent oil leakage.
- All kinds of maintenance works should be carried out within roofed, paved and confined areas.
- All drain holes of the drip trays utilized within works areas should be properly plugged to avoid any oil and chemical waste leakage.
- Oil stains on soil surface and empty chemical containers should be cleared and disposed of as chemical waste.
- Regular review should be conducted for working barges and patrol boats to ensure sufficient measures and spill control kits were provided on working barges and patrol boats to avoid any spreading of leaked oil/chemicals.

#### 11.6 Landscape and Visual Impact

- All existing, retained/transplanted trees at the works areas should be properly fenced off and regularly inspected.

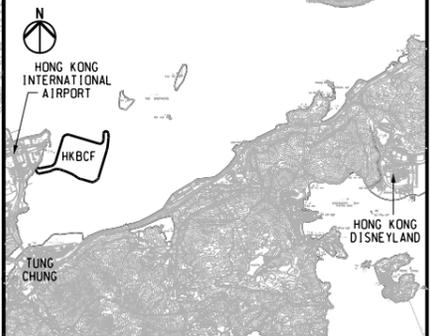
#### 11.7 Recommendations on EM&A Programme

- 11.7.1 The impact monitoring programme for air quality, noise, water quality and dolphin ensured that any deterioration in environmental condition was readily detected and timely actions taken to rectify any non-compliance. Assessment and analysis of monitoring results collected demonstrated the environmental impacts of the Contract. With implementation of recommended effective environmental mitigation measures, the Contract's environmental impacts were considered as environmentally acceptable. The weekly environmental site inspections ensured that all the environmental mitigation measures recommended were effectively implemented.
- 11.7.2 The recommended environmental mitigation measures, as included in the EM&A programme, effectively minimize the potential environmental impacts from the Contract. Also, the EM&A programme effectively monitored the environmental impacts from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.

## 12. CONCLUSIONS

- 12.1 The construction phase and EM&A programme of the Contract commenced on 12 March 2012.
- 12.2 1 Action level exceedances of 24-Hour TSP were recorded at AMS3B on 23 December 2017 and 17 January 2018 respectively. 1 action level exceedance of 24-Hour TSP was recorded at AMS2 on 17 January 2018. After investigation, there is no adequate information to conclude the recorded action level exceedances are related to this Contract. No other 1-hour and 24-hour action and limit level exceedances was recorded at all monitoring stations in the reporting period. The impact air quality levels recorded were generally similar to the predicted levels in the Project EIA.
- 12.3 For construction noise monitoring, no exceedance was recorded at all monitoring stations in the reporting period. Noise generating activities of the Contract did not cause any noticeable noise impact at the sensitive receivers. The impact noise levels recorded were generally similar to the predicted construction noise levels in the Project EIA.
- 12.4 For impact water quality monitoring, 40 action and 4 limit level exceedances of DO (S&M); 42 action level exceedances of DO (Bottom); 5 action level exceedances of Turbidity; 22 action level exceedances and 2 limit level exceedances of SS were recorded at measured suspended solids values (in mg/L). After investigation, all impact water quality exceedances were considered not related to this Contract.
- 12.5 Two (2) Limit level exceedances were recorded in the reporting period for impact dolphin monitoring. The investigation results showed that although no unacceptable changes in environmental parameters of this Contract have been measured. Event and Action Plan for Impact Dolphin Monitoring was triggered. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related solely to Contract works. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual contracts) cannot be quantified nor separate from the other stress factors. Please also refer to the attachment for full investigation result. For investigation results please refer to Appendix L of the corresponding quarterly reports.
- 12.6 Environmental site inspection was carried out 61 times in the reporting period. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.
- 12.7 Four (4) environmental complaints were received in the reporting period.
- 12.8 No summons or successful prosecution was received in the reporting period.
- 12.9 As discussed in the above sections, the Contract did not cause unacceptable environmental impacts or disturbance to air quality, noise, water quality in the vicinity near the reclamation works.
- 12.10 Apart from the above mentioned monitoring, most of the recommended mitigation measures, as included in the EM&A programme, were implemented properly in the reporting period.
- 12.11 The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Contract. The EM&A programme effectively monitored the environmental impacts from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.
- 12.12 Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.

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KEY PLAN

- NOTES**
1. ALL COORDINATES ARE RELATED TO HONG KONG 1980 GRID.
  2. ALL LEVELS ARE IN METRES ABOVE HONG KONG PRINCIPAL DATUM (mPD).
  3. REFER TO DRG NO. 211036/SL/1002 FOR THE DEFINITION OF SETTING OUT LINE (SOL) FOR THE HONG KONG BOUNDARY CROSSING FACILITIES (HKBCF) RECLAMATION SITE.
  4. REFER TO DRG NO. 211036/SL/1004 FOR DETAILS OF SITE BOUNDARY.
  5. FOR EXTENT OF SORTING FACILITIES AT FILL BANK AT TSEUNG KWAN O AREA 137 REFER TO DRG NO. 211036/SL/1015.

- LEGEND**
- SITE BOUNDARY
  - SETTING OUT LINE (SOL)
  - WORKS AREA BOUNDARY

Rev	Description	By	Date
-	FOR CONSTRUCTION	HYJL	11/11

Consultant

**ARUP** 奧雅納工程顧問  
Ove Arup & Partners Hong Kong Limited

Supported By :

- Ecosystems Ltd.
- EDA Marine Ltd.
- Geotechnical Consulting Group (Asia) Ltd.
- Hong Kong Cetacean Research Project
- IntelBuild Technyx Asia Limited
- Tony Gee and Partners LLP

Contract No. and Title:  
Contract No. HY/2010/02  
Hong Kong-Zhuhai-Macao Bridge  
Hong Kong Boundary Crossing Facilities  
- Reclamation Works

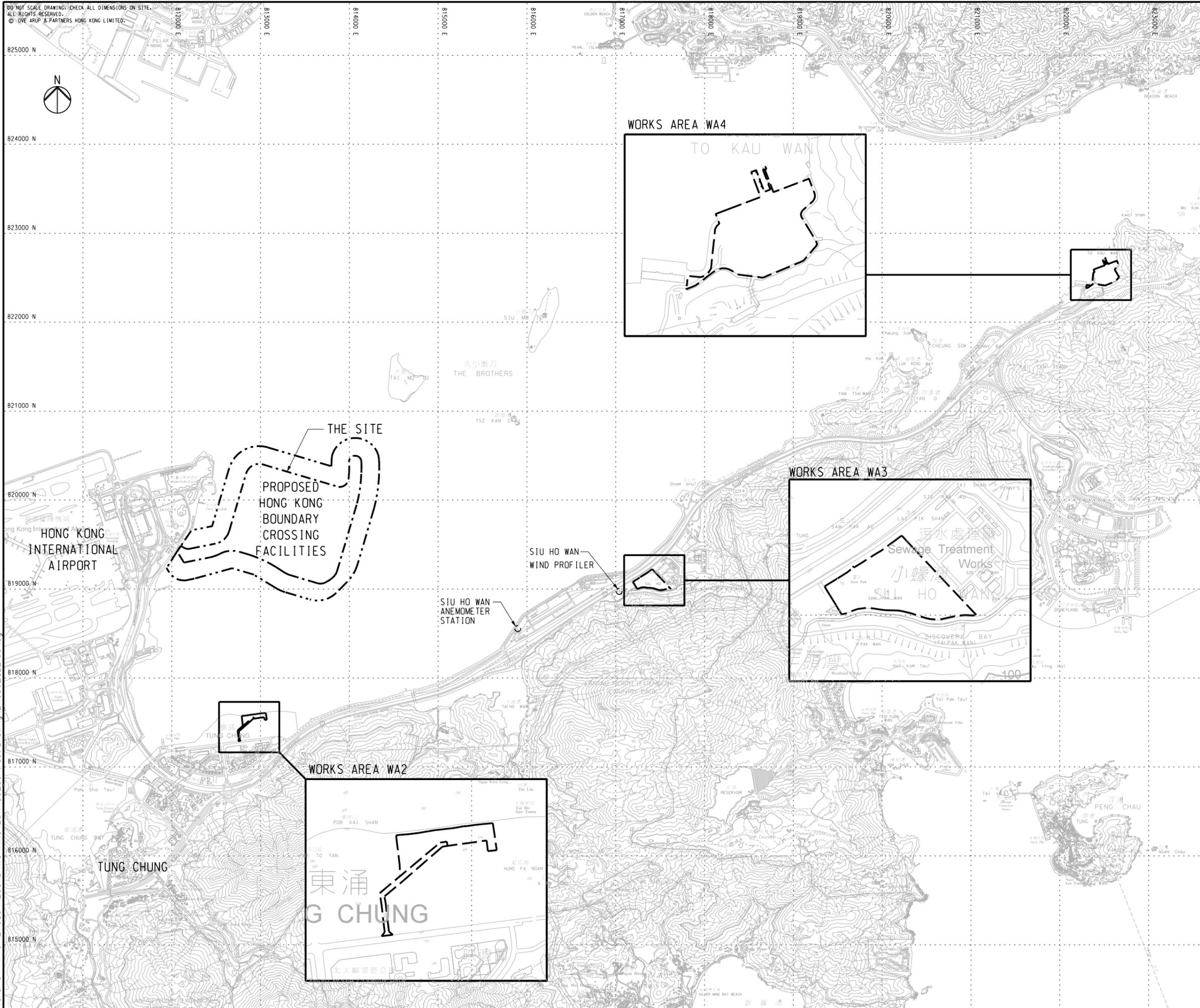
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**KEY PLAN**

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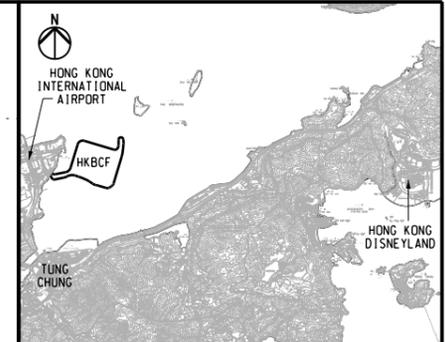
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Hong Kong Project Management Office

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**KEY PLAN**

- NOTES**
- FOR LEGENDS AND NOTES FOR CHAIN LINK FENCE AND GATE REFER TO DRG NO. 211036/SL/1013.
  - THE ERECTION OF CHAIN LINK FENCE AND GATES SHALL BE COMPLETED BY THE HANDOVER DATE OF EACH PORTION OF SITE, OR AS INSTRUCTED BY THE ENGINEER.
  - FOR SETTING OUT COORDINATES OF DIFFERENT PORTIONS OF SITE REFER TO DRG NO. 211036/SL/1003.
  - ACCESS POINTS BETWEEN PORTIONS SHALL BE PROVIDED BY THE CONTRACTOR, AND THE LOCATIONS SHALL BE AGREED WITH THE ENGINEER ON SITE.
  - FOR HOARDING AND FENCE AT FILL BANK AT TSEUNG KWAN O AREA 137 REFER TO DRG NO. 211036/SL/1015.

**LEGEND**

	SETTING OUT LINE (SOL)
	WORKS AREA BOUNDARY
	PORTIONS BOUNDARY LINE

Rev	Description	By	Date
-	FOR CONSTRUCTION	HYJL	11/11

Consultant

<b>ARUP</b>	奧雅納工程顧問	●
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	EDA Marine Ltd.	○
	Geotechnical Consulting Group (Asia) Ltd.	○
	Hong Kong Cetacean Research Project	○
	Intel:Build Technyx Asia Limited	○
	Tony Gee and Partners LLP	○

Contract No. and Title:  
**Contract No. HY/2010/02**  
**Hong Kong-Zhuhai-Macao Bridge**  
**Hong Kong Boundary Crossing Facilities**  
**- Reclamation Works**

Drawing title  
**WORKS AREA LAYOUT**  
**AND HOARDING PLAN**  
**(SHEET 2 OF 3)**

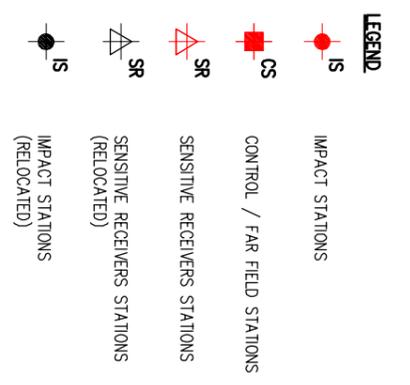
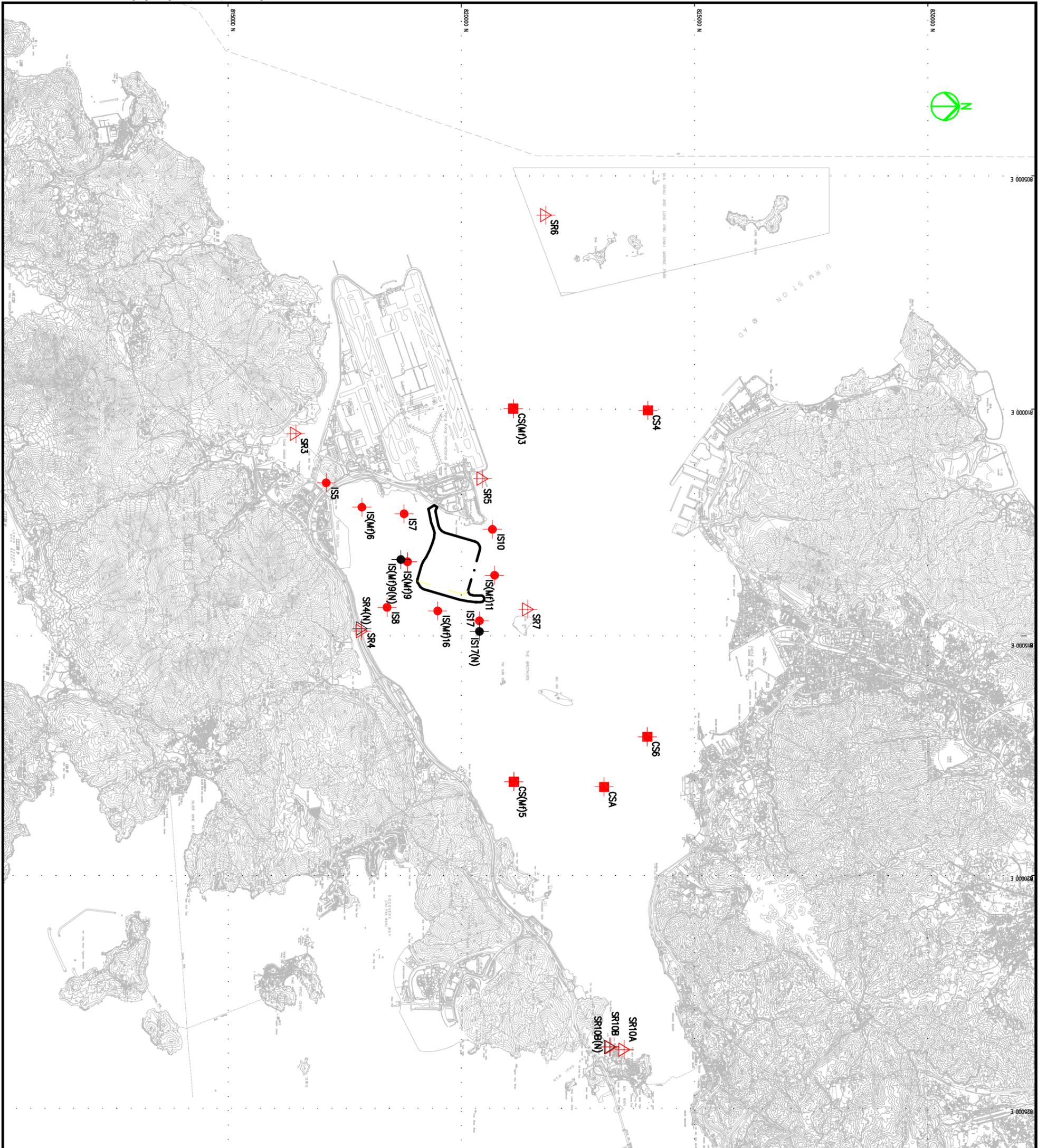
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**路政署**  
**HIGHWAYS DEPARTMENT**  
 港珠澳大橋香港工程管理局  
 Hong Kong - Zhuhai - Macao Bridge  
 Hong Kong Project Management Office

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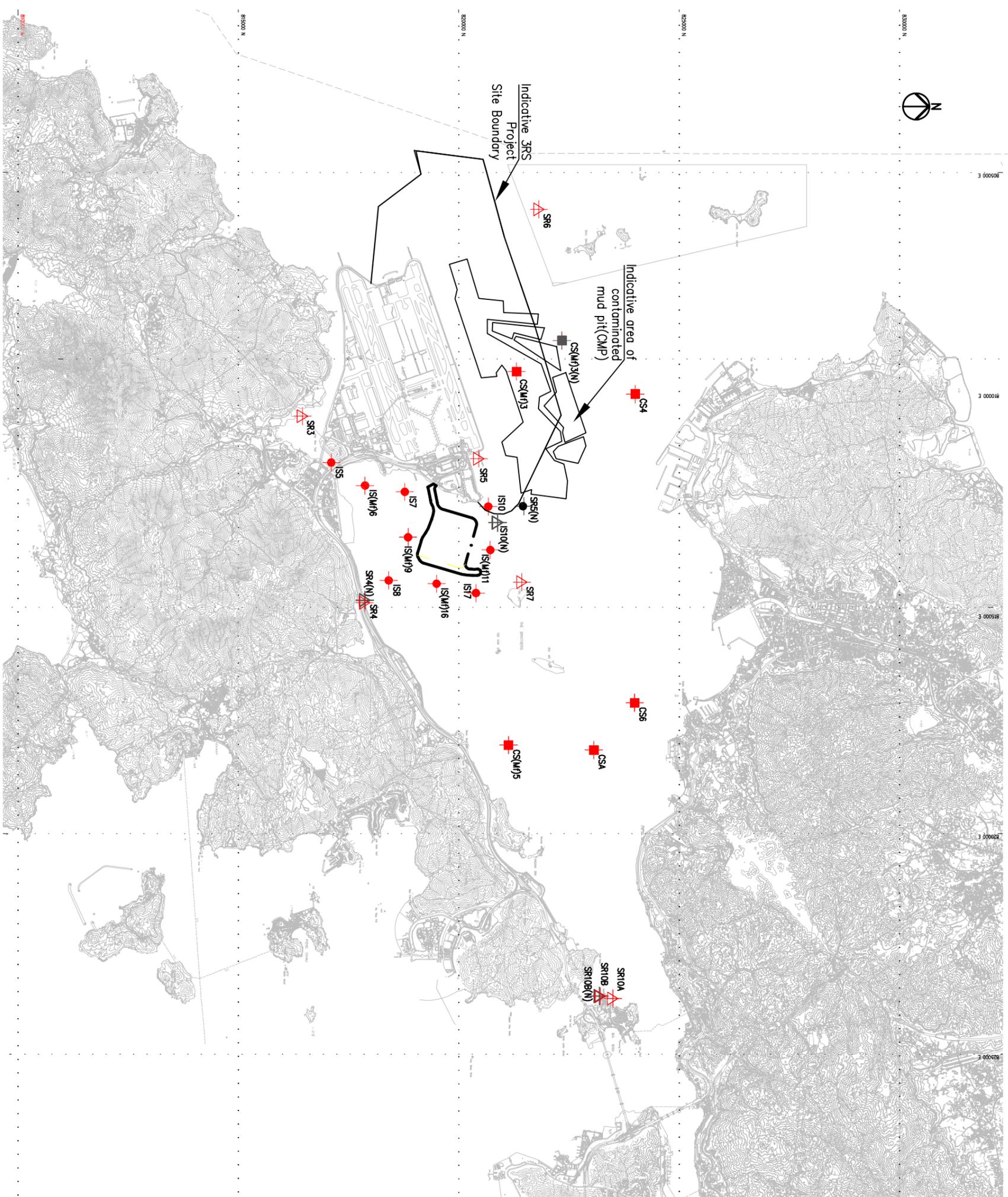




**SETTING OUT SCHEDULE**

MONITORING STATIONS	CO-ORDINATES	
	EASTING	NORTHING
IS5	811579	817106
IS(M)16	812101	817873
IS7	812244	818777
IS8	814251	818412
IS(M)9	813273	818850
IS(M)9(N)	813226	818708
IS10	812577	820670
IS(M)11	813562	820716
IS(M)16	814328	819497
IS17	814539	820391
IS17(N)	814767	820391
SR3	810525	816456
SR4(N)	814705	817859
SR5	811489	820455
SR6	805837	821818
SR7	814293	821431
SR10A	823741	823495
SR10B(N)	823683	823187
CS(M)3	809989	821117
CS(M)5	817990	821129
CS4	810025	824004
CS6	817028	823992
CSA	818103	823064

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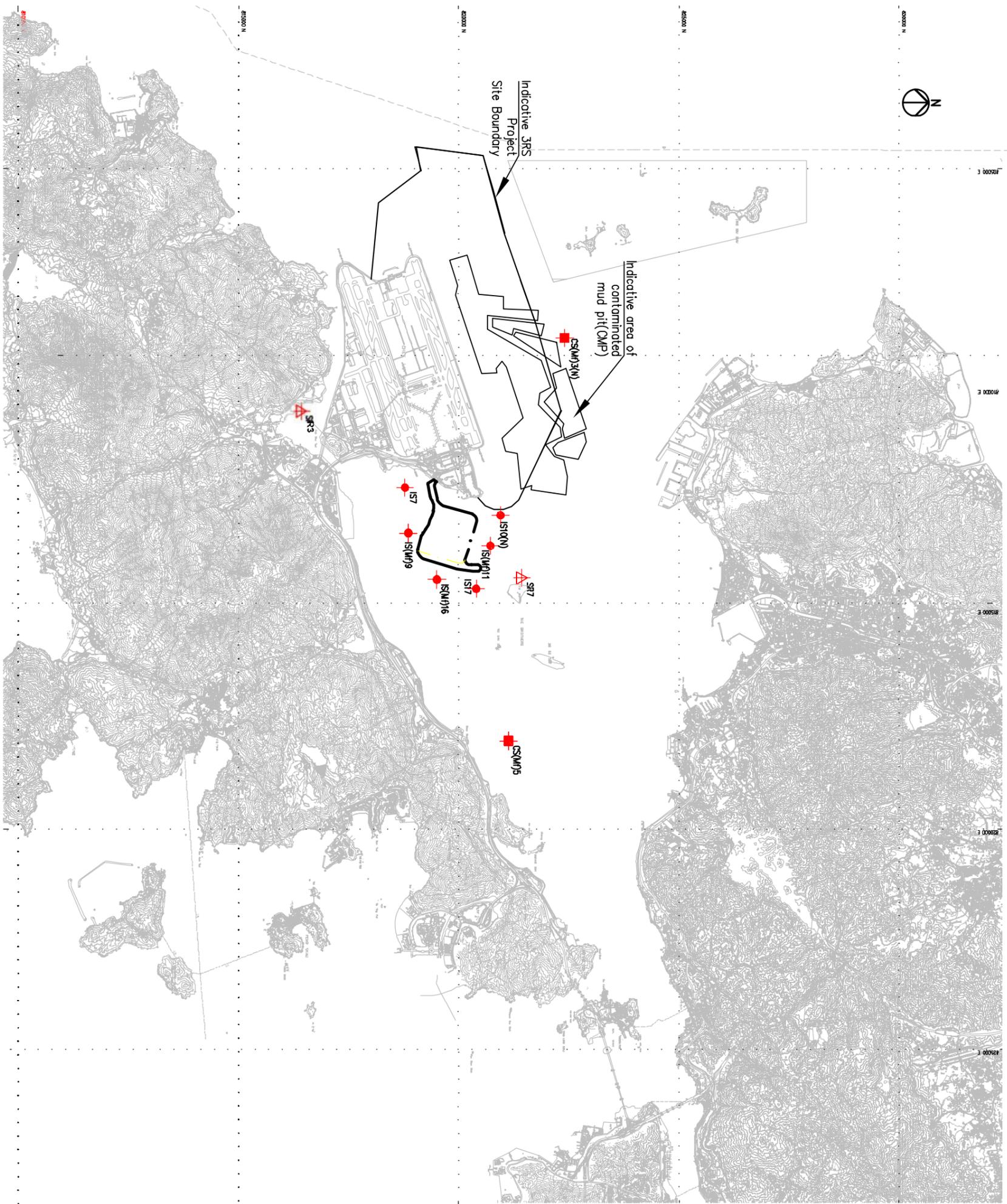


- LEGEND**
- IS IMPACT STATIONS
  - CS CONTROL / FAR FIELD STATIONS
  - SR SENSITIVE RECEIVERS STATIONS
  - IS IMPACT STATIONS (RELOCATED)
  - SR SENSITIVE RECEIVERS STATIONS (RELOCATED)
  - CS CONTROL / FAR FIELD STATIONS (RELOCATED)

**SETTING OUT SCHEDULE**

MONITORING STATIONS	CO-ORDINATES	
	EASTING	NORTHING
IS5	811579	817106
IS(Mf)6	812101	817873
IS7	812244	818777
IS8	814251	818412
IS(Mf)9	813273	818850
SR5(N)	812589	821475
IS(Mf)11	813562	820716
IS(Mf)16	814328	819497
IS17	814539	820391
SR3	810525	816456
SR4(N)	814705	817859
IS10(N)	812942	820881
SR6	805837	821818
SR7	814233	821431
SR10A	823741	823495
SR10B(N)	823683	823187
CS(Mf)3(N)	808814	822355
CS(Mf)5	817990	821129
CS4	810025	824004
CS6	817028	823992
CSA	818103	823064
IS10	812577	820670
SR5	811489	820455
CS(Mf)3	809989	821117

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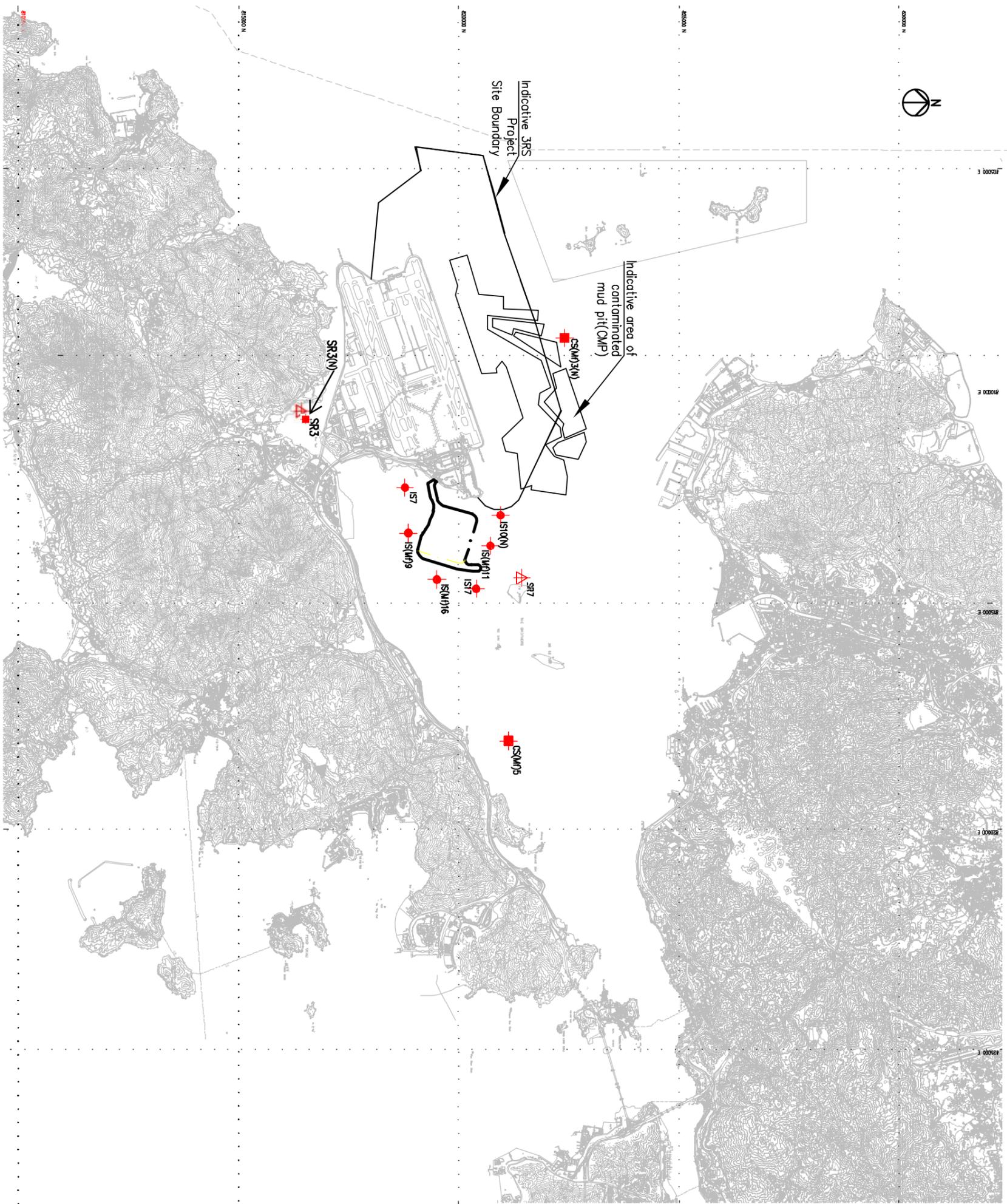


- LEGEND**
- IS IMPACT STATIONS
  - CS CONTROL / FAR FIELD STATIONS
  - SR SENSITIVE RECEIVERS STATIONS

**SETTING OUT SCHEDULE**

Monitoring Stations	Co-ordinates	
	EASTING	NORTHING
IS7	812244	818777
IS(M)9	813273	818850
IS10(N)	812942	820881
IS(M)11	813562	820716
IS(M)16	814328	819497
IS17	814539	820391
SR3	810525	816456
SR7	814293	821431
CS(M)3(N)	808814	822355
CS(M)5	817990	821129

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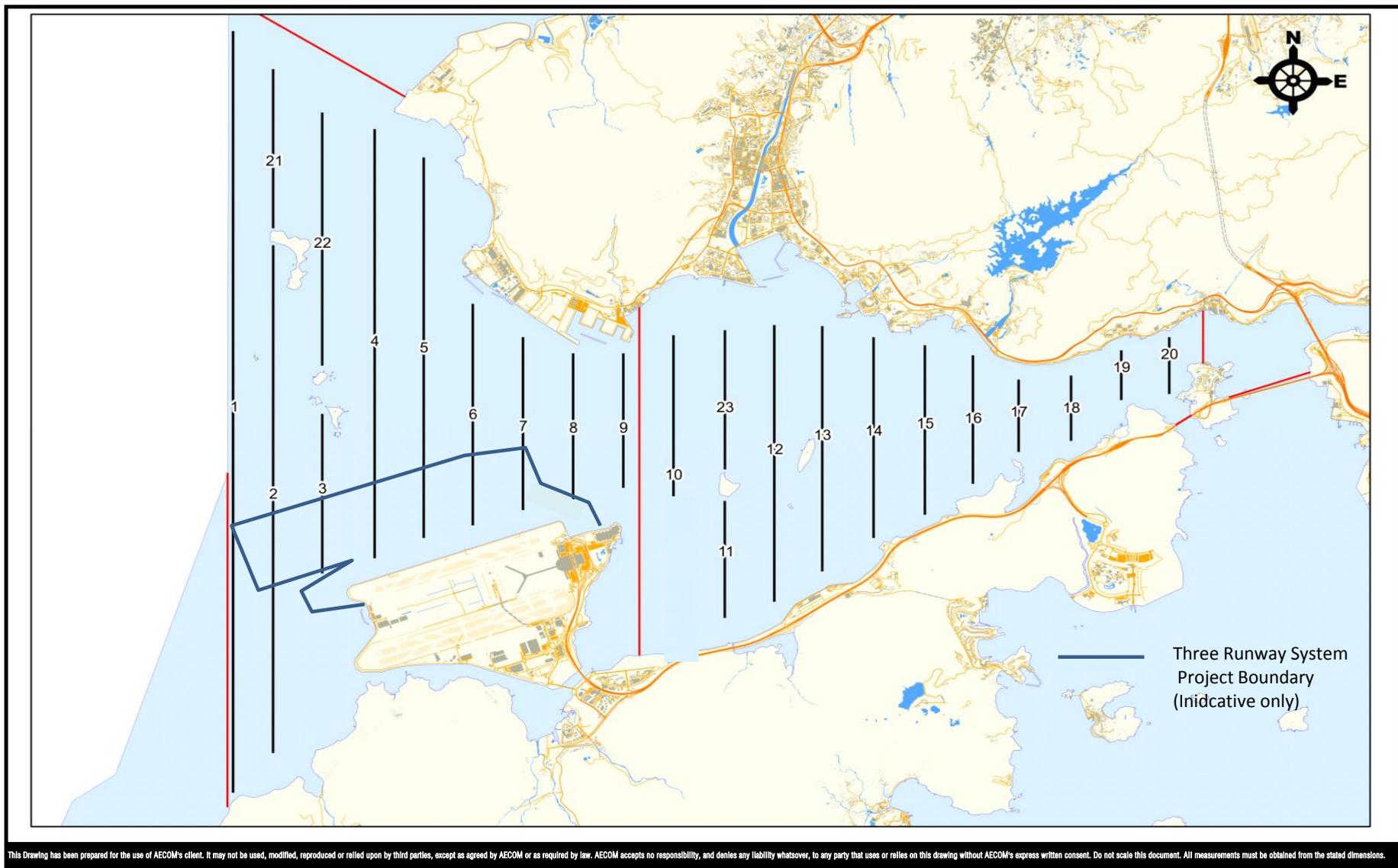


- LEGEND**
- IS IMPACT STATIONS
  - CS CONTROL / FAR FIELD STATIONS
  - SR SENSITIVE RECEIVERS STATIONS

**SETTING OUT SCHEDULE**

Monitoring Stations	Co-ordinates	
	EASTING	NORTHING
IS7	812244	818777
IS(M)9	813273	818850
IS10(N)	812942	820881
IS(M)11	813562	820716
IS(M)16	814328	819497
IS17	814539	820391
SR3(N)	810689	816591
SR7	814293	821431
CS(M)3(N)	808814	822355
CS(M)5	817990	821129

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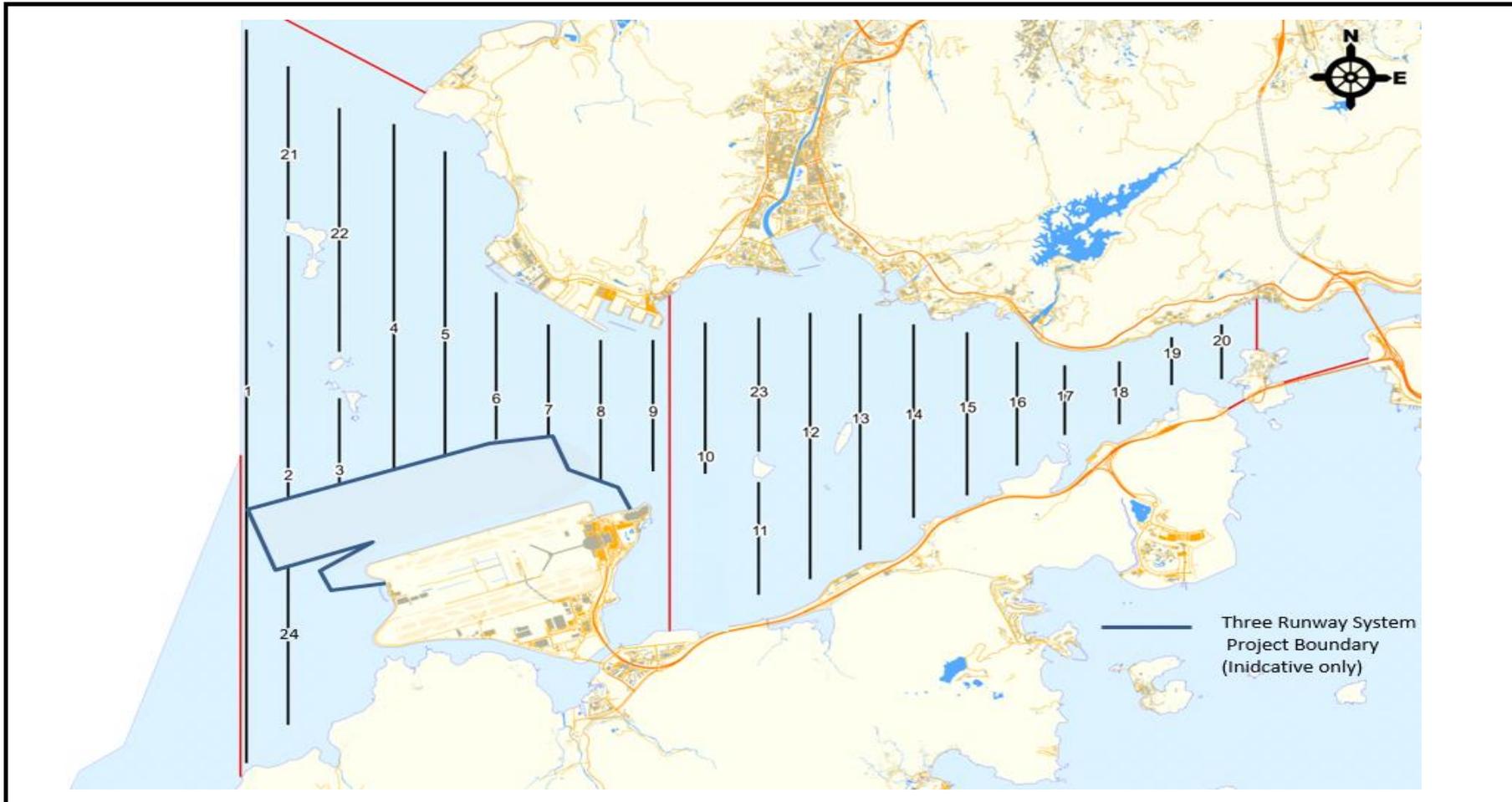


**Remarks:**

\*Transect 10 is now 3.6km in length due to the HKBCF construction site.

^Coordinates for transect lines 1, 2, 7, 8, 9 and 11 have been updated in respect to the Proposal for Alteration of Transect Line for Dolphin Monitoring approved by EPD on 19 August 2015. The total transect length for both NEL and NWL combined is 108km.

# New projects, large number of barges/vessels were anchored densely at north of Three Runway System project boundary, access to the transect area on lines 1, 2, 3, 4, 6 and 8 were blocked or affected in February 2017.



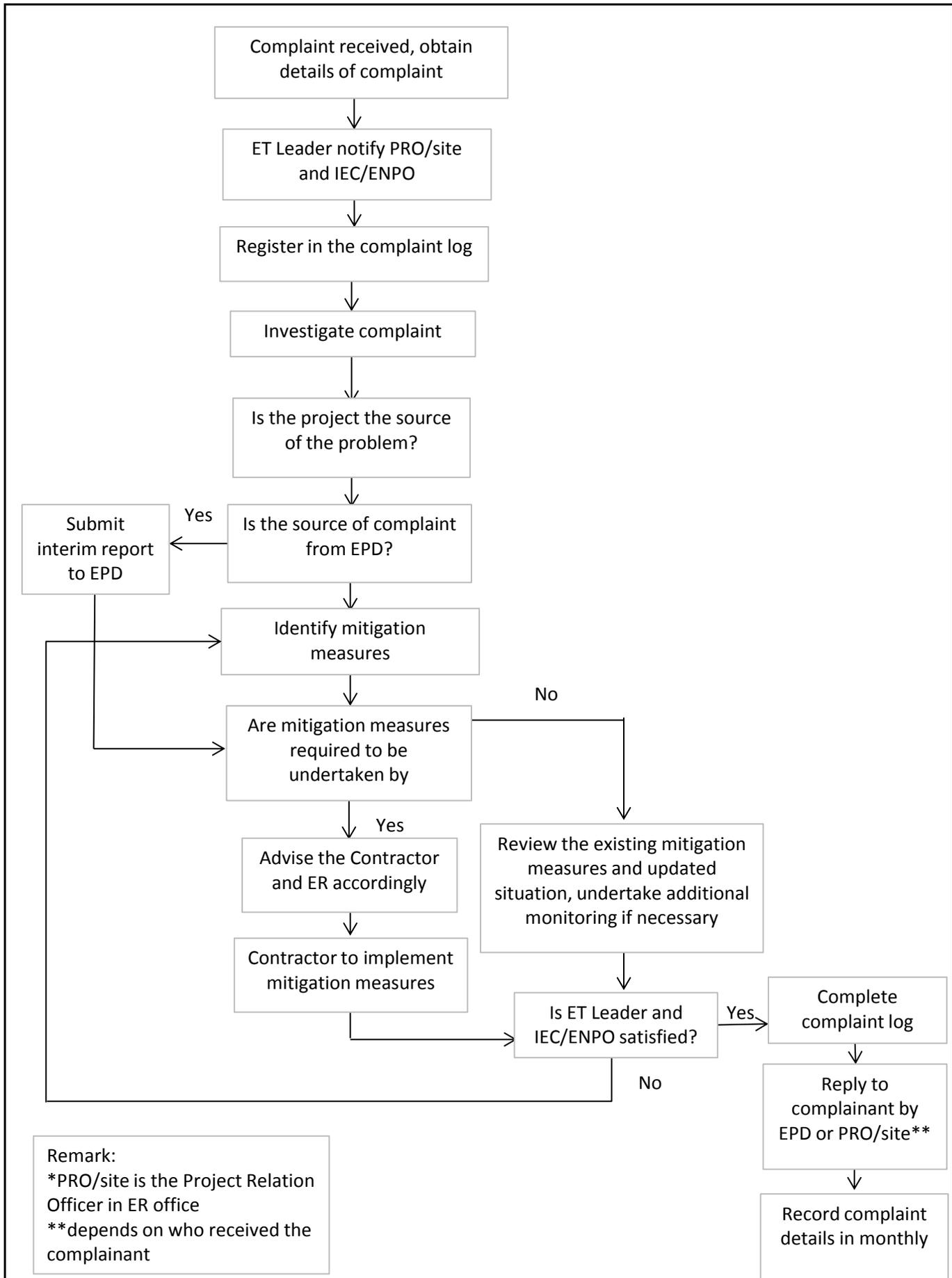
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**Remarks:**

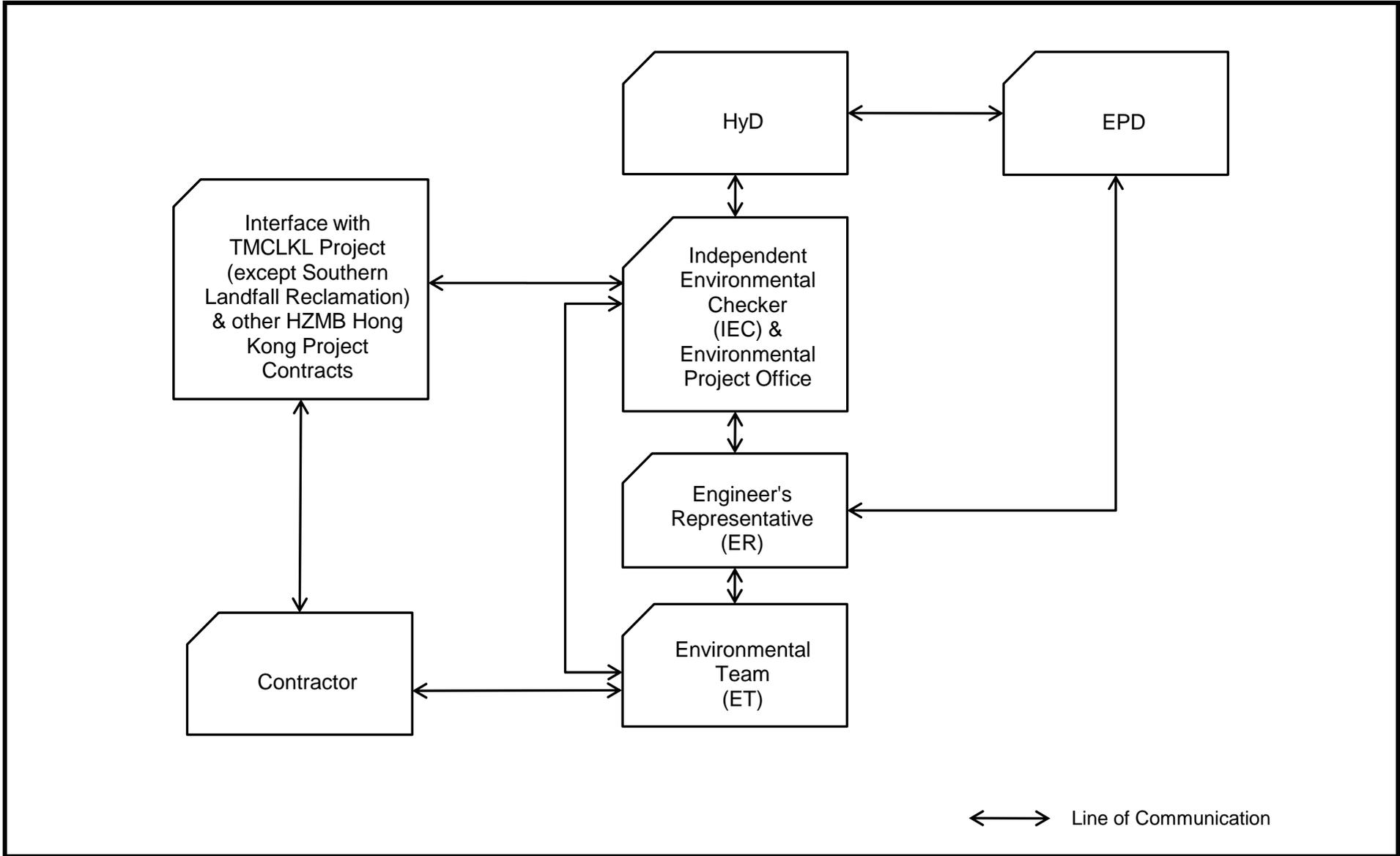
\*Transect 10 is now 3.6km in length due to the HKBCF construction site.

^Coordinates for transect lines 1, 2, 7, 8, 9 and 11 have been updated in respect to the Proposal for Alteration of Transect Line for Dolphin Monitoring approved by EPD on 19 August 2015. The total transect length for both NEL and NWL combined is 108km.

^Coordinates for transect lines 2, 3, 4, 5, 6 and 7 have been updated in respect to the Proposal for Alteration of Transect Line of Dolphin Monitoring and Alternative Monitoring Location for Impact Water Quality Monitoring (IWQM) Stations Due to Commencement of Third Runway Project which was approved by EPD on 12 May 2017. The total transect length for both NEL and NWL combined is 99km.

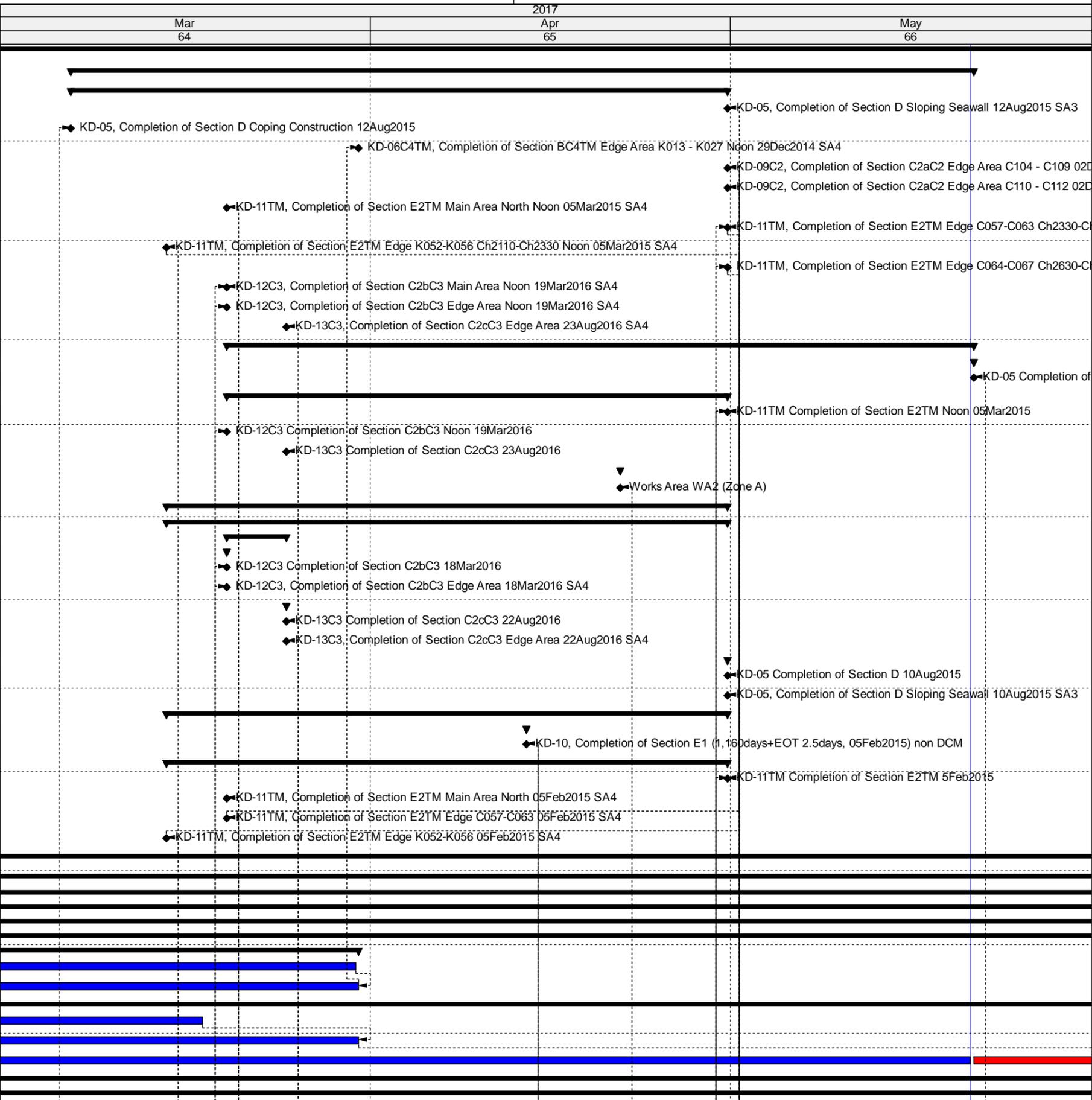


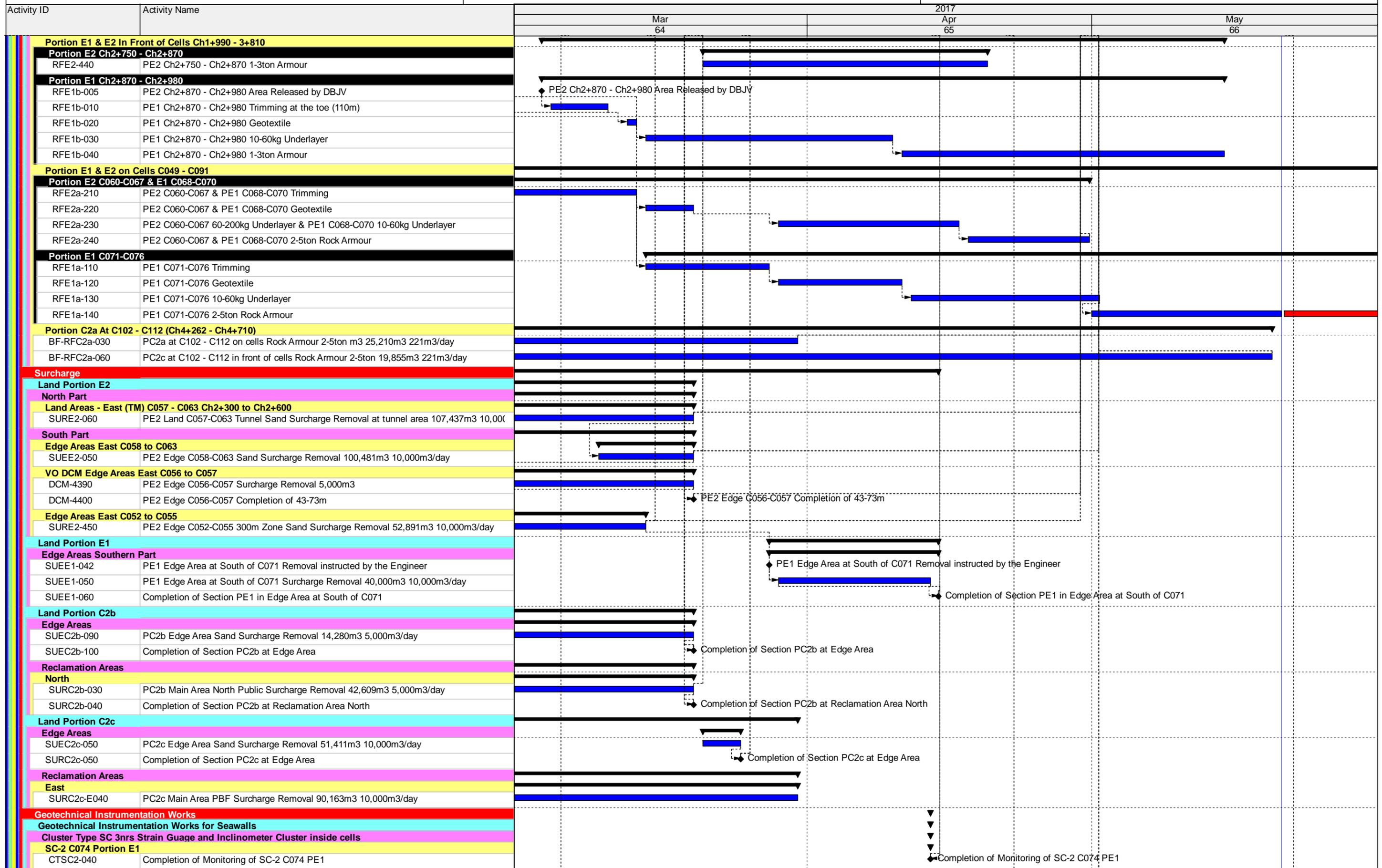
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Activity ID	Activity Name
<b>66th Monthly Progress Report Status as on 21May2017</b>	
<b>Contract Key Dates</b>	
<b>Key Dates for achievement of Stages and completion of Sections</b>	
G1076	KD-05, Completion of Section D Sloping Seawall 12Aug2015 SA3
G1078	KD-05, Completion of Section D Coping Construction 12Aug2015
G1082	KD-06C4TM, Completion of Section BC4TM Edge Area K013 - K027 Noon 29Dec2014 S
G1111	KD-09C2, Completion of Section C2aC2 Edge Area C104 - C109 02Dec2015 SA3 43-73M
G1118	KD-09C2, Completion of Section C2aC2 Edge Area C110 - C112 02Dec2015 SA3 23-73n
G1130	KD-11TM, Completion of Section E2TM Main Area North Noon 05Mar2015 SA4
G1134	KD-11TM, Completion of Section E2TM Edge C057-C063 Ch2330-Ch2630 Noon 05Mar2
G1135	KD-11TM, Completion of Section E2TM Edge K052-K056 Ch2110-Ch2330 Noon 05Mar2
G1136	KD-11TM, Completion of Section E2TM Edge C064-C067 Ch2630-Ch2790 Noon 05Mar2
G1140	KD-12C3, Completion of Section C2bC3 Main Area Noon 19Mar2016 SA4
G1142	KD-12C3, Completion of Section C2bC3 Edge Area Noon 19Mar2016 SA4
G1152	KD-13C3, Completion of Section C2cC3 Edge Area 23Aug2016 SA4
<b>Supplementary Agreement</b>	
<b>SA3</b>	
SA3-KD05-010	KD-05 Completion of Section D 12Aug2015
<b>SA4</b>	
SA4-KD11-040	KD-11TM Completion of Section E2TM Noon 05Mar2015
SA4-KD12-010	KD-12C3 Completion of Section C2bC3 Noon 19Mar2016
SA4-KD13-010	KD-13C3 Completion of Section C2cC3 23Aug2016
<b>Vacation of Site</b>	
G1280	Works Area WA2 (Zone A)
<b>Summary Programme</b>	
<b>Portion Summary</b>	
<b>Portion C</b>	
<b>Portion C2b</b>	
SSA4-KD12-010	KD-12C3 Completion of Section C2bC3 18Mar2016
SSC2b-1142	KD-12C3, Completion of Section C2bC3 Edge Area 18Mar2016 SA4
<b>Portion C2c</b>	
SSA4-KD13-010	KD-13C3 Completion of Section C2cC3 22Aug2016
SSC2c-1152	KD-13C3, Completion of Section C2cC3 Edge Area 22Aug2016 SA4
<b>Portion D</b>	
SSA3-KD05-010	KD-05 Completion of Section D 10Aug2015
SSD-1076	KD-05, Completion of Section D Sloping Seawall 10Aug2015 SA3
<b>Portion E</b>	
<b>Portion E1</b>	
SSE1-1120	KD-10, Completion of Section E1 (1,160days+EOT 2.5days, 05Feb2015) non DCM
<b>Portion E2</b>	
SSA4-KD11-040	KD-11TM Completion of Section E2TM 5Feb2015
SSE2-1130	KD-11TM, Completion of Section E2TM Main Area North 05Feb2015 SA4
SSE2-1134	KD-11TM, Completion of Section E2TM Edge C057-C063 05Feb2015 SA4
SSE2-1135	KD-11TM, Completion of Section E2TM Edge K052-K056 05Feb2015 SA4
<b>Work Zone, as defined in PS Clause 1.03(6)</b>	
<b>Portion A, B, C &amp; E</b>	
<b>Seawall</b>	
<b>Optimizing Rubble Mound Seawalls</b>	
<b>Rock Armour</b>	
<b>Seawall Portion B K013-K027 Ch0+450 - Ch1+100</b>	
RFB0-030	PB at K013 - K027 Underlayer (200-500kg) 16,832m3 1000m3/day
RFB0-040	PB at K013 - K027 Rock Armour (0.3-1 ton 33904m3 244m3/day)
<b>Seawall Portion C2a C113-C119 Ch4+710 - Ch5+050</b>	
RFC2a010	PC2a at C113 - C117 Removal of Temporary Rockfill (190,000m3, 1,500m3/day)
RFC2a030	PC2a at C113 - C117 Underlayer 21,600m3 1000m3/day
RFC2a040	PC2a at C113 - C117 Rock Armour (2-5 ton 43,272m3 305m3/day)
<b>Conforming Sloping Seawalls</b>	
<b>Rock Armour - Before Surcharge Period</b>	





Activity ID	Activity Name	2017		
		Mar 64	Apr 65	May 66
<b>Portion D</b>				
<b>Site Construction</b>				
<b>C1 to C4</b>				
<b>Construction of Permanent Seawall</b>				
<b>Vertical Seawall Type V2 6+136 to 5+650</b>				
<b>Reclamation upto +5.5mPD</b>				
PD-V2-0380	PD C1 West - Coping backfill with compaction upto +5.5mPD VSOP22-20			
PD-V2-0420	PD C4 East - Coping backfill with compaction upto +5.5mPD VSOP05-01			
PD-V2-0430	PD Completion of Coping before end June 2017	 PD Completion of Coping before end June 2017		
<b>Sloping Seawall Type S1 0+000 to 0+420</b>				
<b>S1 Rockfill Type 1</b>				
PD-S1-1030	PD C2/3 - Sloping Seawall Type S1 Reconstruction			
PD-S1-1040	PD C3/4 - Sloping Seawall Type S1 Reconstruction			
PD-S1-1045	PD C4 East - Sloping Seawall Type S1 Reconstruction			
PD-S1-1050	Completion of Southern Sloping Seawall	 Completion of Southern Sloping Seawall		
<b>Works Area WA2 (Tung Chung)</b>				
<b>Zone A</b>				
A1880	Maintenance of Engineer's Accommodation (28Feb2017)			

Activity ID	Activity Name	2017		
		Jun	Jul	Aug
		67	68	69
<b>67th Monthly Progress Report Status as on 21Jun2017</b>				
<b>Additional Works</b>				
<b>Reinstatement of Seawall After Removal of Temporary Jetty by C2 contractor</b>				
OS01-0020	Reinstatement of seawall			
<b>Effluent Discharge Pipe K047/048</b>				
OS02-0010	Removal of top soil of existing cell at K047/048			
OS02-0020	Cut Down existing steel sheet pile & capping beam			
OS02-0030	300mm Rockfill bedding			
OS02-0040	Discharge pipe laying			
OS02-0050	Discharge Pipe Concrete Surrounding			
OS02-0060	Outfall Precast Concrete			
OS02-0070	Outfall Curing			
OS02-0080	Outfall Installation			
<b>Additional GI Works</b>				
OS03-0010	Outstanding Land Based GI Works 13nos from 1 July 2017			
OS03-0020	Outstanding Marine Based GI Works 37nos from 1 July 2017			

█ Remaining Level of Effort    █ Remaining Work    S...  
█ Actual Level of Effort    █ Critical Remaining Work  
█ Actual Work    ◆ ◆ Milestone

Activity ID	Activity Name	2017			
		Sep	Oct	Nov	Dec
		70	71	72	73
<b>70th Monthly Progress Report Status as on 21September2017</b>					
<b>Additional Works</b>					
<b>Reinstatement of Seawall After Removal of Temporary Jetty by C2 contractor</b>					
OS01-0030	Removal of Temp Rockfill Seaside				
OS01-0040	Removal of Temp Rockfill Landside				
OS01-0050	Installation Underlayer				
OS01-0060	Installation of Rock Armour				
<b>Effluent Discharge Pipe K047/048</b>					
OS02-0020	Cut Down existing steel sheet pile & capping beam				
OS02-0030	300mm Rockfill bedding				
OS02-0040	Discharge pipe laying				
OS02-0050	Discharge Pipe Concrete Surrounding				
OS02-0060	Outfall Precast Concrete				
OS02-0070	Outfall Curing				
OS02-0080	Outfall Installation				
OS02-0100	Flexible Joint				
OS02-0110	Backfill				
OS02-0120	Reinstatement at K047/048				
<b>Additional GI Works</b>					
OS03-0020	Outstanding Marine Based GI Works 194nos				

█ Remaining Level of Effort   
 █ Remaining Work   
 S...  
█ Actual Level of Effort   
 █ Critical Remaining Work  
█ Actual Work   
 ◆ ◆ Milestone

Activity ID	Activity Name	2017		2018	
		Dec 73	Jan 74	Feb 75	Mar 76
<b>73rd Monthly Progress Report Status as on 21December2017</b>					
<b>Additional Works</b>					
<b>Reinstatement of Seawall After Removal of Temporary Jetty by C2 contractor</b>					
OS01-0050	Installation Underlayer				
OS01-0060	Installation of Rock Armour				
<b>Effluent Discharge Pipe K047/048</b>					
OS02-0120	Reinstatement at K047/048 (SRT)				
<b>Additional GI Works</b>					
OS03-0020	Outstanding Marine Based GI Works 194nos				

█ Remaining Level of Effort    █ Remaining Work    S...  
█ Actual Level of Effort    █ Critical Remaining Work  
█ Actual Work    ◆ ◆ Milestone

Activity ID	Activity Name
<b>74th Monthly Progress Report Status as on 21 January 2018</b>	
<b>Additional Works</b>	
<b>Effluent Discharge Pipe K047/048</b>	
OS02-0120	Reinstatement at K047/048 (SRT)

2	2018			
	Jan	Feb	Mar	Apr
	74	75	76	77

**Appendix C - Implementation Schedule of Environmental Mitigation Measures**

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
<b>Air Quality</b>				
S5.5.6.1 of HKBCFEIA	A1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	All construction sites	V
S5.5.6.2 of HKBCFEIA and S4.8.1 of TKCLKLEIA	A2	Proper watering of exposed spoil should be undertaken throughout the construction phase: <ul style="list-style-type: none"> <li>• Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;</li> <li>• Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;</li> <li>• A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones.</li> <li>• Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;</li> <li>• When there are open excavation and reinstatement works, hoarding of not less</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;</p> <ul style="list-style-type: none"> <li>• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;</li> <li>• Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;</li> <li>• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;</li> <li>• Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;</li> <li>• Any skip hoist for material transport should be totally enclosed by impervious sheeting;</li> <li>• Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA)</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;</p> <ul style="list-style-type: none"> <li>• Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;</li> <li>• All unpaved roads/exposed area shall be watered which results in dust suppression by forming moist cohesive films among the discrete grains of road surface material.</li> <li>• No burning of debris or other materials on the works areas is allowed;</li> <li>• Water spray shall be used during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created;</li> <li>• Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading;</li> <li>• During transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards;</li> <li>• Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and <ul style="list-style-type: none"> <li>• Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.</li> </ul>		
S5.5.6.3 of HKBCFEIA and S4.8.1 of TKCLKLEIA	A3	The Contractor should undertake proper watering on all exposed spoil and associated work areas (with at least 8 times per day) throughout the construction phase.	All construction sites	V
S5.5.6.4 of HKBCFEIA and S4.11 of TKCLKLEIA	A4	Implement regular dust monitoring under EM&A programme during the construction stage.	Selected representative dust monitoring station	V (monitoring works between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge)

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
				HKBCF – Passenger Clearance Building.)
S5.5.7.1 of HKBCFEIA	A5	<p>The following mitigation measures should be adopted to prevent fugitive dust emissions for concrete batching plant:</p> <ul style="list-style-type: none"> <li>• Loading, unloading, handling, transfer or storage of any dusty materials should be carried out in totally enclosed system;</li> <li>• All dust-laden air or waste gas generated by the process operations should be properly extracted and vented to fabric filtering system to meet the emission limits for TSP;</li> <li>• Vents for all silos and cement/ pulverised fuel ash (PFA) weighing scale should be fitted with fabric filtering system;</li> <li>• The materials which may generate airborne dusty emissions should be wetted by water spray system;</li> <li>• All receiving hoppers should be enclosed on three sides up to 3m above unloading point;</li> <li>• All conveyor transfer points should be totally enclosed;</li> <li>• All access and route roads within the premises should be paved and wetted; and</li> <li>• Vehicle cleaning facilities should be provided and used by all concrete trucks</li> </ul>	All construction sites	N/A

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		before leaving the premises to wash off any dust on the wheels and/or body.		
S5.5.2.7 of HKBCFEIA	A6	The following mitigation measures should be adopted to prevent fugitive dust emissions at barging point: <ul style="list-style-type: none"> <li>• All road surface within the barging facilities will be paved;</li> <li>• Dust enclosures will be provided for the loading ramp;</li> <li>• Vehicles will be required to pass through designated wheels wash facilities; and</li> <li>• Continuous water spray at the loading points.</li> </ul>	All construction sites	N/A (Construction in process)
<b>Construction Noise (Air borne)</b>				
S6.4.10 of HKBCFEIA	N1	Use of good site practices to limit noise emissions by considering the following: <ul style="list-style-type: none"> <li>• only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;</li> <li>• machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>• plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;</li> <li>• silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;</li> <li>• mobile plant should be sited as far away from NSRs as possible and practicable;</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>material stockpiles, mobile container site office and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>		
S6.4.11 of HKBCFEIA	N2	Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	All construction sites	V
S6.4.12 of HKBCFEIA	N3	Install movable noise barriers (typically density @14kg/m <sup>2</sup> ), acoustic mat or full enclosure close to noisy plants including air compressor, generators, saw.	For plant items listed in Appendix 6D of the EIA report at all construction sites	N/A
S6.4.13 of HKBCFEIA	N4	Select “Quiet plants” which comply with the BS 5228 Part 1 or TM standards.	For plant items listed in Appendix 6D of the EIA report at all construction sites	V
S6.4.14 of HKBCFEIA	N5	Sequencing operation of construction plants where practicable.	All construction sites where practicable	V
S5.1 of TMCLKLEIA	N6	Implement a noise monitoring under EM&A programme.	Selected representative noise monitoring station	V (monitoring works between September 2017 and April 2018 for the Contract are

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
				covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF – Passenger Clearance Building.)
<b>Waste Management (Construction Waste)</b>				
S12.6 of TMCLKLEIA	WM1	The Contractor shall identify a coordinator for the management of waste.	All construction sites	V
S12.6 of TMCLKLEIA	WM2	The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	All construction sites	V
S12.6 of TMCLKLEIA	WM3	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All construction sites	V
S8.3.8 of HKBCFEIA and S12.6 of TMCLKLEIA	WM4	<p><i>Construction and Demolition Material</i></p> <p>The following mitigation measures should be implemented in handling the waste:</p> <ul style="list-style-type: none"> <li>Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement;</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>• Carry out on-site sorting;</li> <li>• Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate;</li> <li>• Adopt ‘Selective Demolition’ technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible;</li> <li>• Implement a trip-ticket system for each works contract to ensure that the disposal of C&amp;D materials are properly documented and verified;</li> <li>• Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – “Environmental Management on Construction Sites” to encourage on-site sorting of C&amp;D materials and to minimize their generation during the course of construction;</li> <li>• In addition, disposal of the C&amp;D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation; and</li> <li>• The surplus surcharge should be transferred to a fill bank.</li> </ul>		
S8.3.9- S8.3.11 of HKBCFEIA	WM5	<p><u>C&amp;D Waste</u></p> <ul style="list-style-type: none"> <li>• Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&amp;D materials. The use of more durable formwork or</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
and S12.6 of TMCLKLEIA		<p>plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding and falsework should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage.</p> <ul style="list-style-type: none"> <li>The Contractor should recycle as much of the C&amp;D materials as possible on-site. Public fill and C&amp;D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.</li> </ul>		
S8.2.12- S8.3.15 of HKBCFEIA and S12.6 of TMCLKLEIA	WM6	<p><u>Chemical Waste</u></p> <ul style="list-style-type: none"> <li>Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.</li> <li>Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation.</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated.</li> <li>Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.</li> </ul>		
S8.3.16 of HKBCFEIA and S12.6 of TMCLKLEIA	WM7	<p><u>Sewage</u></p> <ul style="list-style-type: none"> <li>Adequate numbers of portable toilets should be provided for the workers. The portable toilets should be maintained in a state, which will not deter the workers from utilizing these portable toilets. Night soil should be collected by licensed collectors regularly.</li> </ul>	All construction sites	V
S8.3.17 of HKBCFEIA and S12.6 of	WM8	<p><u>General Refuse</u></p> <ul style="list-style-type: none"> <li>The site and surroundings shall be kept tidy and litter free. General refuse generated on-site should be stored in enclosed bins or compaction units</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
TMCLKLEIA		<p>separately from construction and chemical wastes.</p> <ul style="list-style-type: none"> <li>• A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law.</li> <li>• Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible.</li> <li>• Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. In addition, waste separation facilities for paper, aluminum cans, plastic bottles etc., should be provided.</li> <li>• Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including reduction, reuse and recycling of wastes.</li> <li>• Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station.</li> <li>• All waste containers shall be in a secure area on hardstanding.</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
<b>Water Quality (Construction Phase)</b>				
	W1	<p>Mitigation during the marine works to reduce impacts to within acceptable levels have been recommended and will comprise a series of measures that restrict the method and sequencing of backfilling, as well as protection measures. Details of the measures are provided below:</p> <ul style="list-style-type: none"> <li>• Reclamation filling for the Project shall not proceed until at least 200m of leading seawall at the reclamation area formed above +2.2mPD, unless otherwise agreement was obtained from EPD, except for the 300m gaps for marine access. All underwater filling works shall be carried out behind seawalls to avoid dispersion of suspended solids outside the Project limit;</li> <li>• Except for the filling of the cellular structures, not more than 15% public fill shall be used for reclamation filling below +2.5mPD during construction of the seawall;</li> <li>• After the seawall is completed except for the 300m marine access as indicated in the EPs, not more than 30% public fill shall be used for reclamation filling below</li> </ul>	During filling	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>+2.5mPD, unless otherwise agreement from EPD was obtained;</p> <ul style="list-style-type: none"> <li>• Upon completion of 200m leading seawall, no more than a total of 60 filling barge trips per day shall be made with a cumulative maximum daily filling rate of 60,000 m3 for HKBCF and TMCLKL southern landfall reclamation during the filling operation; and</li> <li>• Upon completion of the whole section of seawall except for the 300m marine access as indicated in the EPs, no more than a total of 190 filling barge trips per day shall be made with a cumulative maximum daily filling rate of 190,000 m3 for the remaining filling operations for HKBCF and TMCLKL southern landfall reclamation.</li> <li>• Floating type perimeter silt curtains shall be around the HKBCF site before the commencement of marine works. Staggered layers of silt curtain shall be provided to prevent sediment loss at navigation accesses. The length of each staggered layers shall be at least 200m;</li> <li>• Single layer silt curtain to be applied around the North-east airport water intake;</li> <li>• The silt-curtains should be maintained in good condition to ensure the sediment plume generated from filling be confined effectively within the site boundary;</li> <li>• The filling works shall be scheduled to spread the works evenly over a working day;</li> <li>• Cellular structure shall be used for seawall construction;</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>• A layer of geotextile shall be placed on top of the seabed before any filling activities take place inside the cellular structures to form the seawall;</li> <li>• The conveyor belts shall be fitted with windboards and conveyor release points shall be covered with curtain to prevent any spillage of filling materials onto the surrounding waters; and</li> <li>• An additional layer of silt curtain shall be installed near the active stone column installation points. A layer of geotextile with stone blanket on top shall be placed on the seabed prior to stone column installation works.</li> <li>• All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash</li> </ul>		
S9.11.1.3 of HKBCFEIA and S6.10 of TMCLKLEIA	W2	<p><u>Land Works</u></p> <p>General construction activities on land should also be governed by standard good working practice. Specific measures to be written into the works contracts should include:</p> <ul style="list-style-type: none"> <li>• wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;</li> <li>• sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO</li> </ul>	All land-based construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>or collected for disposal offsite. The use of soakaways shall be avoided;</p> <ul style="list-style-type: none"> <li>• storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks;</li> <li>• silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm;</li> <li>• temporary access roads should be surfaced with crushed stone or gravel;</li> <li>• rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;</li> <li>• measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;</li> <li>• open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;</li> <li>• manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>from getting into foul sewers;</p> <ul style="list-style-type: none"> <li>• discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;</li> <li>• all vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit;</li> <li>• wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain;</li> <li>• the section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel;</li> <li>• wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects;</li> <li>• vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for offsite disposal;</li> <li>• the contractors shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately;</li> <li>• waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance;</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>• all fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank; and</li> <li>• surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the storm water system..</li> </ul>		
S9.14 of HKBCFEIA and S6.10 of TMCLKLEIA	W3	Implement a water quality monitoring programme	At identified monitoring location	V (monitoring works between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF – Passenger Clearance Building.)
S6.10 of TMCLKLEIA	W4	All construction works shall be subject to routine audit to ensure implementation of all	All construction site areas	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		EIA recommendations and good working practice.		
<b>Ecology (Construction Phase)</b>				
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E1	<ul style="list-style-type: none"> <li>• Install silt curtain during the construction</li> <li>• Limit works fronts</li> <li>• Construct seawall prior to reclamation filling where practicable</li> <li>• Good site practices</li> <li>• Strict enforcement of no marine dumping</li> <li>• Site runoff control</li> <li>• Spill response plan</li> </ul>	Seawall, reclamation area	V
S10.7 of HKBCFEIA	E2	<ul style="list-style-type: none"> <li>• Watering to reduce dust generation; prevention of siltation of freshwater habitats; Site runoff should be desilted, to reduce the potential for suspended sediments, organics and other contaminants to enter streams and standing freshwater.</li> </ul>	Land-based works areas	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E3	<ul style="list-style-type: none"> <li>• Good site practices, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time.</li> </ul>	Land-based works areas	V
S10.7 of HKBCFEIA and S8.14 of	E4	<ul style="list-style-type: none"> <li>• Dolphin Exclusion Zone</li> <li>• Dolphin watching plan</li> </ul>	Marine works	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
TMCLKLEIA				
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E5	<ul style="list-style-type: none"> <li>• Decouple compressors and other equipment on working vessels</li> <li>• Proposal on design and implementation of acoustic decoupling measures applied during reclamation works</li> <li>• Avoidance of percussive piling</li> </ul>	Marine works	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E6	<ul style="list-style-type: none"> <li>• Control vessel speed</li> <li>• Skipper training</li> <li>• Predefined and regular routes for working vessels; avoid Brothers Islands</li> </ul>	Marine traffic	V
S10.10 of HKBCFEIA and S8.14 of TMCLKLEIA	E7	<ul style="list-style-type: none"> <li>• Vessel based dolphin monitoring</li> </ul>	Northeast and Northwest Lantau	V (monitoring works between September 2017 and April 2018 for the Contract are covered by Contract No. HY/2013/01 Hong Kong-Zhuhai Macao Bridge HKBCF – Passenger

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
				Clearance Building.)
<b>Fisheries</b>				
S11.7 of HKBCFEIA	F1	<ul style="list-style-type: none"> <li>• Reduce re-suspension of sediments</li> <li>• Limit works fronts</li> <li>• Good site practices</li> <li>• Strict enforcement of no marine dumping</li> <li>• Spill response plan</li> </ul>	Seawall, reclamation area	V
S11.7 of HKBCFEIA	F2	<ul style="list-style-type: none"> <li>• Install silt-grease trap in the drainage system collecting surface runoff</li> </ul>	Reclamation area	V
<b>Landscape &amp; Visual (Construction Phase)</b>				
S14.3.3. 3 of HKBCFEIA and S10.9 of TMCLKLEIA	LV1	<p><u>Mitigate Landscape Impacts</u></p> <p>G1/CM4 Grass-hydroseed or sheeting bare soil surface and stock pile areas.</p> <p>G9 Reserve of loose natural granite rocks for re-use. Provide new coastline to adopt “natural-look” by means of using armour rocks in the form of natural rock materials and planting strip area accommodating screen buffer to enhance “natural-look” of new coastline.</p>	All construction site areas	N/A
S10.9 of TMCLKLEIA	LV2	<p><u>Mitigate Landscape Impacts</u></p> <p>CM7 Ensure no run-off into water body adjacent to the Project Area.</p>	All construction site areas	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
S14.3.3. 3 of HKBCFEIA	LV4	<u>Mitigate Visual Impacts</u> V1 Minimize time for construction activities during construction period.	All construction site areas	V
S10.9 of TMCLKLEIA	LV5	<u>Mitigate Visual Impacts</u> CM6 Control night-time lighting and glare by hooding all lights.	All construction site areas	V
<b>EM&amp;A</b>				
S15.2.2 of HKBCFEIA	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	All construction site areas	V
S15.5 - S15.6 of HKBCFEIA	EM2	<ul style="list-style-type: none"> <li>An Environmental Team needs to be employed as per the EM&amp;A Manual.</li> <li>Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures.</li> <li>An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&amp;A Manual are fully complied with.</li> </ul>	All construction site areas	V

Legend: V = implemented;

x = not implemented;

N/A = not applicable

## Appendix D - Summary of Action and Limit Levels

Table 1 – Action and Limit Levels for 1-hour TSP

Location	Action Level	Limit Level
AMS2	374 µg/m <sup>3</sup>	500 µg/m <sup>3</sup>
AMS3B*	368 µg/m <sup>3</sup>	500 µg/m <sup>3</sup>
AMS6	360 µg/m <sup>3</sup>	500 µg/m <sup>3</sup>
AMS7/AMS7B	370 µg/m <sup>3</sup>	500 µg/m <sup>3</sup>

Remarks: \* Action Level set out at AMS3 Ho Yu College is adopted.

Table 2 – Action and Limit Levels for 24-hour TSP

Location	Action Level	Limit Level
AMS2	176 µg/m <sup>3</sup>	260 µg/m <sup>3</sup>
AMS3B*	167 µg/m <sup>3</sup>	260 µg/m <sup>3</sup>
AMS6	173 µg/m <sup>3</sup>	260 µg/m <sup>3</sup>
AMS7/AMS7B	183 µg/m <sup>3</sup>	260 µg/m <sup>3</sup>

Remarks: \* Action Level set out at AMS3 Ho Yu College is adopted.

Table 3 – Action and Limit Levels for Construction Noise (0700-1900 hrs of normal weekdays)

Location	Action Level	Limit Level
NMS2	When one documented complaint, related to 0700 – 1900 hours on normal weekdays, is received from any one of the sensitive receivers	75 dB(A)
NMS3B		*65 / 70 dB(A)

\*Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65dB(A) applies during school examination period.

Table 4 – Action and Limit Levels for Water Quality

<b>Parameters</b>	<b>Action</b>	<b>Limit</b>
DO in mg L <sup>-1</sup> (Surface, Middle & Bottom)	<u>Surface and Middle</u> 5.0 <u>Bottom</u> 4.7	<u>Surface and Middle</u> 4.2 (except 5 mg/L for FCZ) <u>Bottom</u> 3.6
SS in mg L <sup>-1</sup> (depth-averaged)	23.5 and 120% of upstream control station's SS at the same tide of the same day	34.4 and 130% of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes
Turbidity in NTU (depth-averaged)	27.5 and 120% of upstream control station's turbidity at the same tide of the same day	47.0 and 130% of upstream control station's turbidity at the same tide of the same day

Notes:

1. "depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
2. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
3. For turbidity, SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

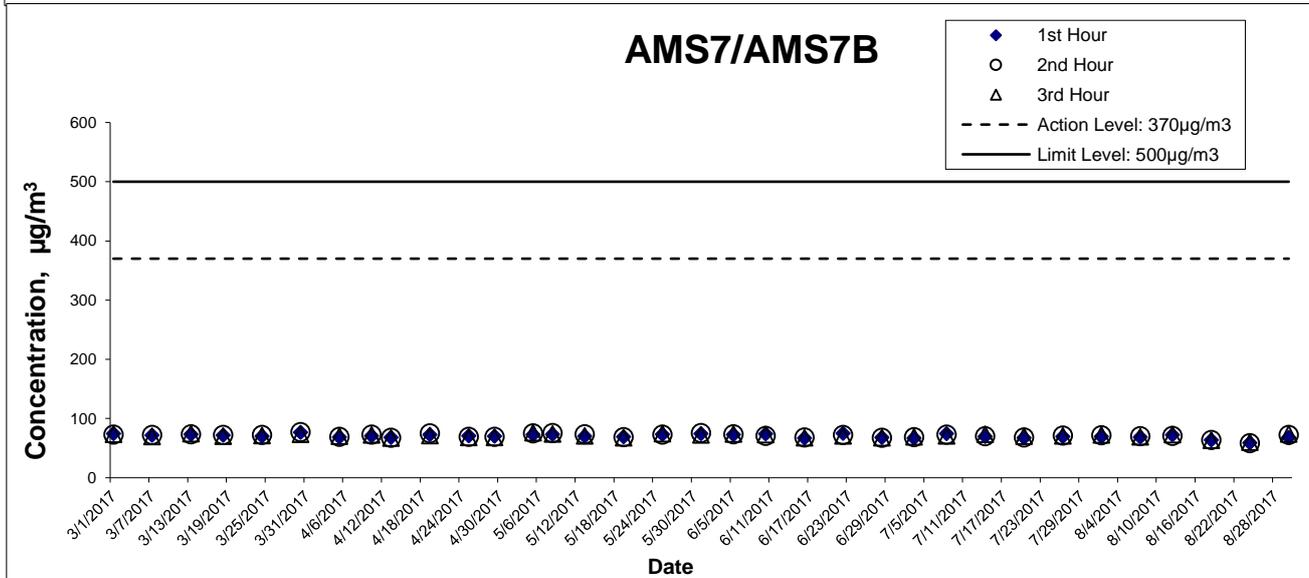
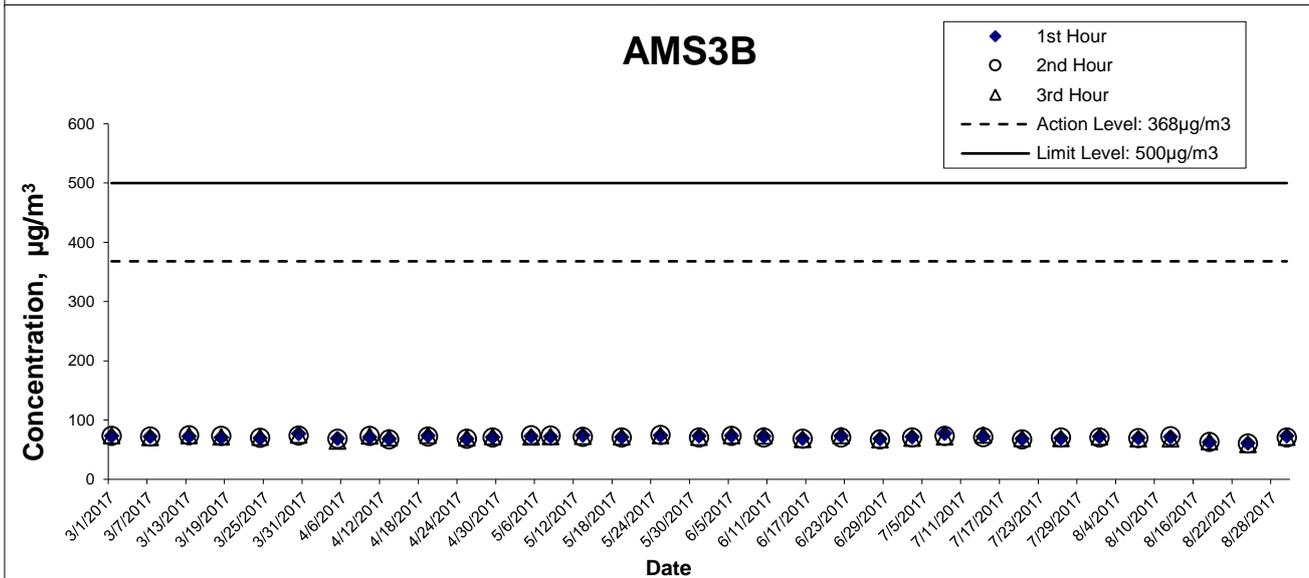
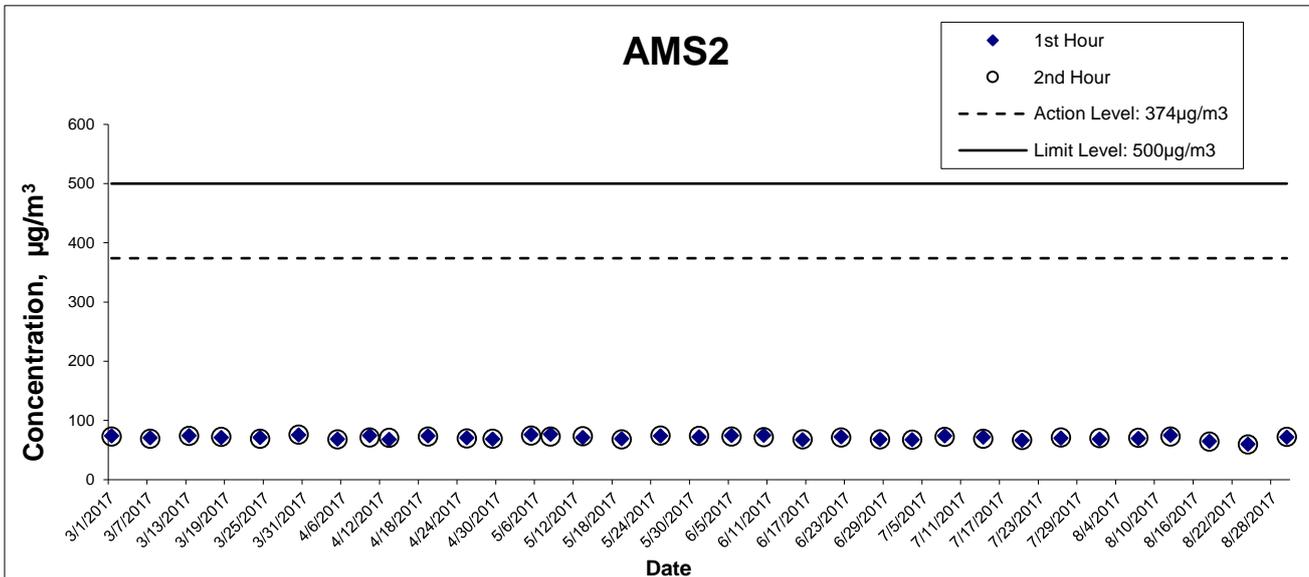
Table 5(a) Action and Limit Levels for Chinese White Dolphin Monitoring - Approach to Define Action Level (AL) and Limit Level (LL):

	<b>North Lantau Social Cluster</b>	
	<b>NEL</b>	<b>NWL</b>
Action Level	(STG < 70% of baseline) & (ANI < 70% of baseline)	(STG < 70% of baseline) & (ANI < 70% of baseline)
Limit Level	[(STG < 40% of baseline) & (ANI < 40% of baseline)] AND [(STG < 40% of baseline) & (ANI < 40% of baseline)]	

For North Lantau Social Cluster, action level will be trigger if either NEL **or** NWL fall below the criteria; limit level will be triggered if both NEL **and** NWL fall below the criteria.

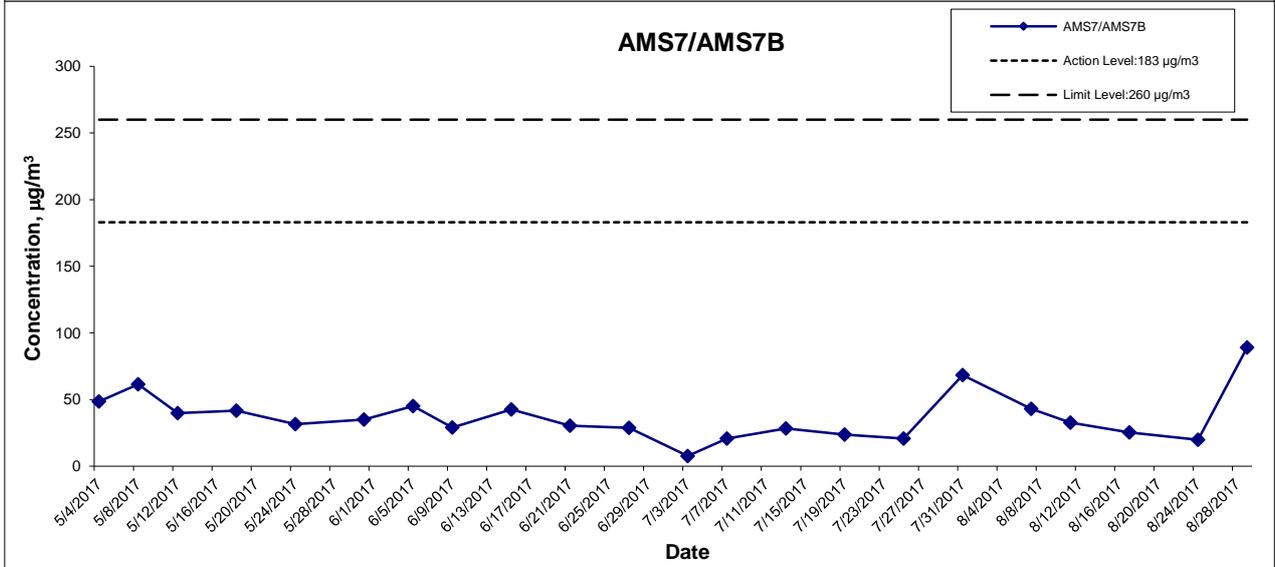
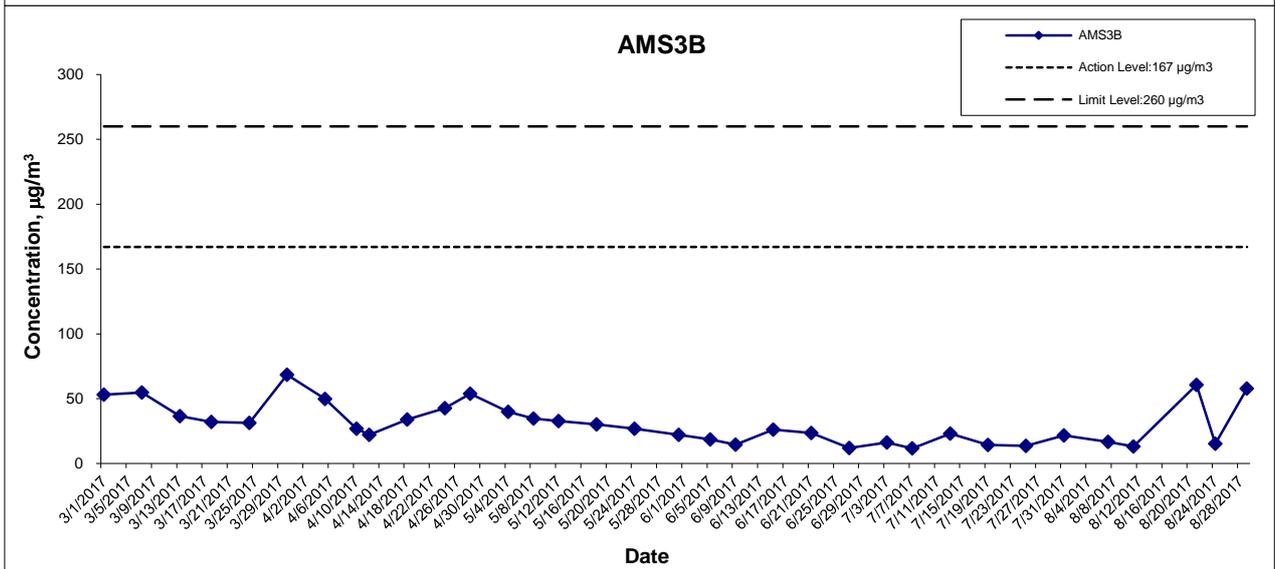
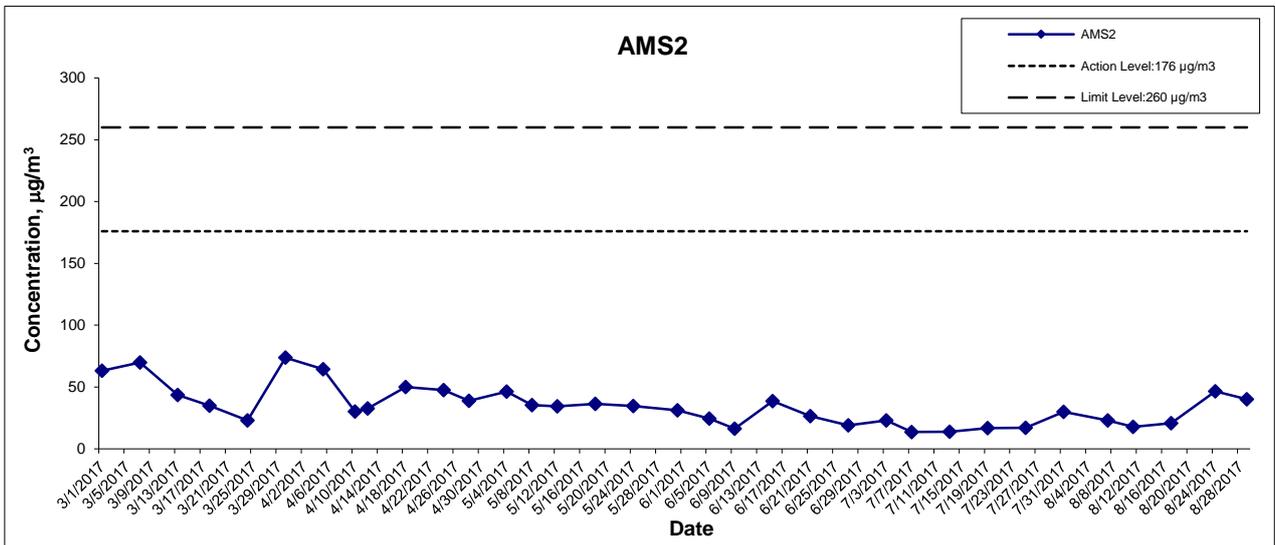
Table 5(b) Derived Value of Action Level (AL) and Limit Level (LL) for Chinese White Dolphin Monitoring

	<b>North Lantau Social Cluster</b>	
	<b>NEL</b>	<b>NWL</b>
Action Level	(STG < 4.2) & (ANI < 15.5)	(STG < 6.9) & (ANI < 31.3)
Limit Level	[(STG < 2.4) & (ANI < 8.9)] AND [(STG < 3.9) & (ANI < 17.9)]	



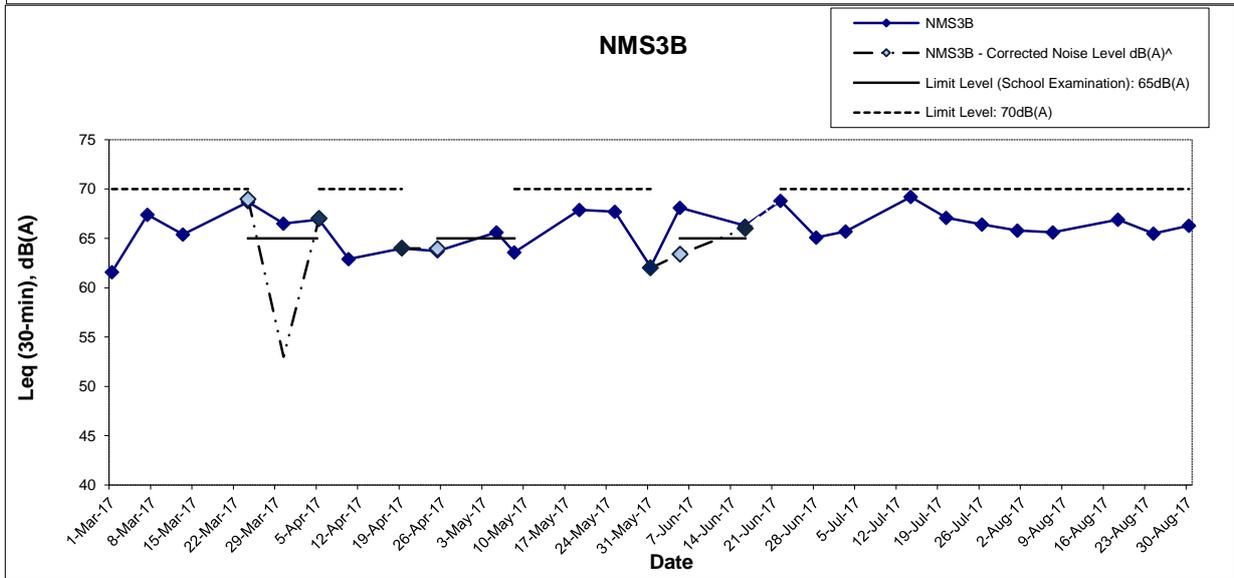
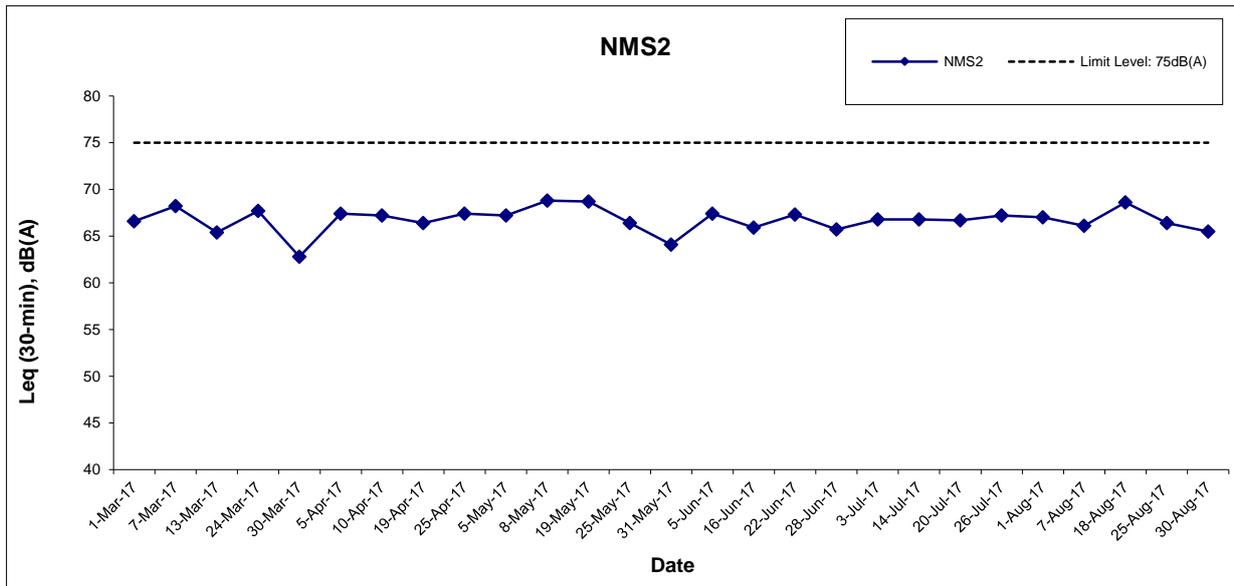
Remarks: Impact air quality monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building effective since 1 September 2017.

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Remarks: Effective from July 2012, the Limit Level at NMS3A was revised to 70dB(A). Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65dB(A) applies during school examination period.

>The measured noise level on 5 May 2017 at NMS3B exceeded the noise level of 65dB(A) during examination period but it was below the baseline level. Therefore, it is not considered as an exceedance. As such the EAP was not triggered.

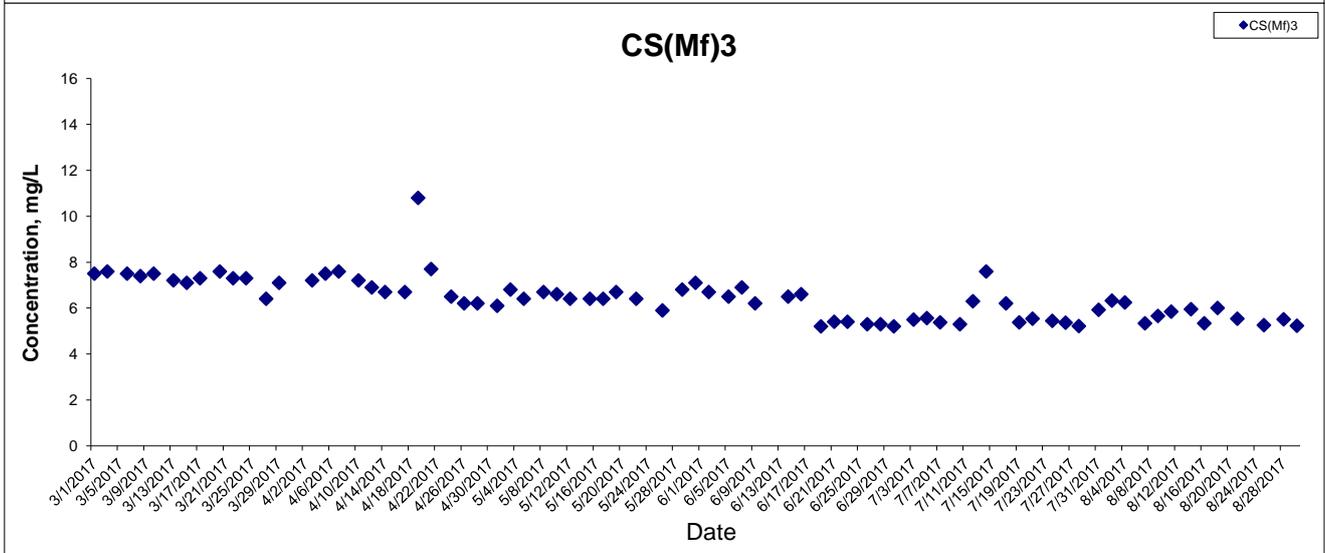
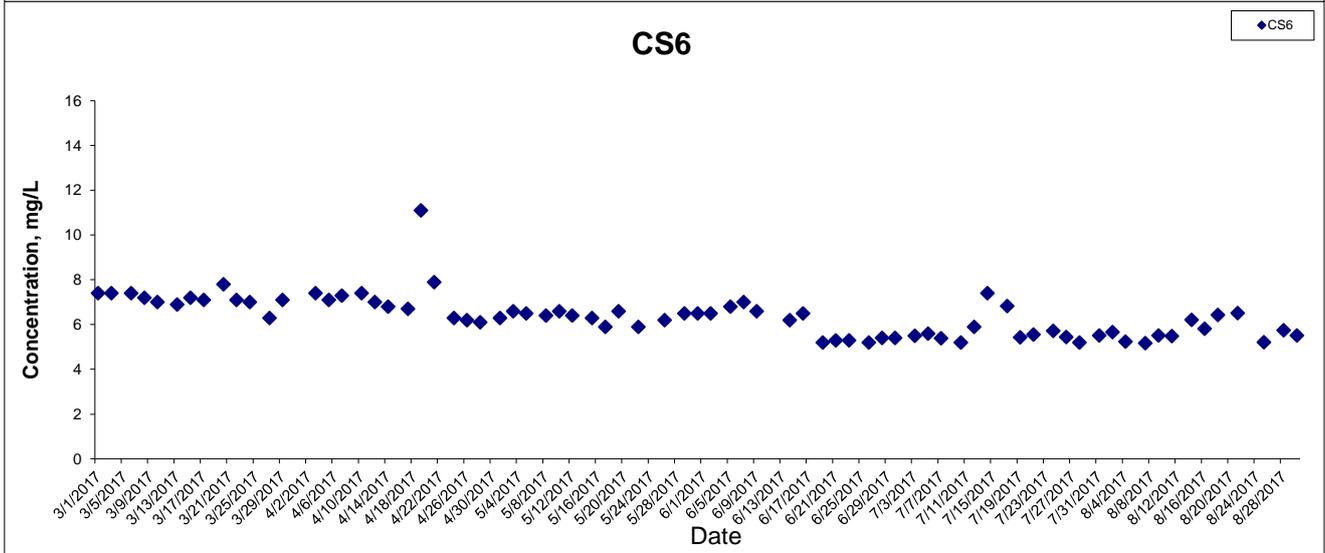
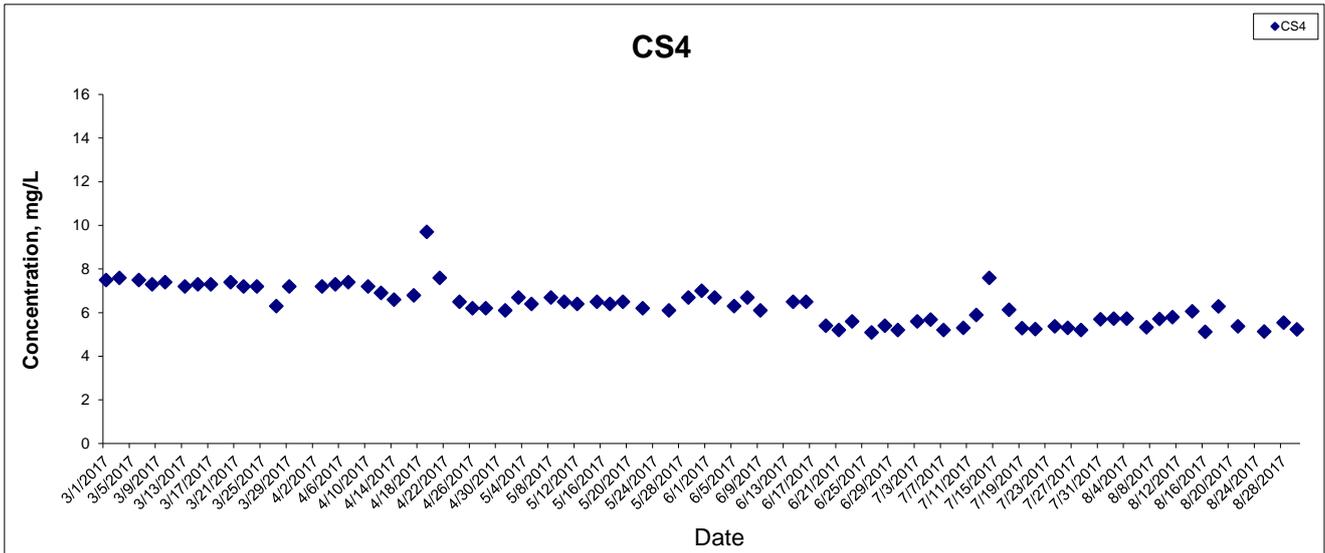
#The measured noise level on 5 Jun 2017 at NMS3B exceeded the noise level of 65dB(A) during examination period. Therefore, baseline correction was carried out and the corrected noise level which solely represent the noise level of Construction works 63.4 dB(A) respectively which is lower than the exceedance level of 65dB(A) . As such the EAP was not triggered.

^The measured noise level on 16 Jun 2017 at NMS3B exceeded the noise level of 65dB(A) during examination period but it was below the baseline level. Therefore, it is not considered as an exceedance. As such the EAP was not triggered.

Noise monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building effective since 1 September 2017.

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## Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



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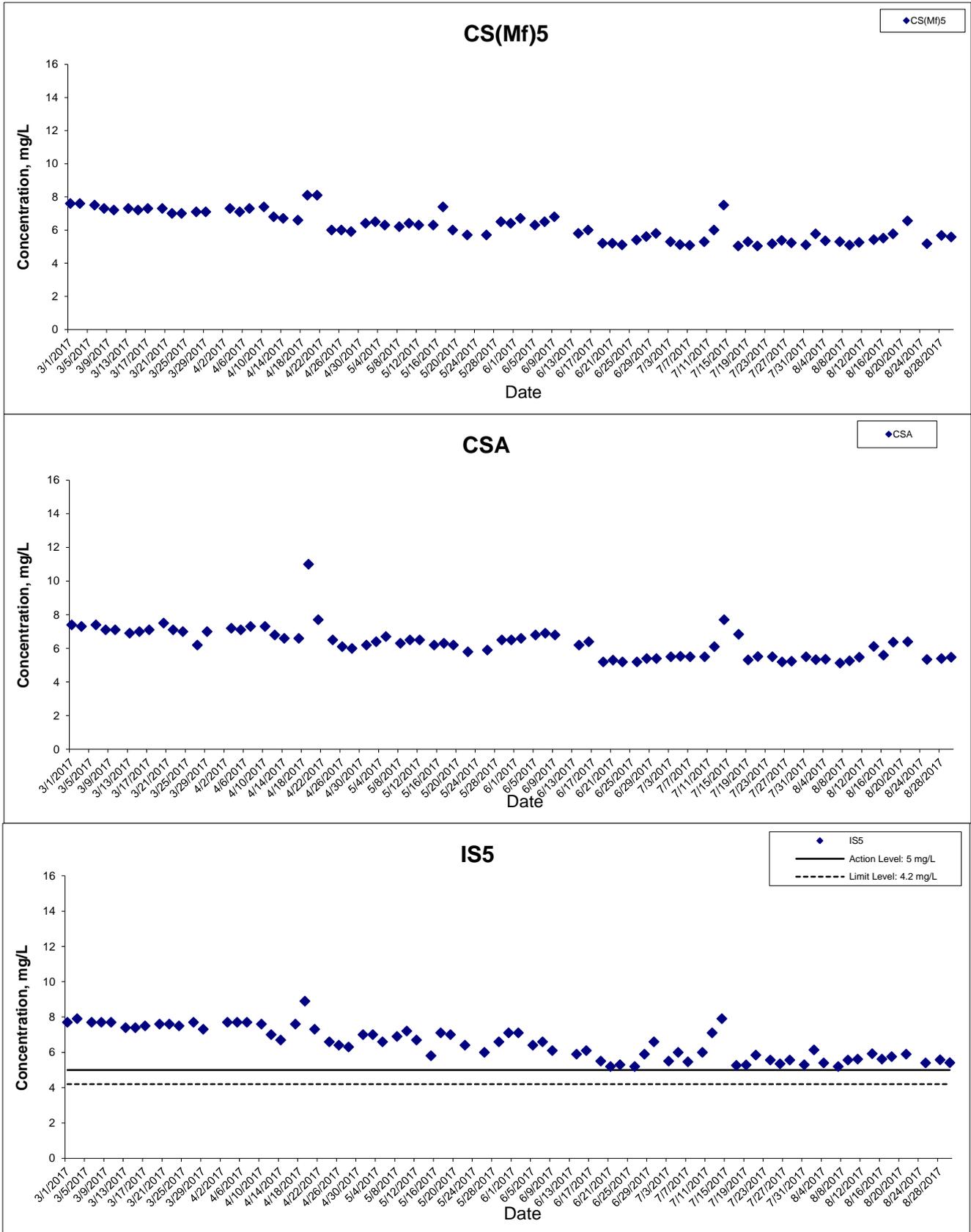
**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



\*Water quality monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building effective since 1 September 2017.

## Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

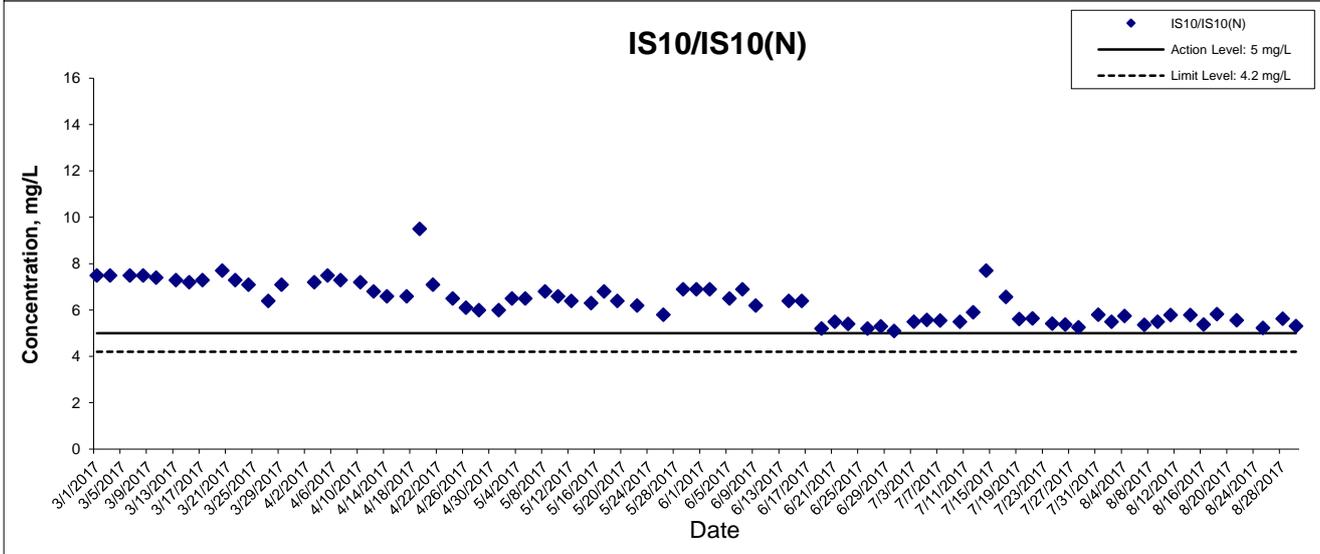
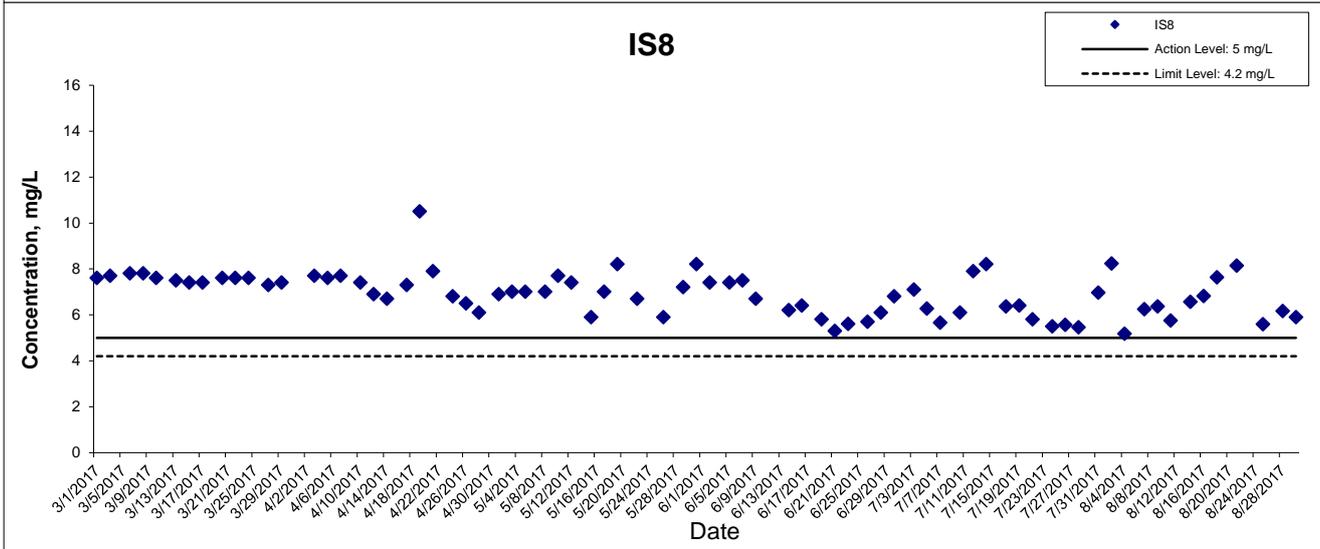
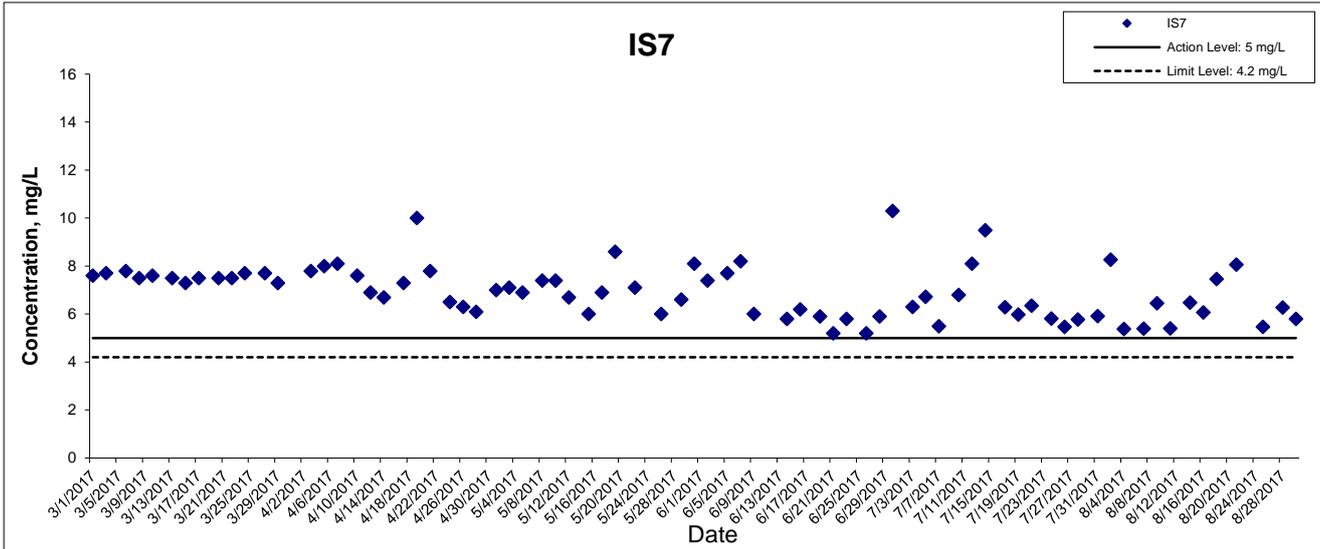
Graphical Presentation of Impact Water Quality

Monitoring Results

\*Water quality monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF - Passenger Clearance Building effective since 1 September 2017.



## Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



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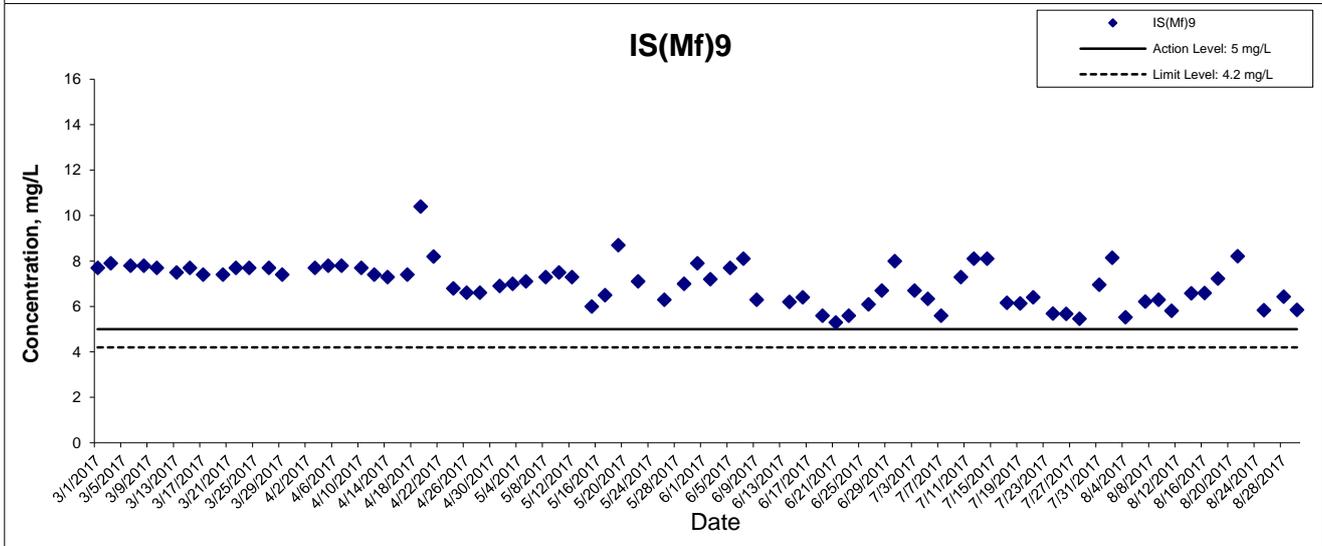
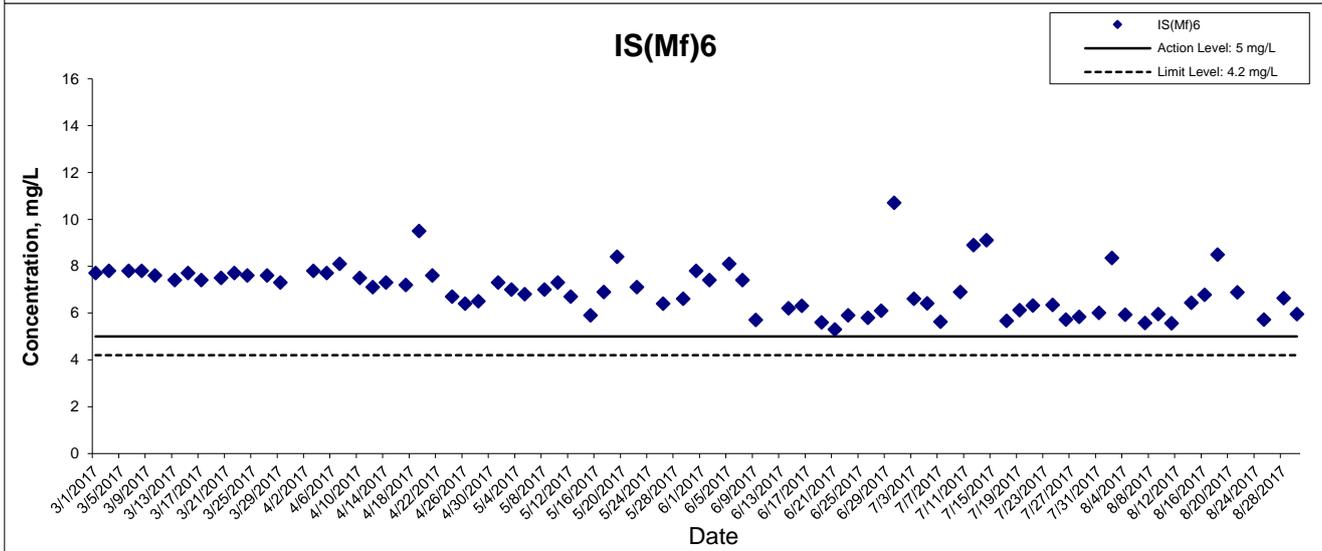
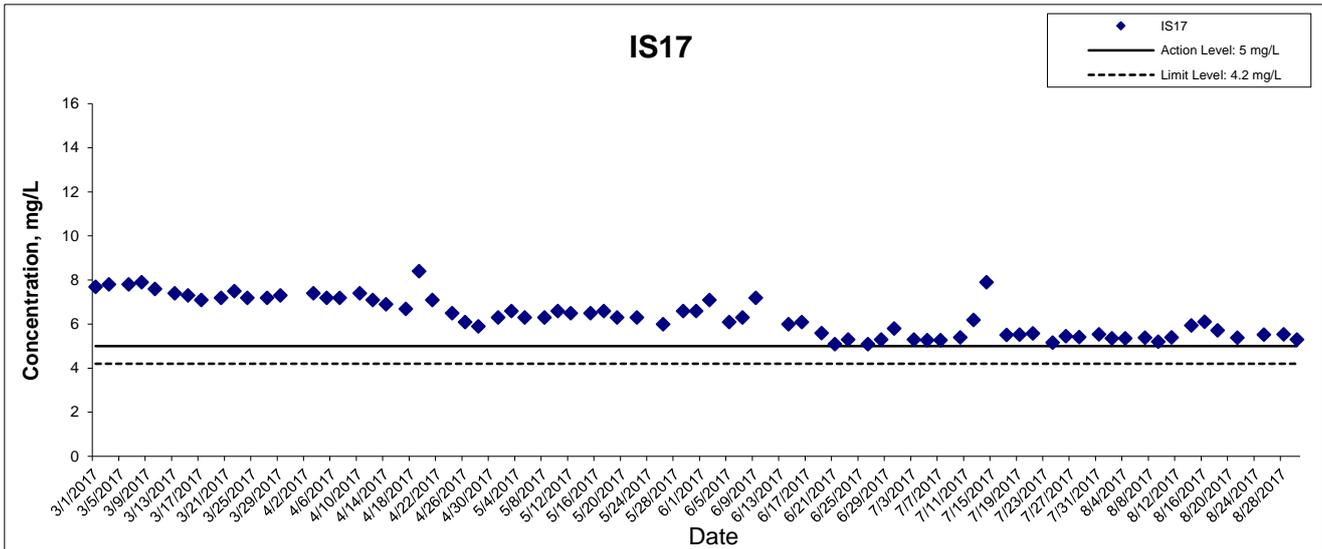
**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



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## Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



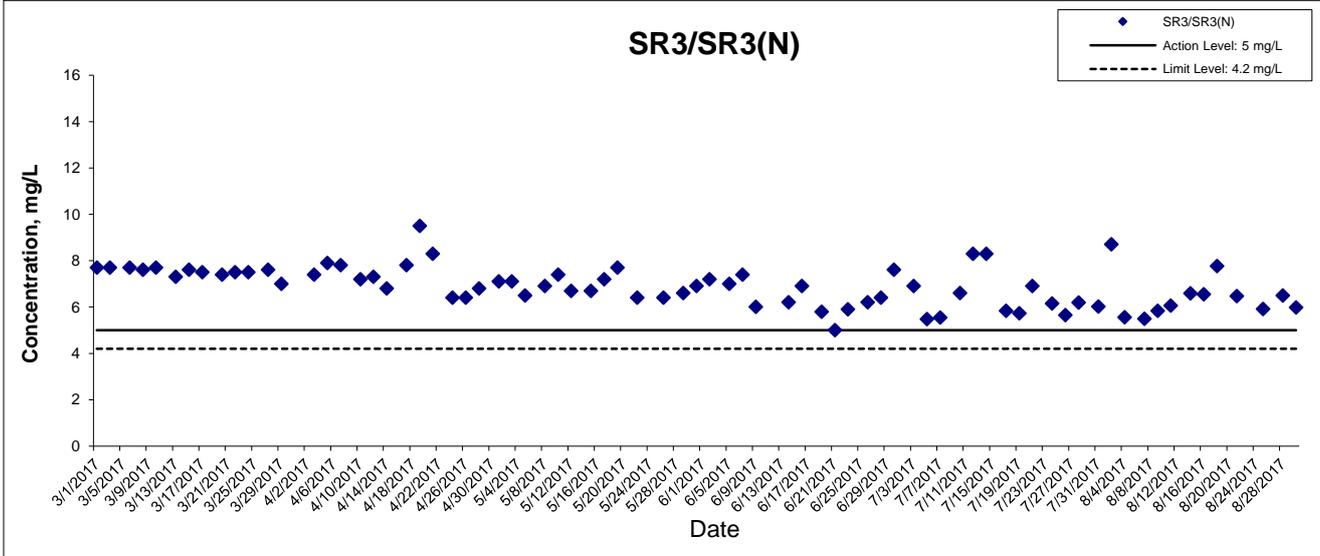
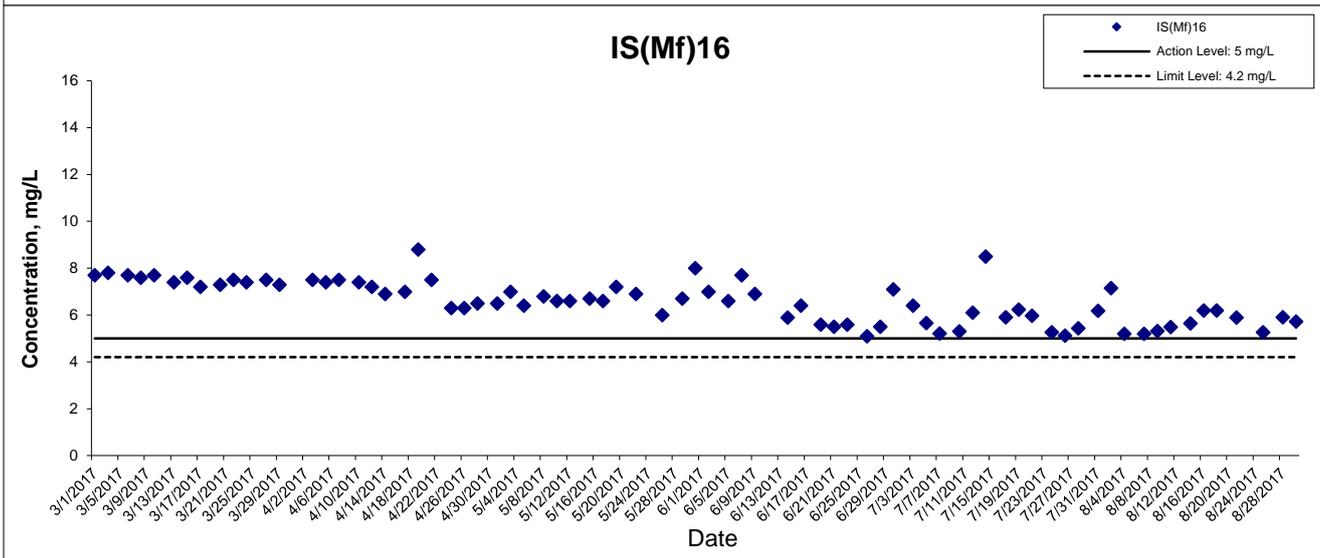
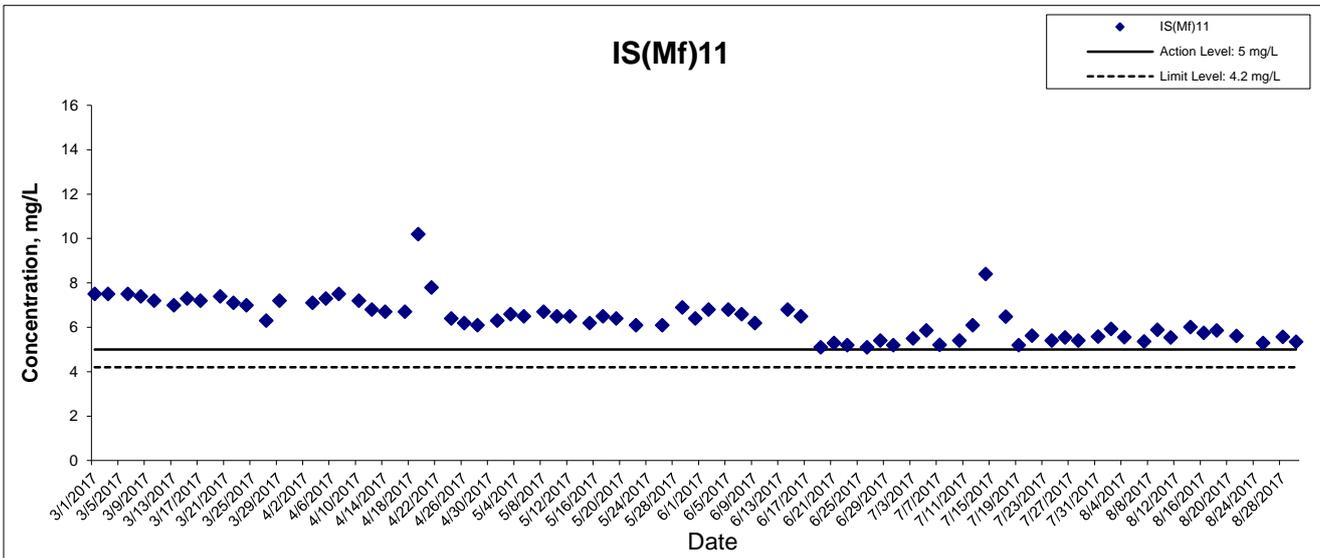
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**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



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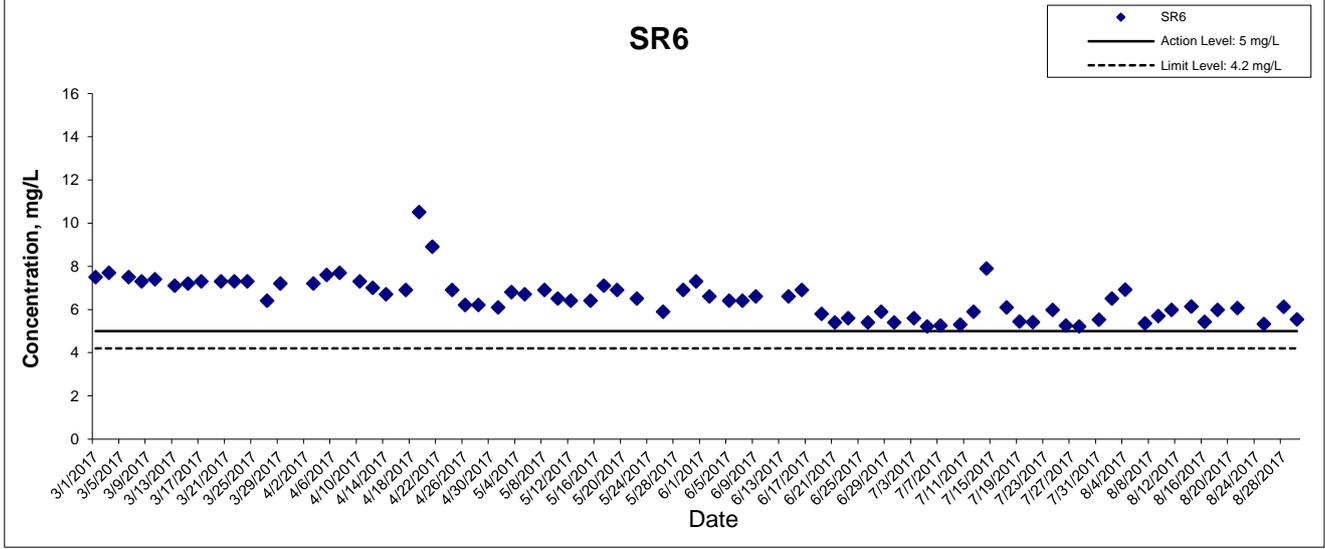
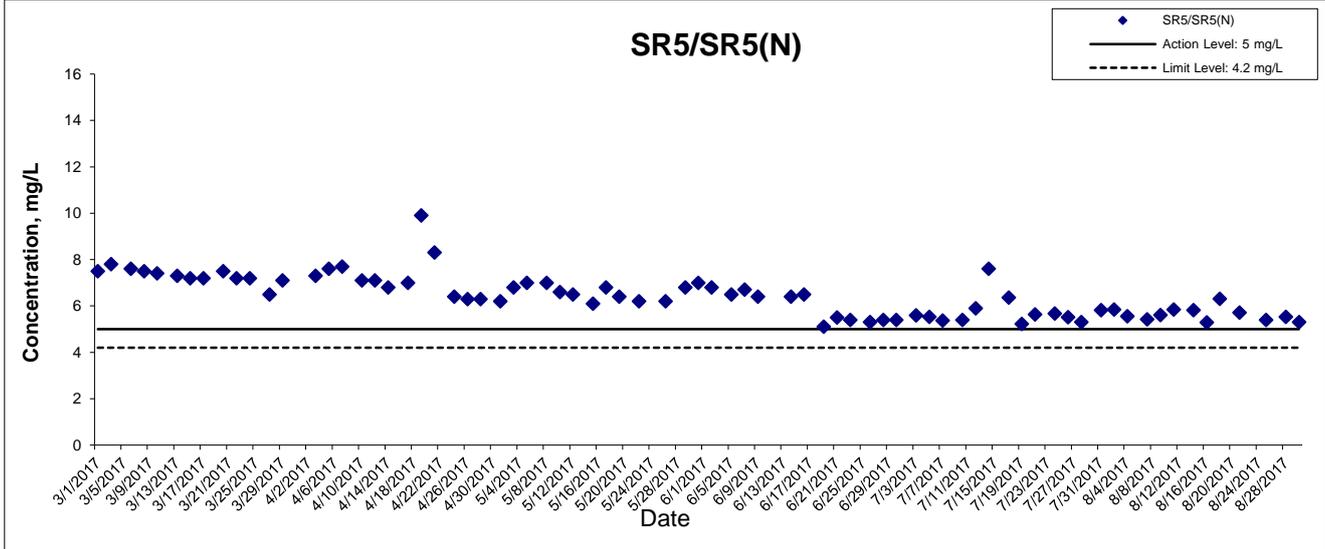
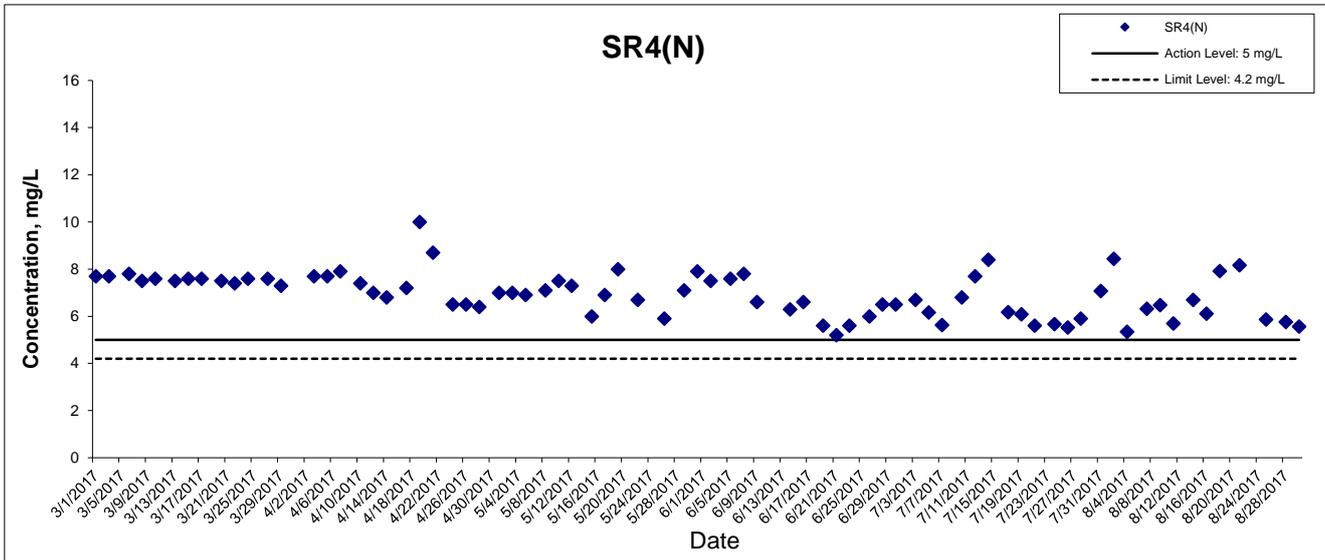
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**HONG KONG - ZHUHAI - MACAO BRIDGE**  
**HONG KONG BOUNDARY CROSSING FACILITIES**  
**- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality**  
**Monitoring Results**



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HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality  
 Monitoring Results

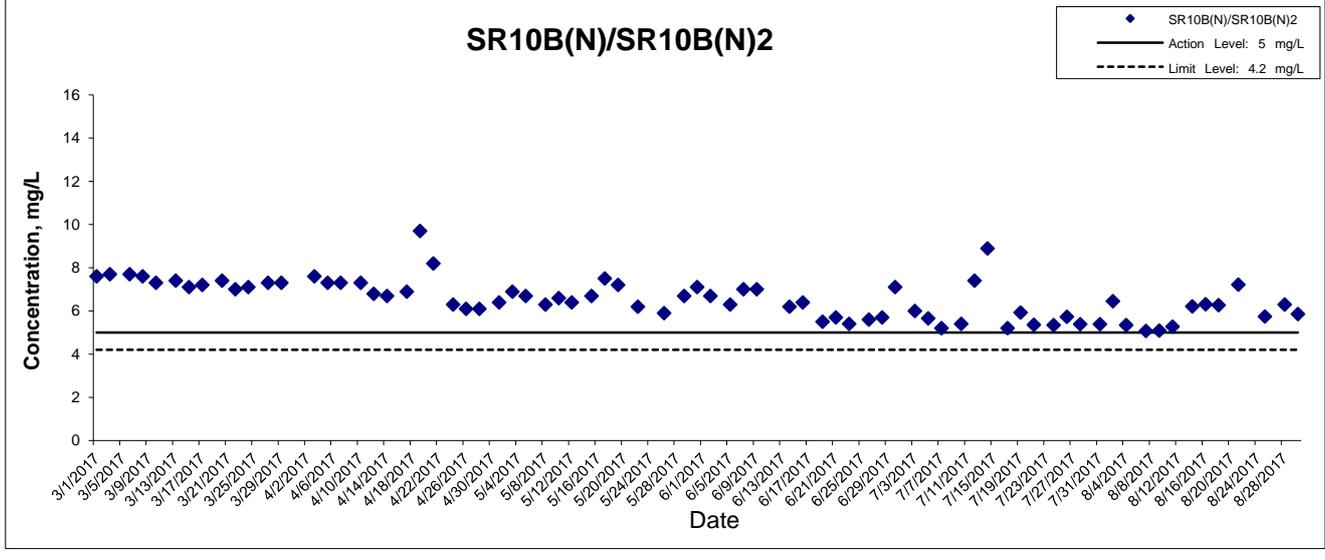
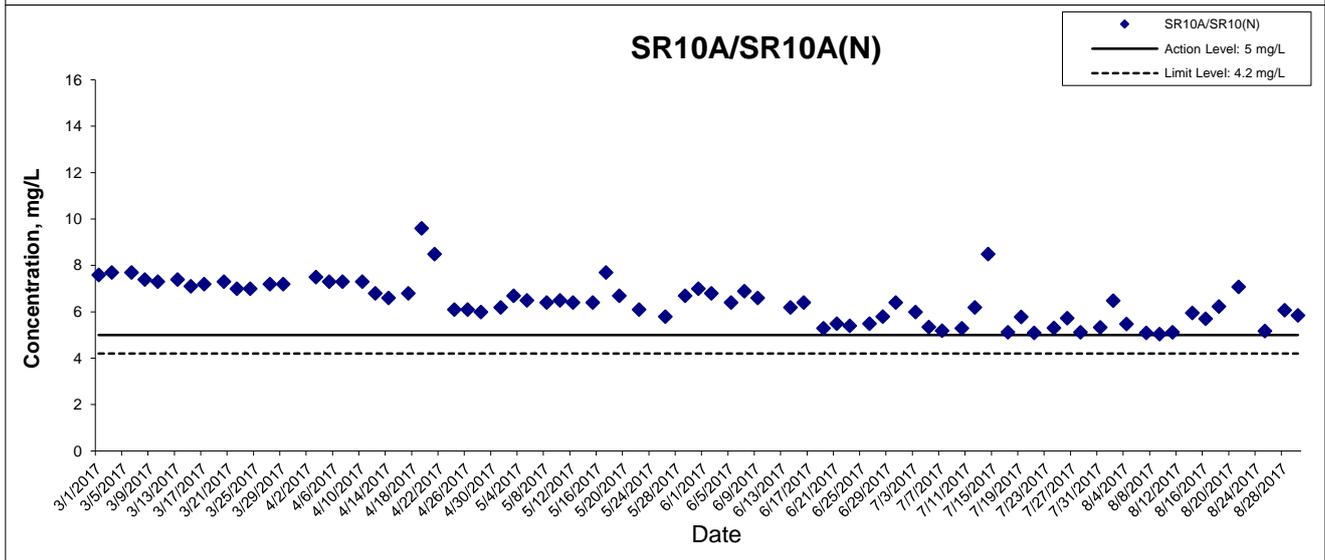
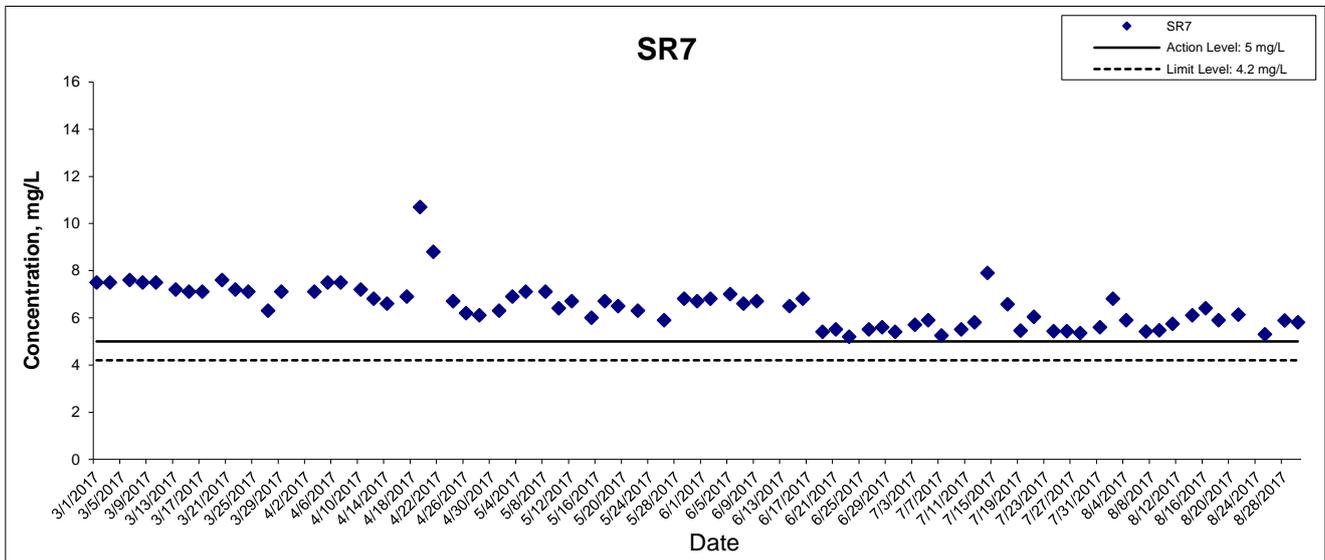


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Project No.: 60249820

Date: April 2018

Appendix G



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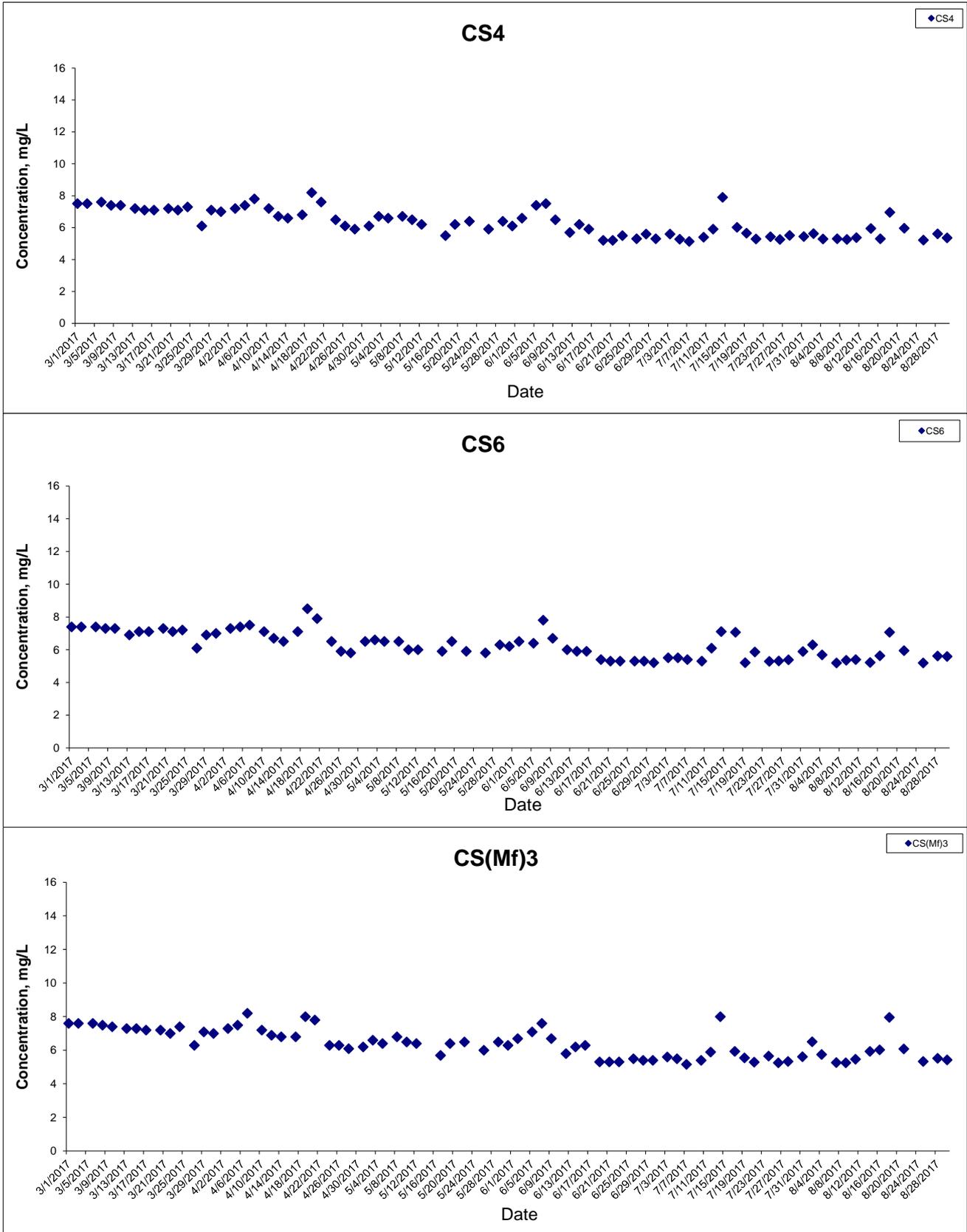
**HONG KONG - ZHUHAI - MACAO BRIDGE**  
**HONG KONG BOUNDARY CROSSING FACILITIES**  
**- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality**  
**Monitoring Results**



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## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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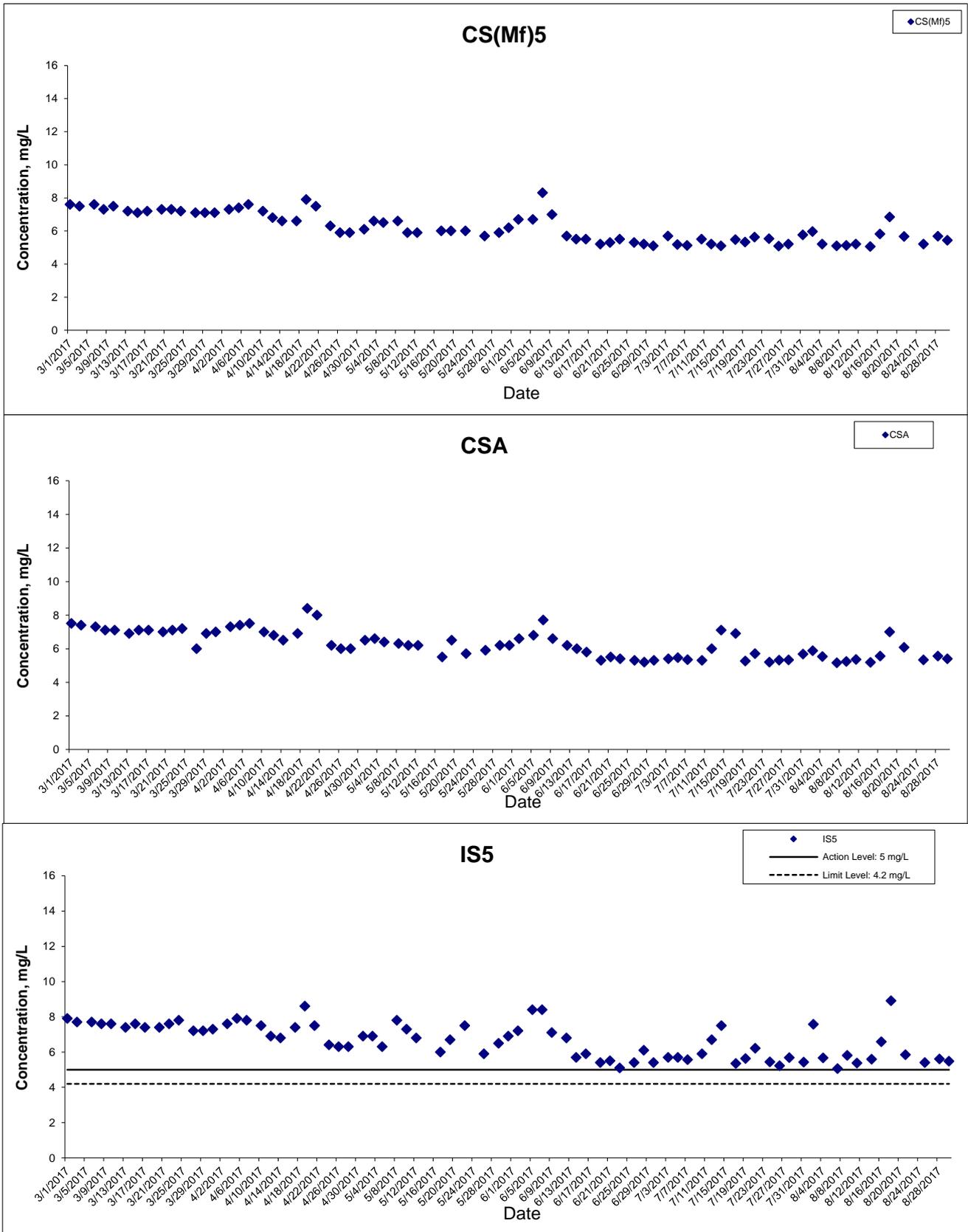
**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**



### Graphical Presentation of Impact Water Quality Monitoring Results

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## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality

Monitoring Results

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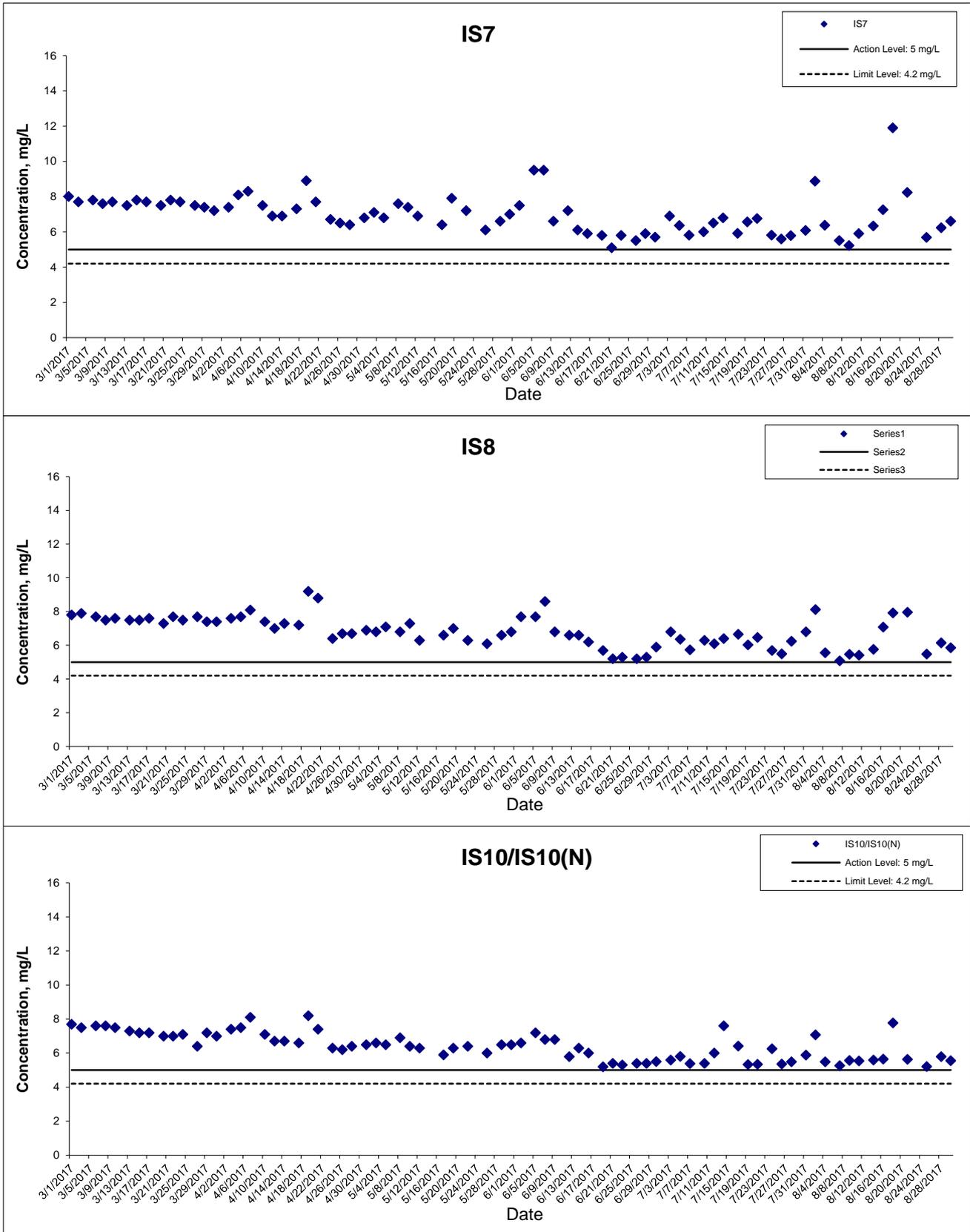
Project No.: 60249820

Date: April 2018

Appendix G



## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality

Monitoring Results

\*Water quality monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building effective since 1 September 2017.

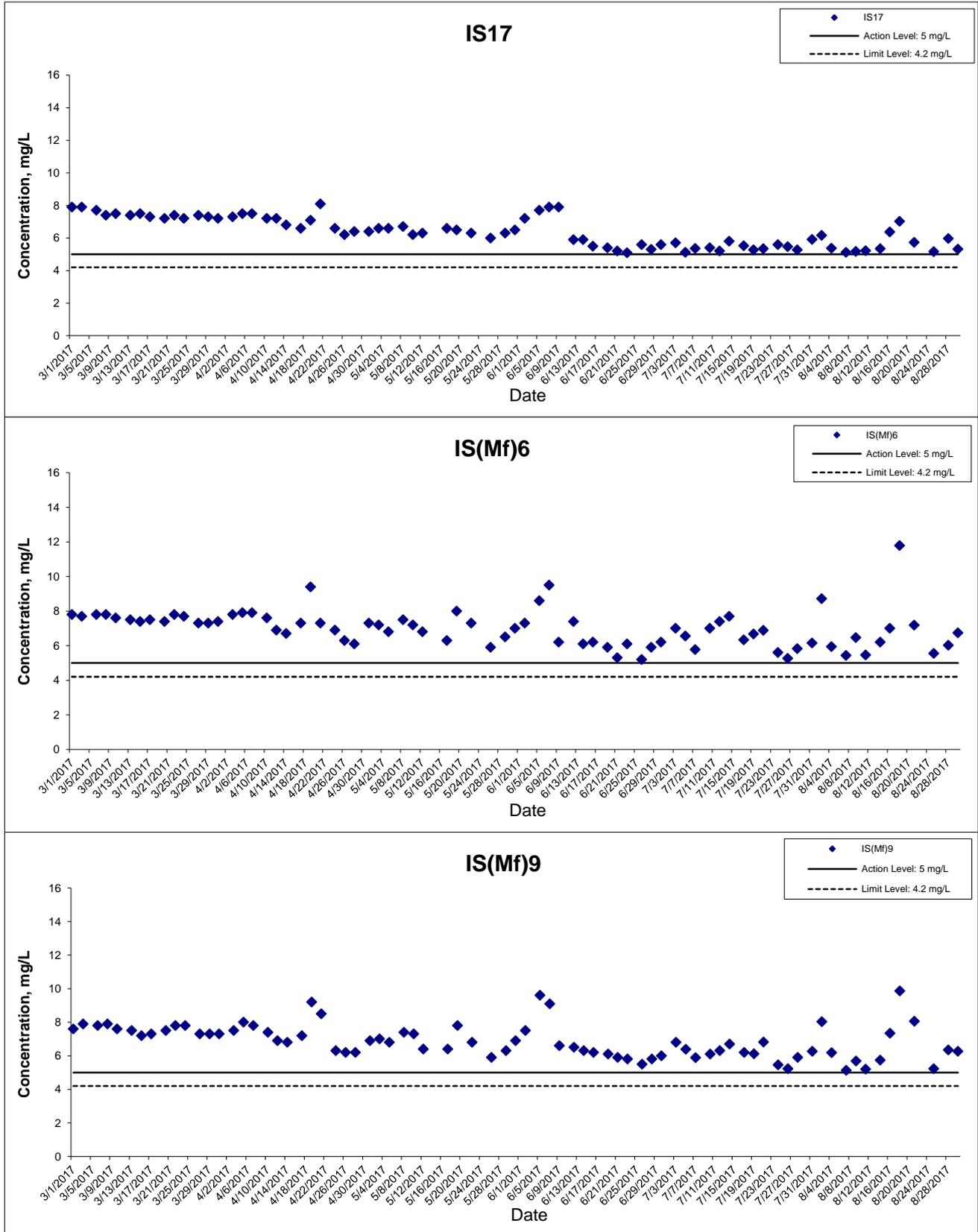
Project No.: 60249820

Date: April 2018

Appendix G



## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality

Monitoring Results

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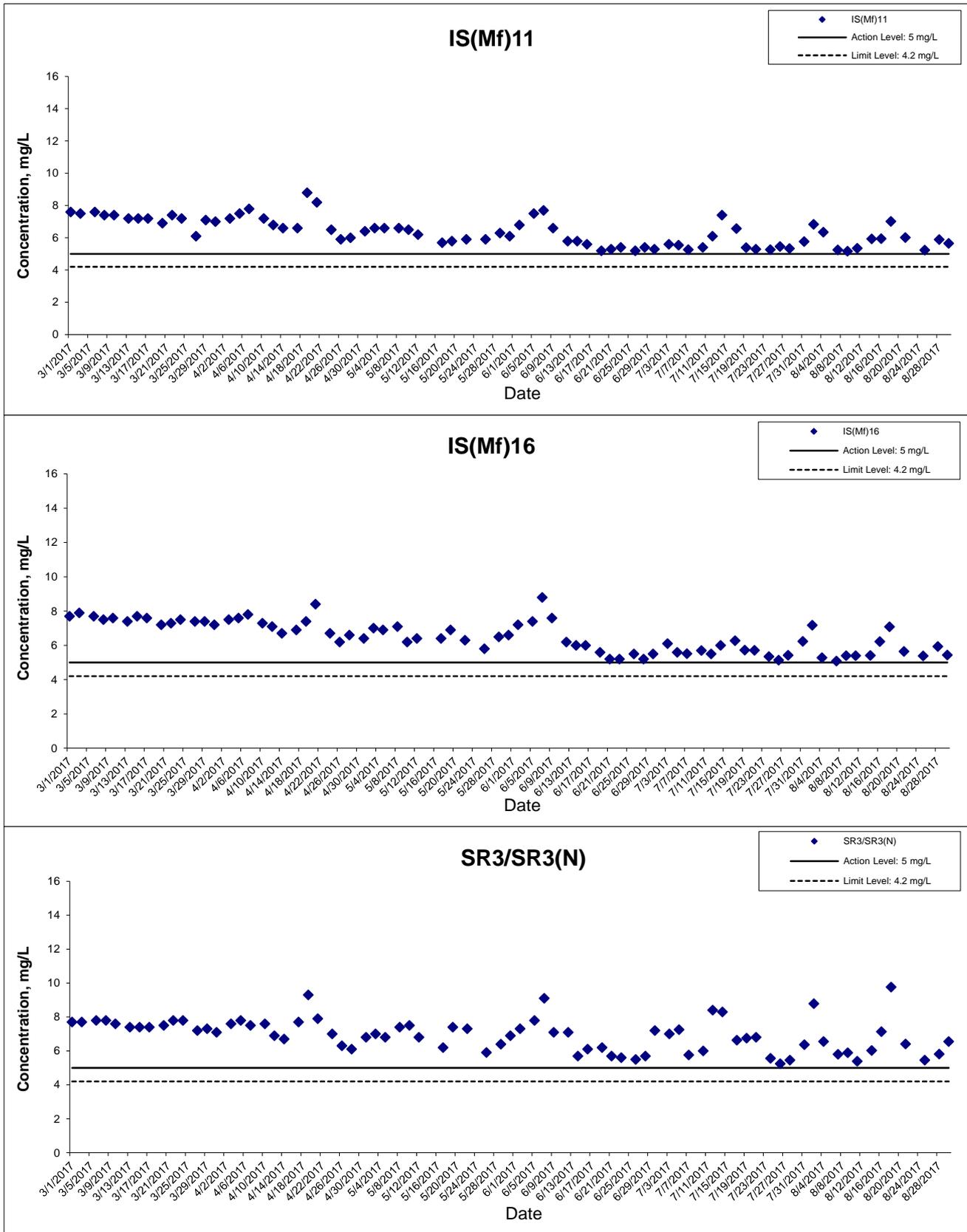
Project No.: 60249820

Date: April 2018



Appendix G

## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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**HONG KONG - ZHUHAI - MACAO BRIDGE**

**HONG KONG BOUNDARY CROSSING FACILITIES**

**- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality**

**Monitoring Results**

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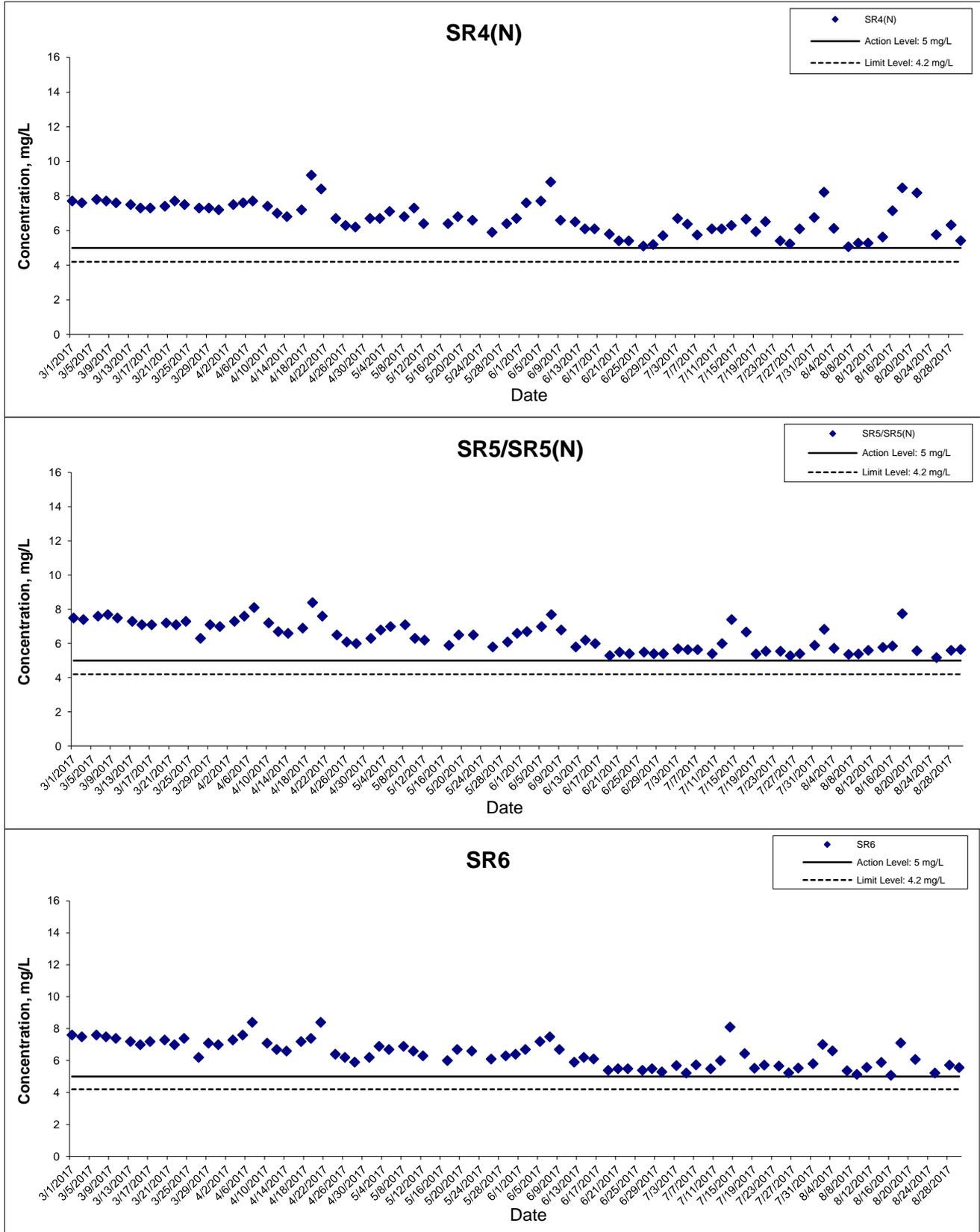
Project No.: 60249820

Date: April 2018

Appendix G



## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality  
 Monitoring Results



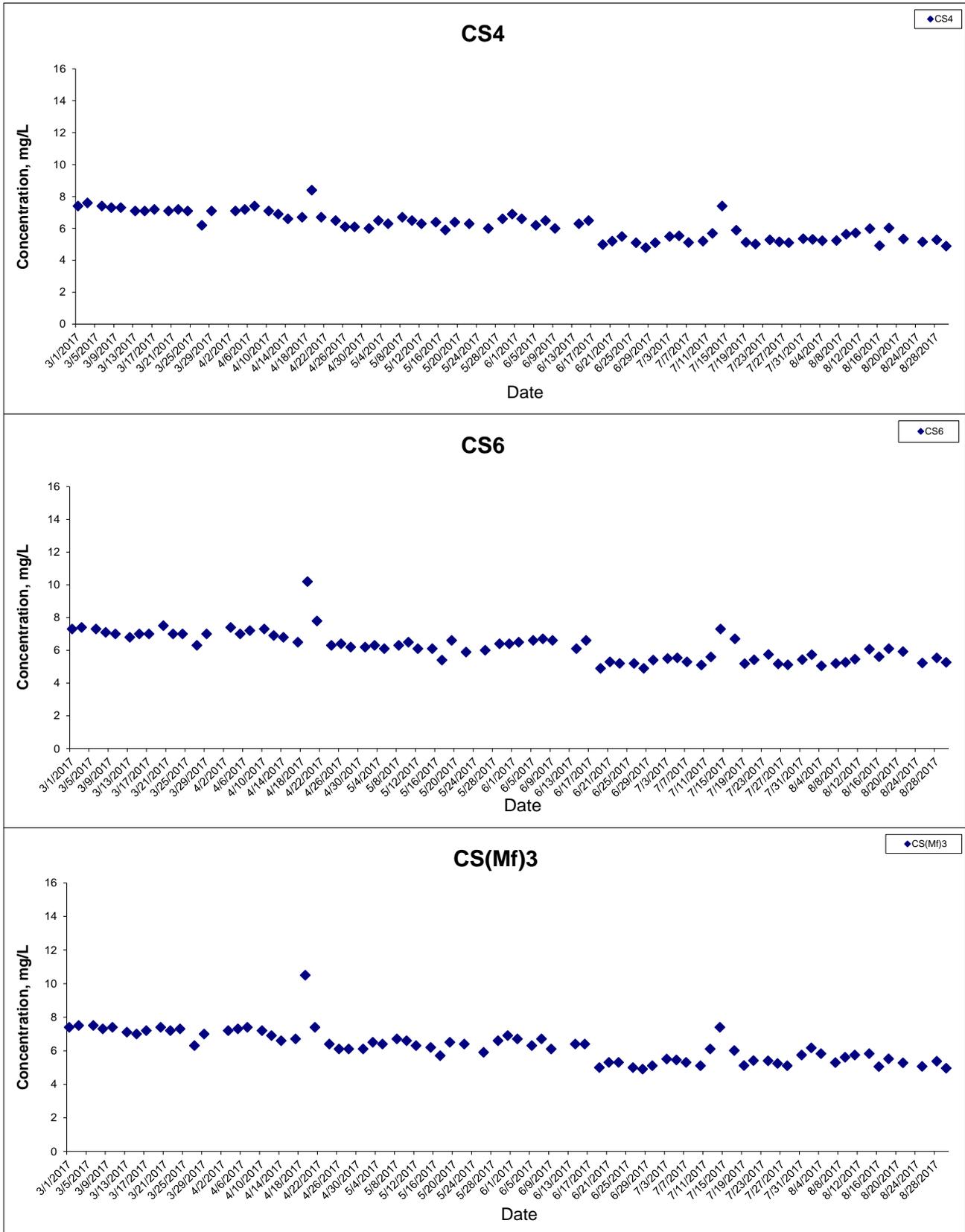
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Project No.: 60249820

Date: April 2018

Appendix G

## Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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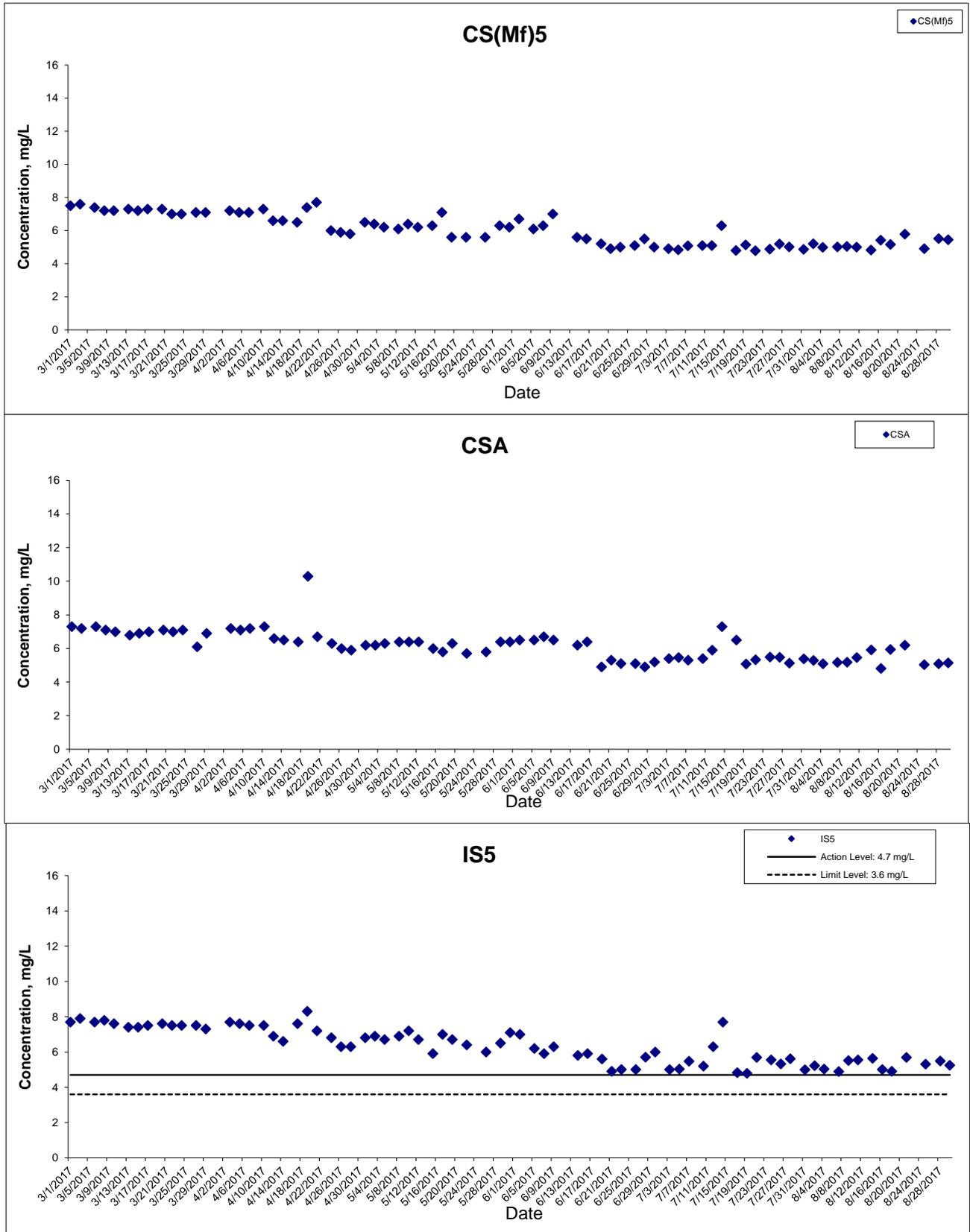
HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS



### Graphical Presentation of Impact Water Quality Monitoring Results

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## Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



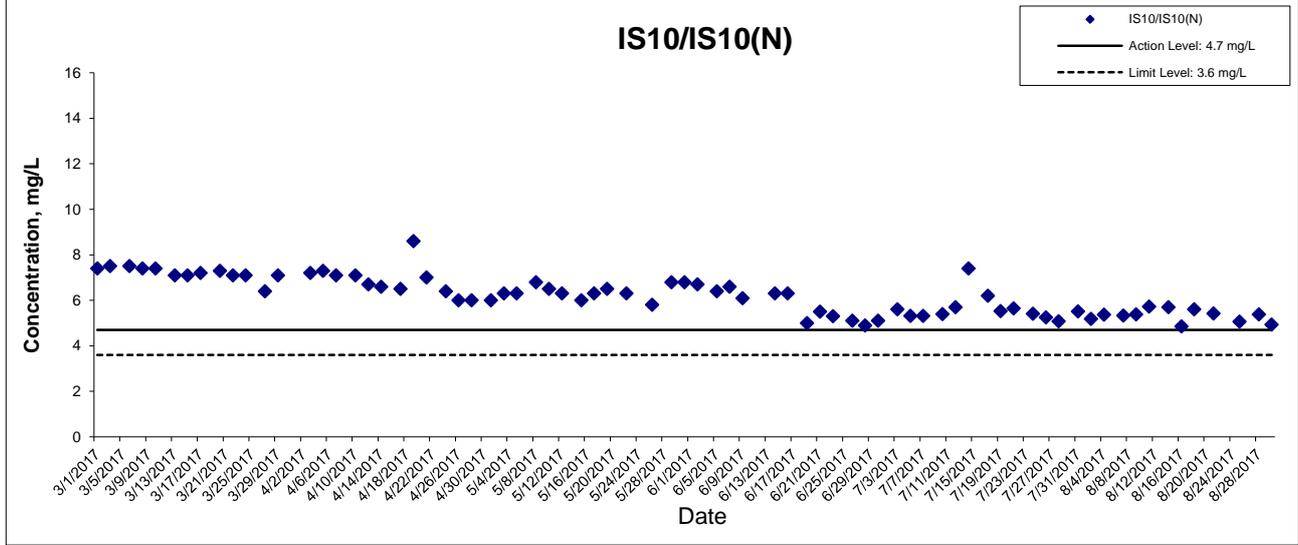
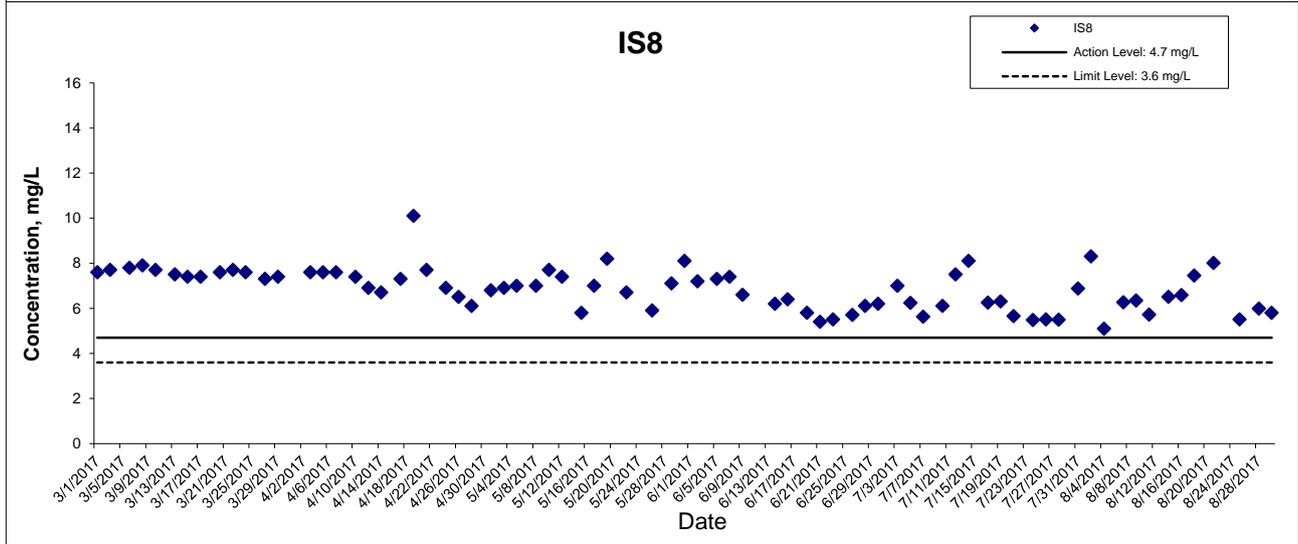
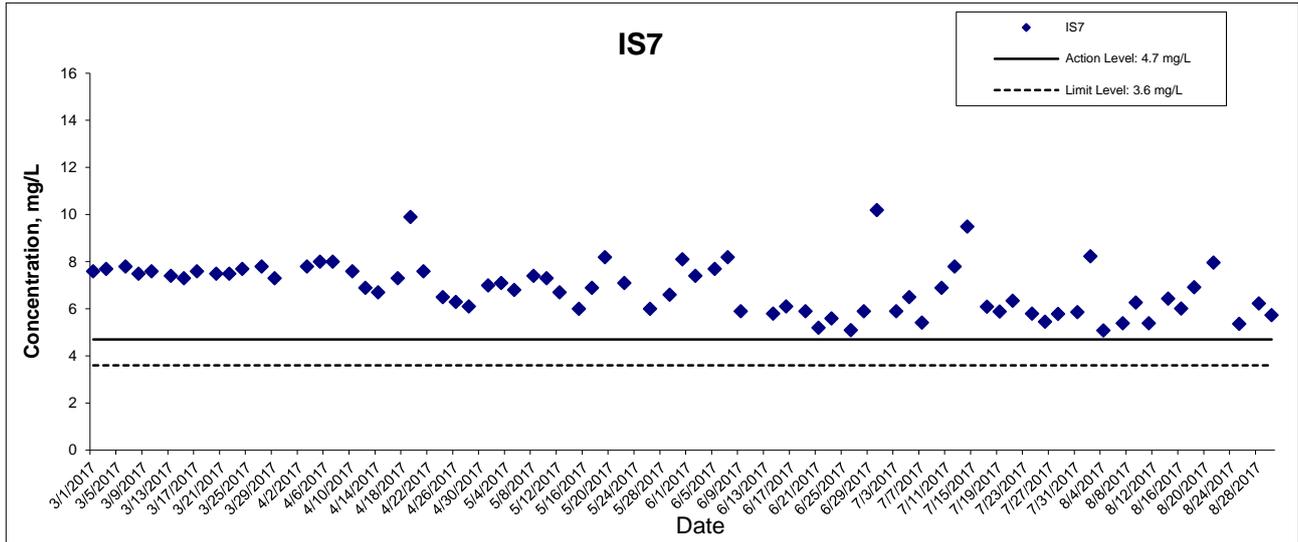
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Project No.: 60249820

Date: April 2018

Appendix G

## Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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**HONG KONG - ZHUHAI - MACAO BRIDGE**

**HONG KONG BOUNDARY CROSSING FACILITIES**

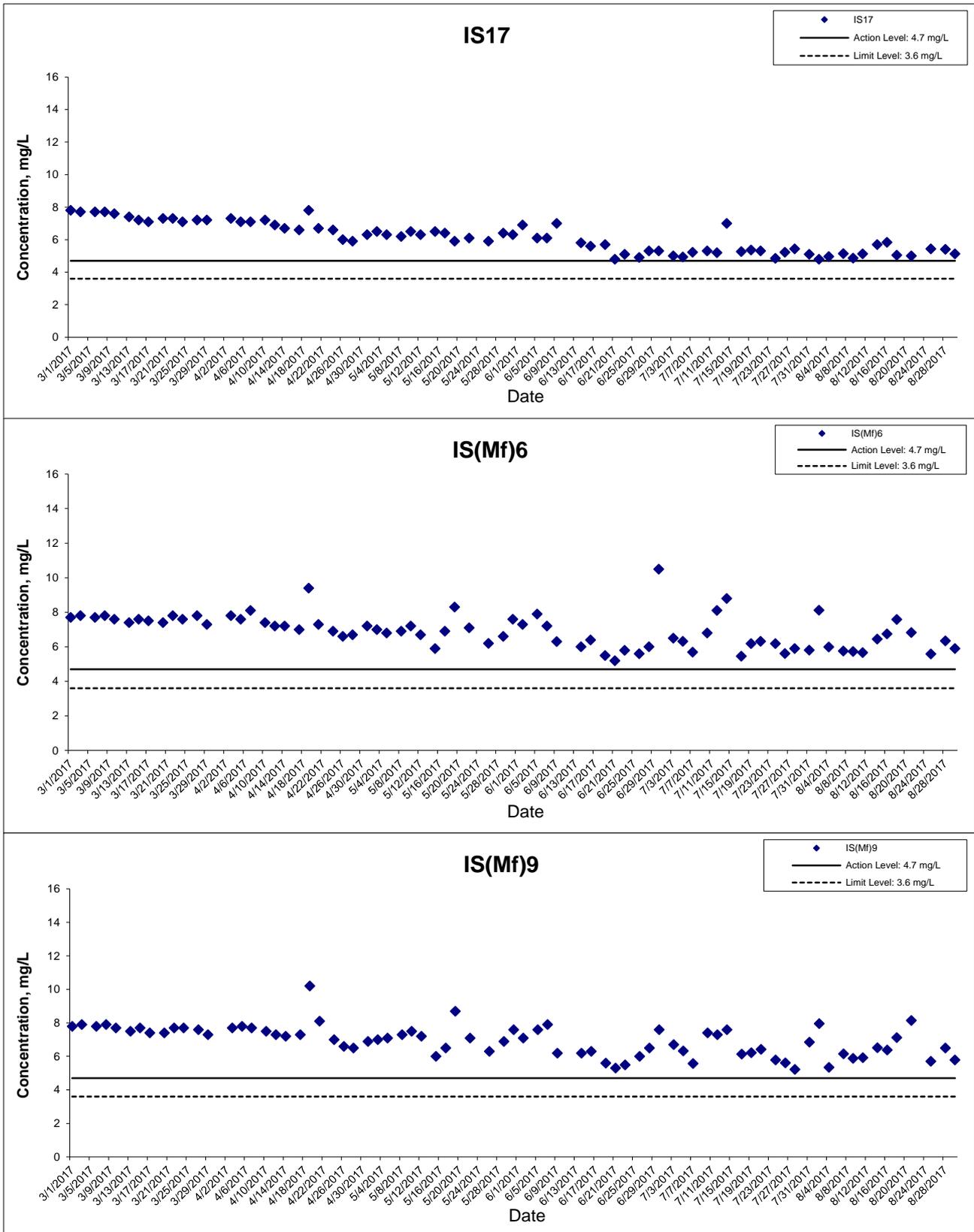
**- RECLAMATION WORKS**



### Graphical Presentation of Impact Water Quality Monitoring Results

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## Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality  
 Monitoring Results



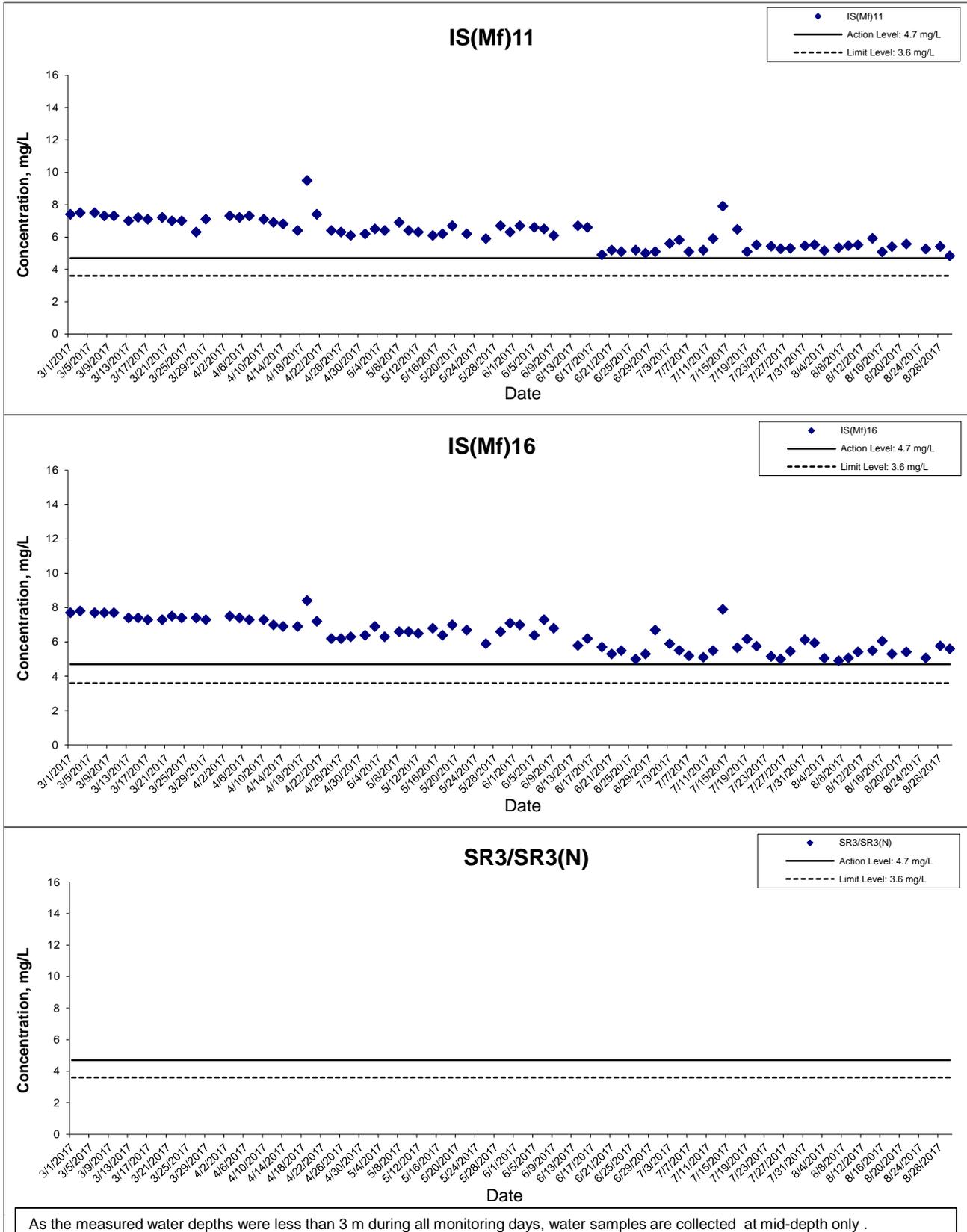
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Project No.: 60249820

Date: April 2018

Appendix G

## Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



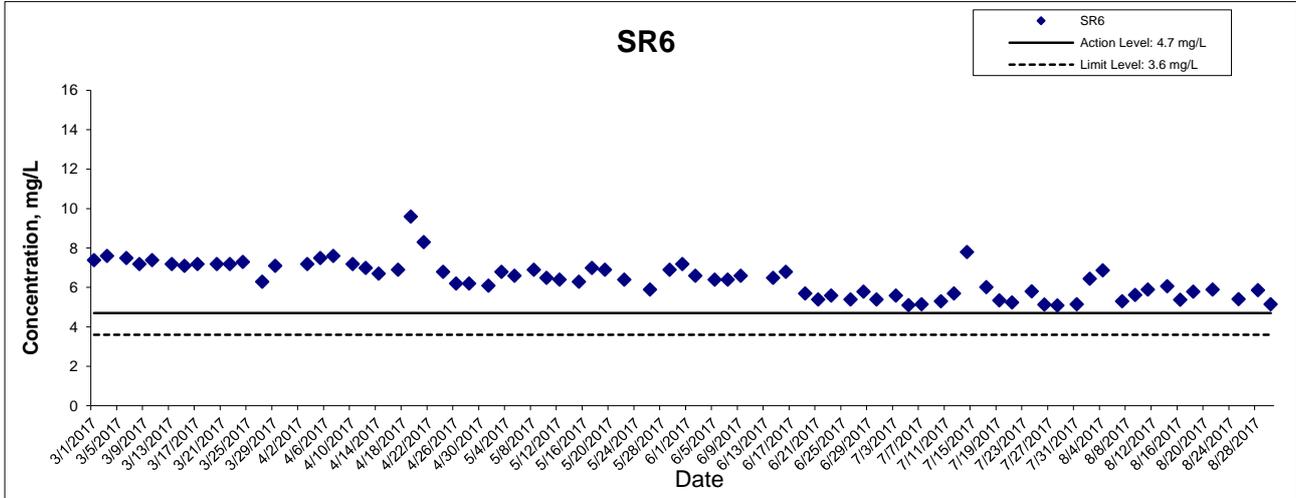
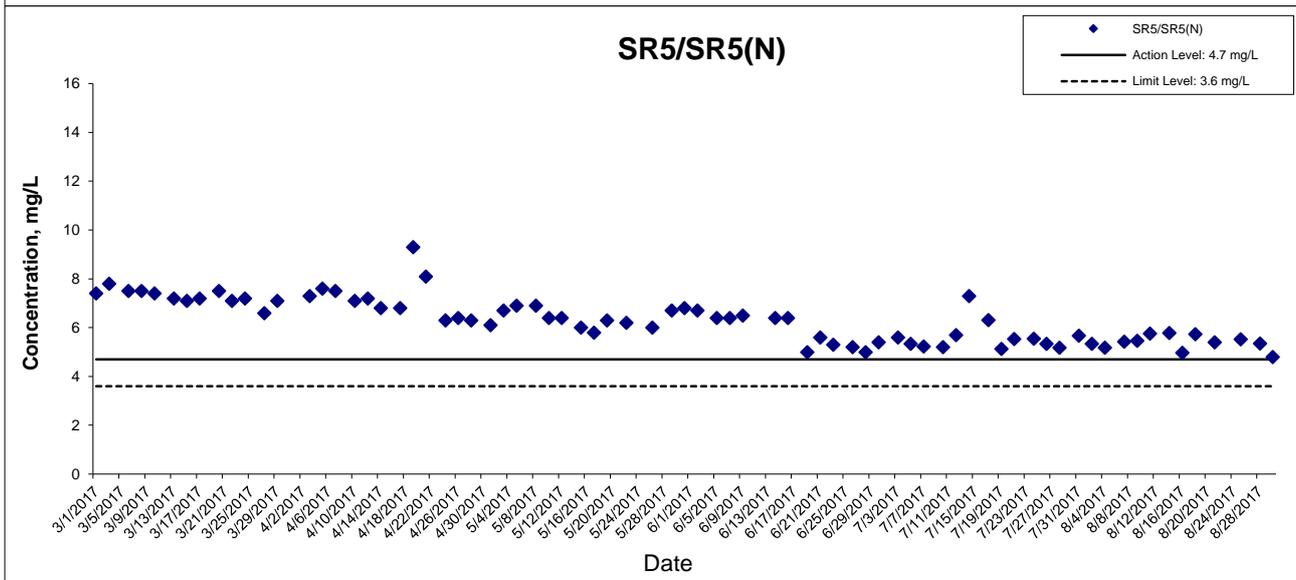
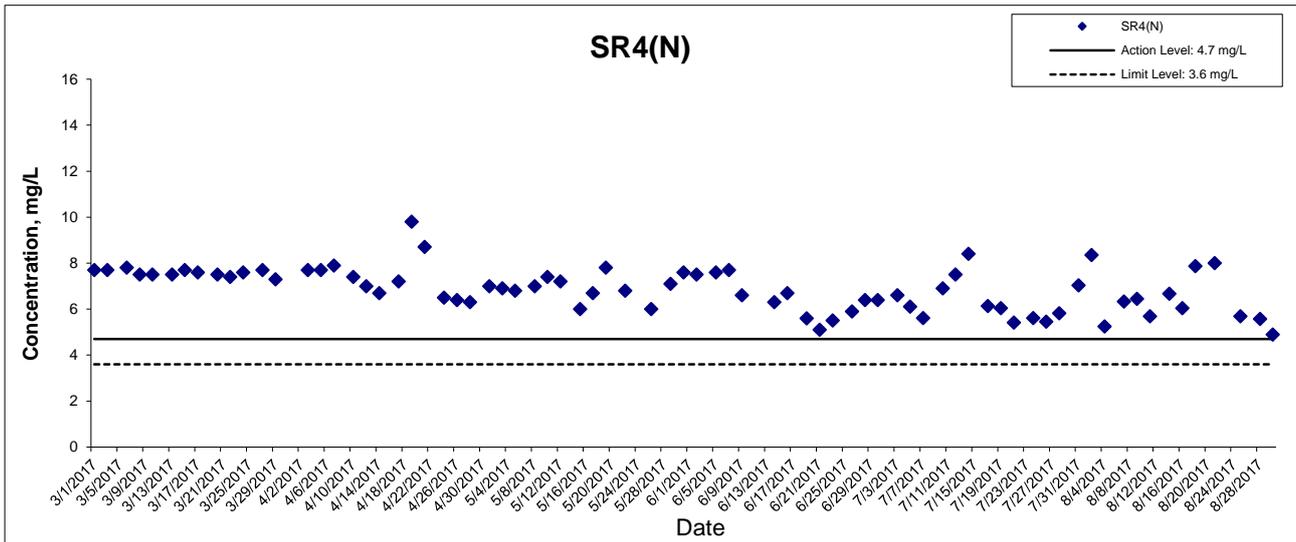
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Project No.: 60249820

Date: April 2018

Appendix G

## Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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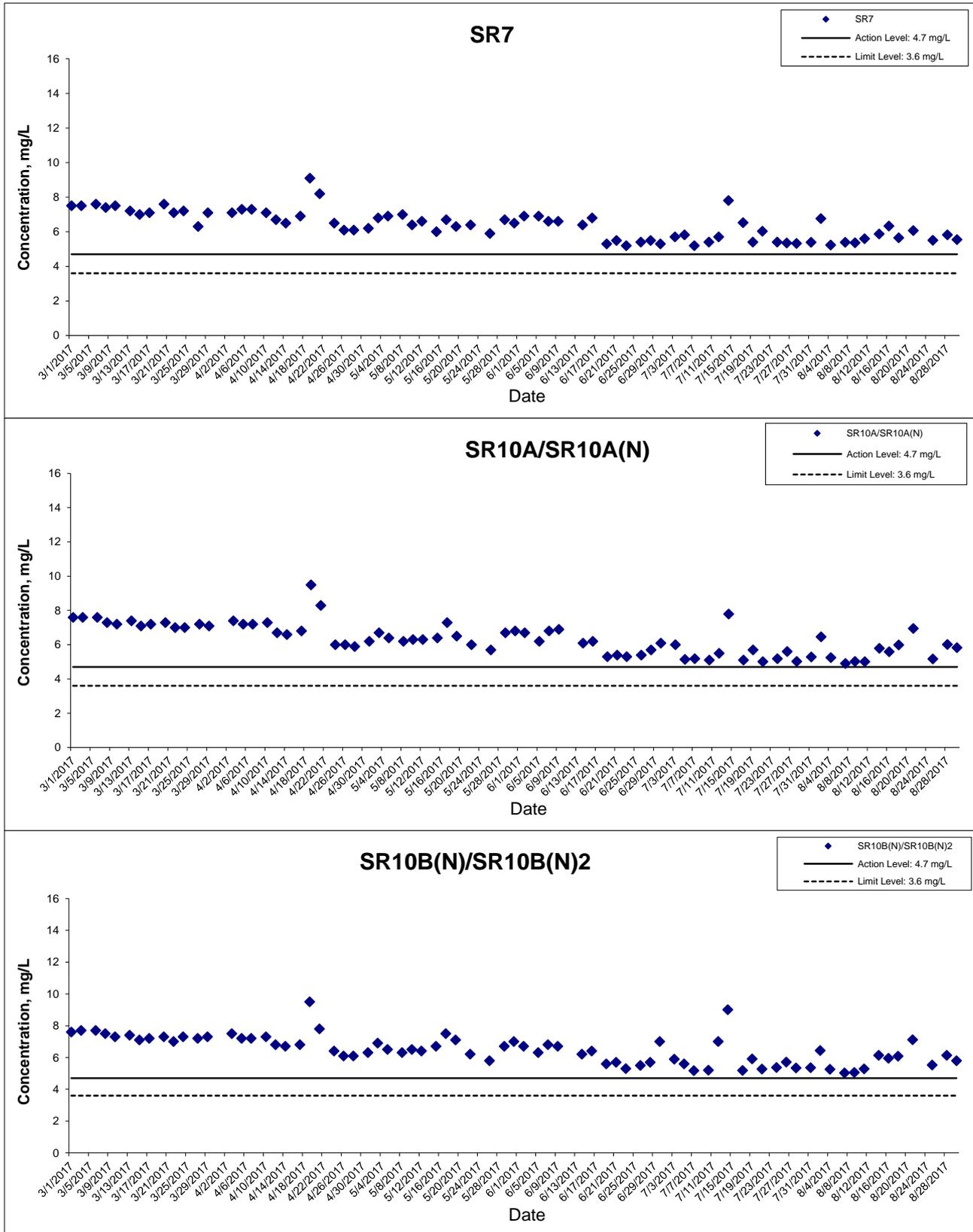
HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS

**Graphical Presentation of Impact Water Quality  
 Monitoring Results**



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## Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

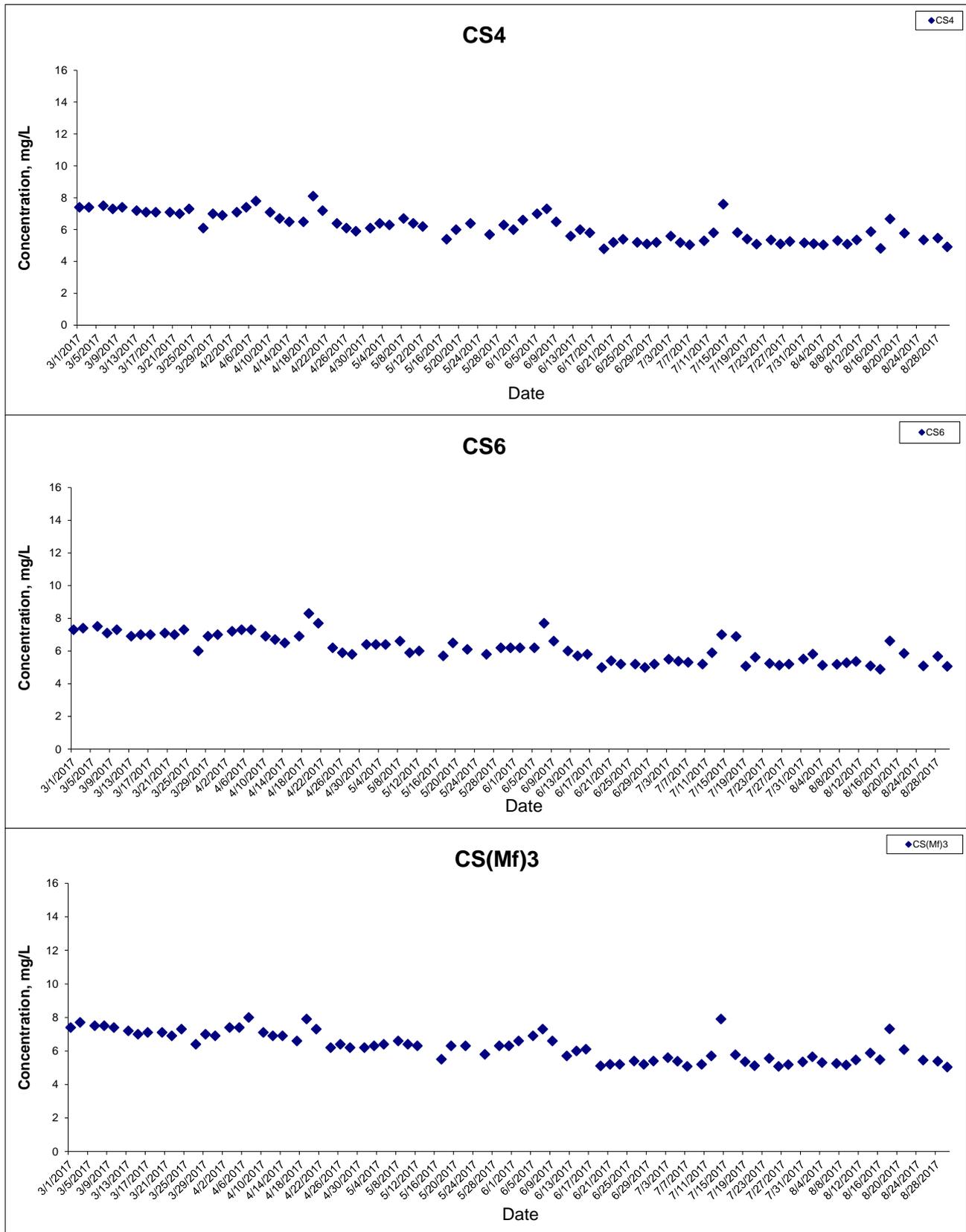
- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality  
Monitoring Results



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## Dissolved Oxygen (Bottom) at Mid-Flood Tide



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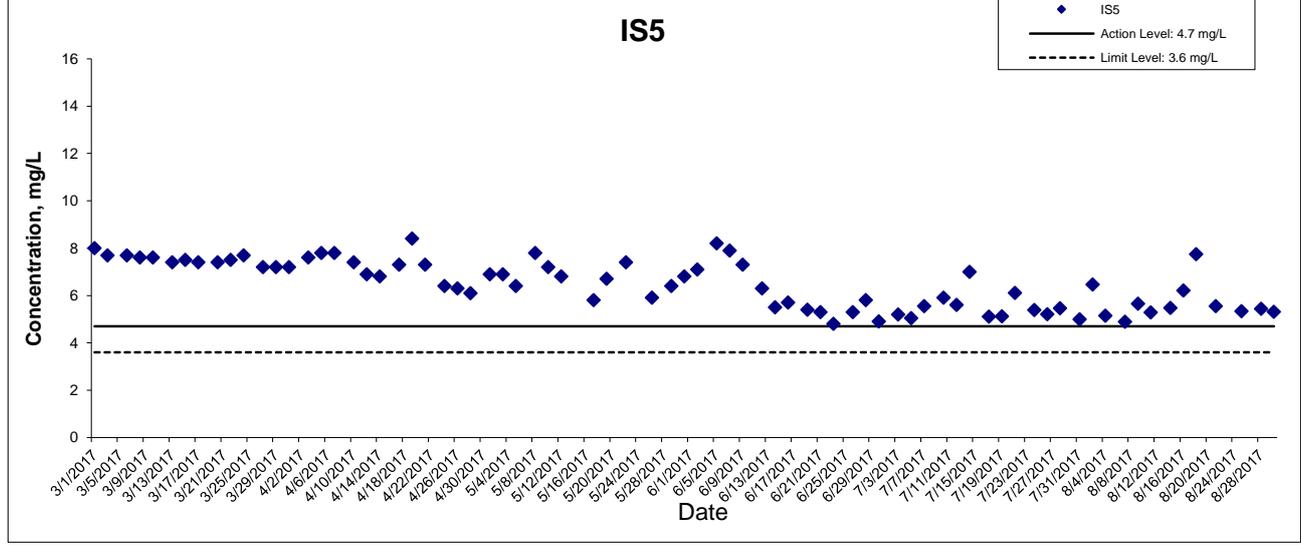
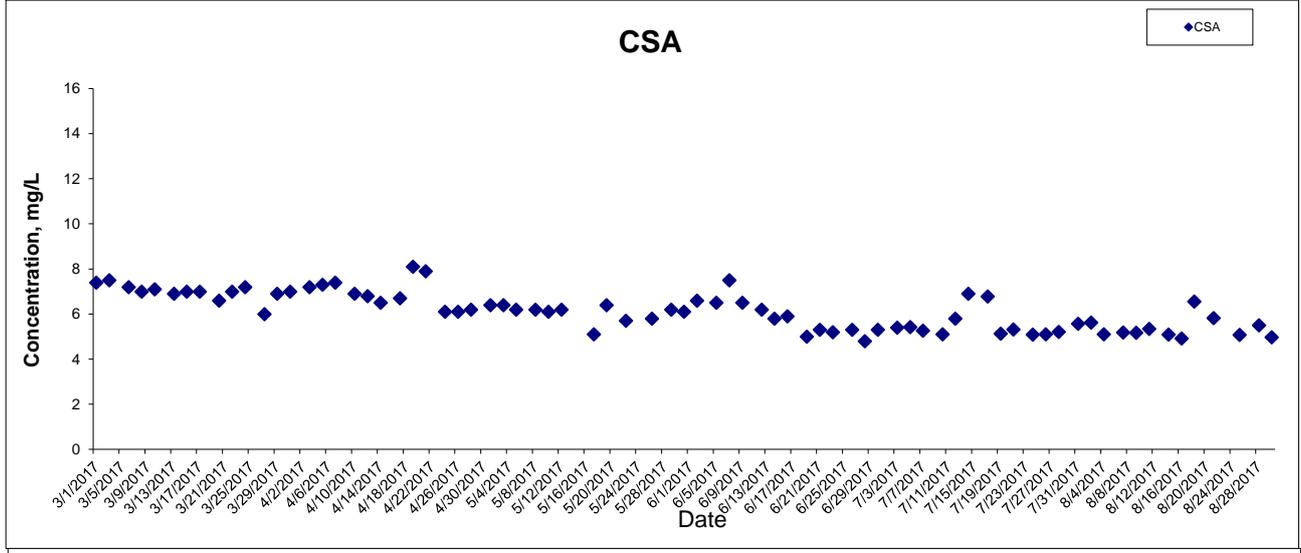
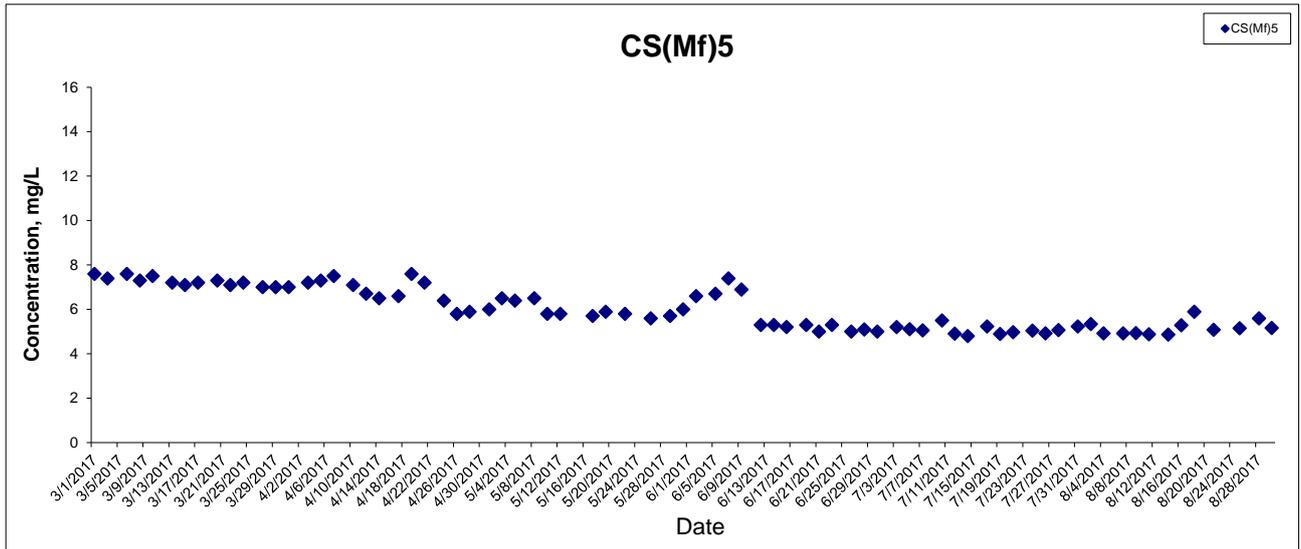
HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS



### Graphical Presentation of Impact Water Quality Monitoring Results

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## Dissolved Oxygen (Bottom) at Mid-Flood Tide



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**HONG KONG - ZHUHAI - MACAO BRIDGE**

**HONG KONG BOUNDARY CROSSING FACILITIES**

**- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



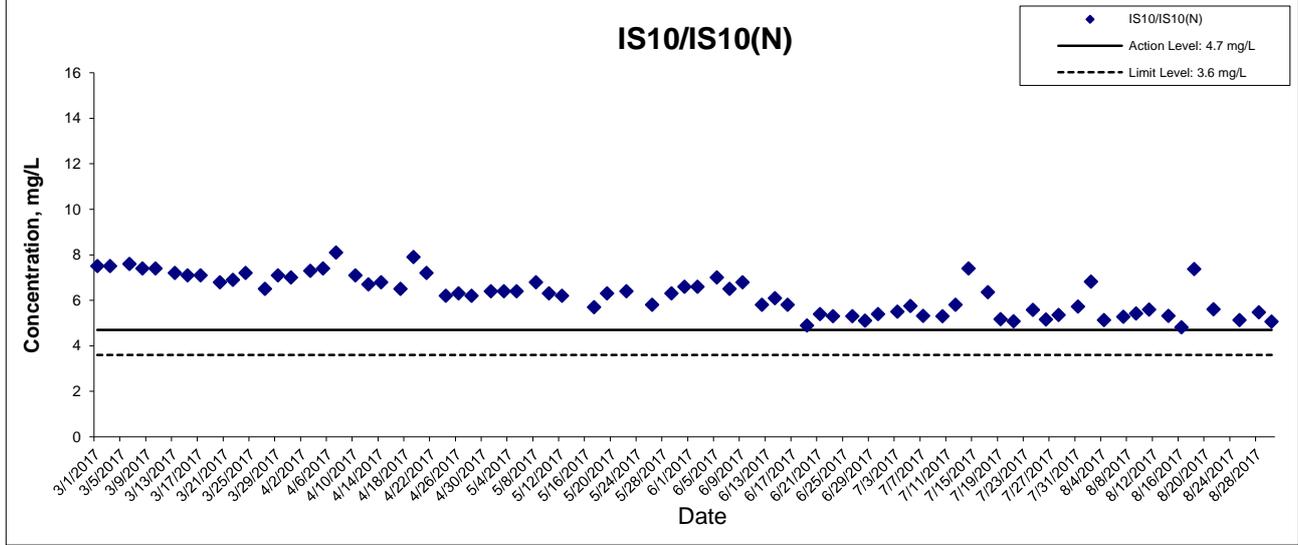
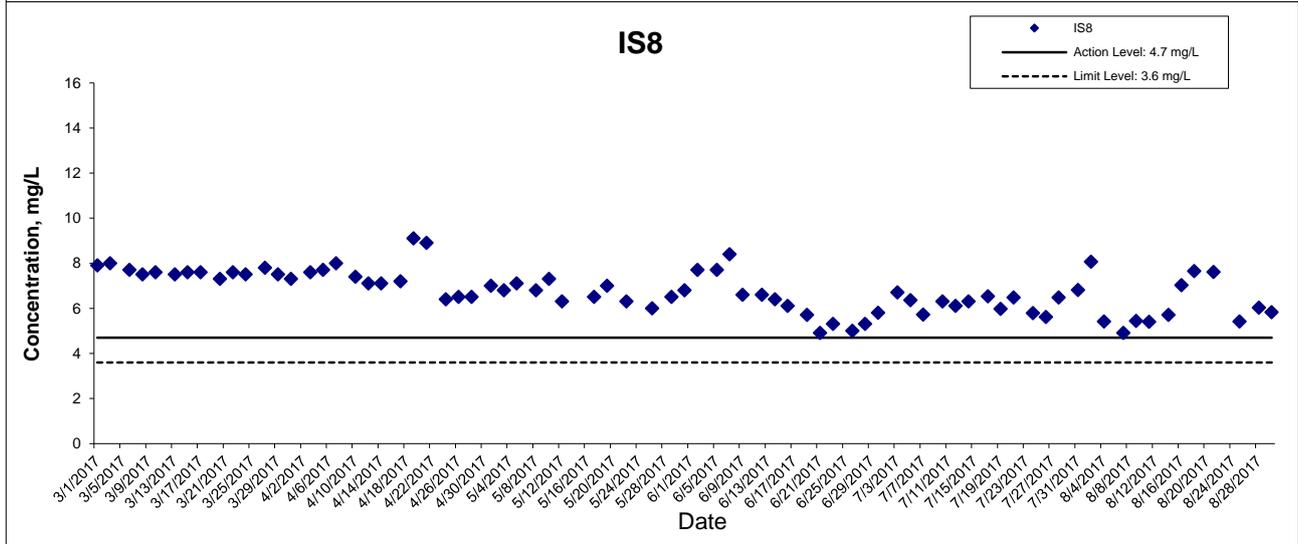
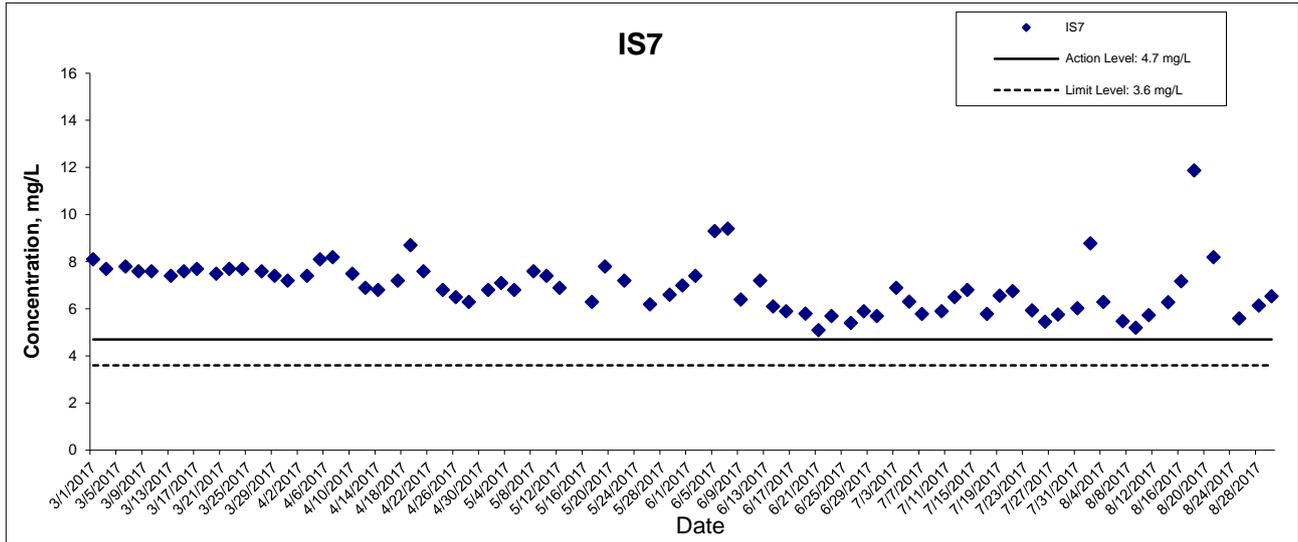
\*Water quality monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building effective since 1 September 2017.

Project No.: 60249820

Date: April 2018

Appendix G

## Dissolved Oxygen (Bottom) at Mid-Flood Tide



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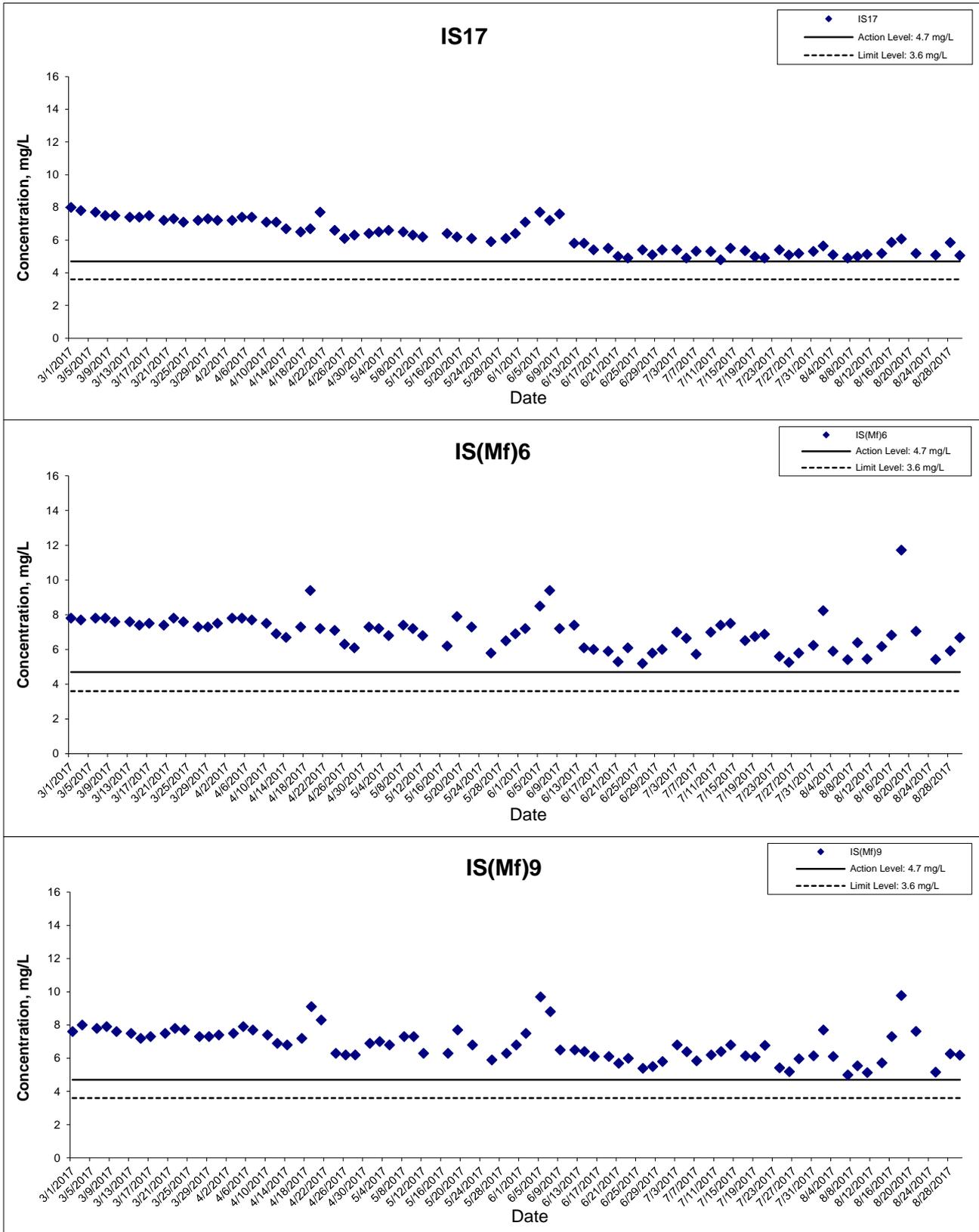
**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



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## Dissolved Oxygen (Bottom) at Mid-Flood Tide



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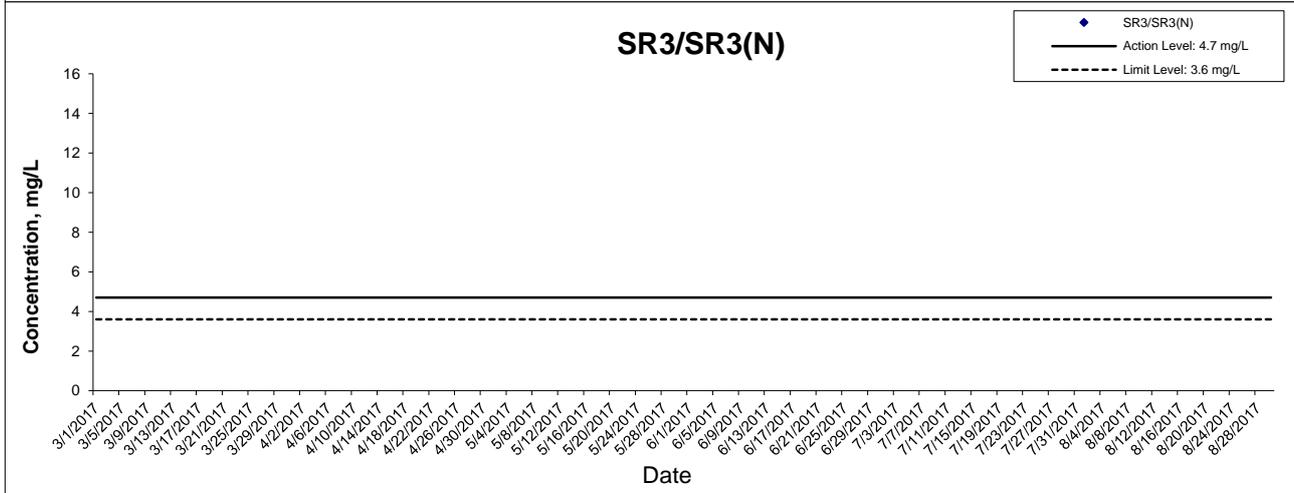
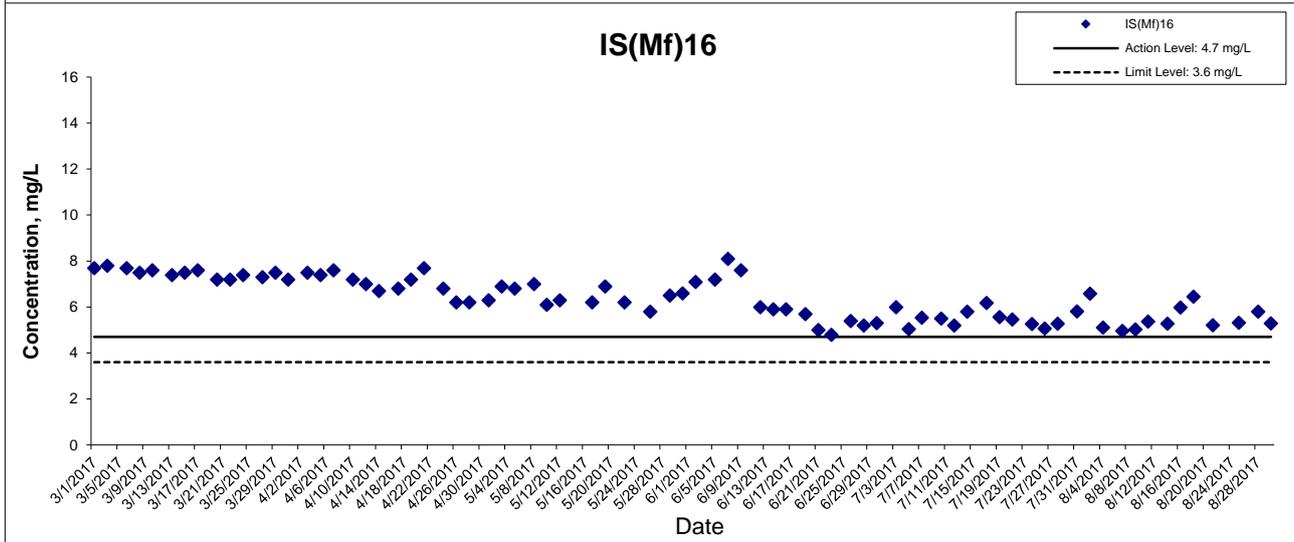
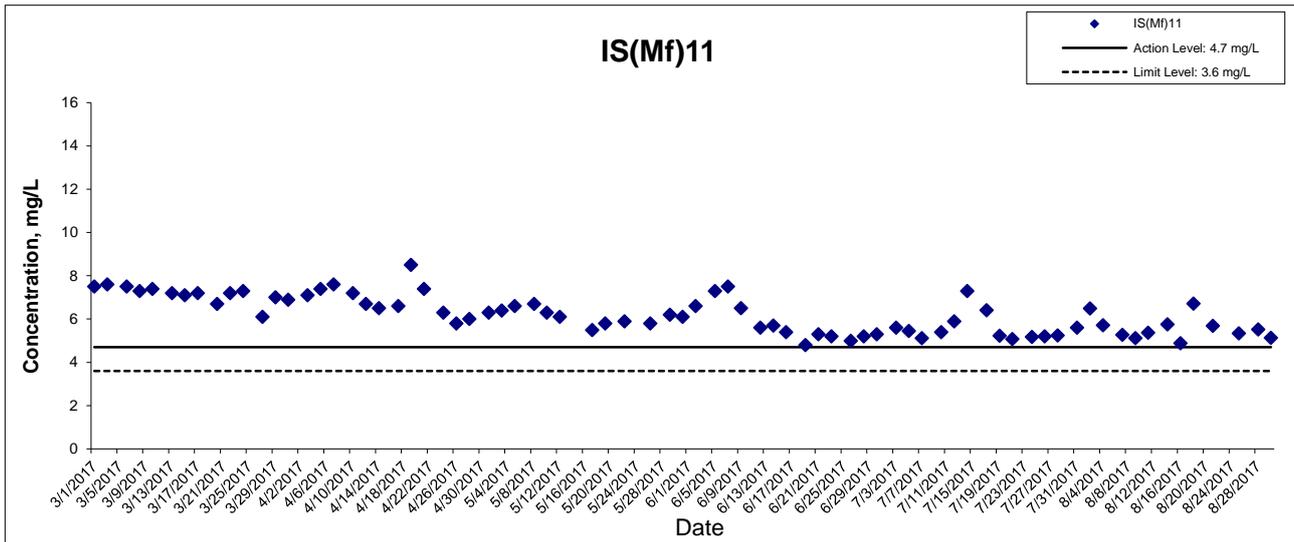
**HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



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## Dissolved Oxygen (Bottom) at Mid-Flood Tide



As the measured water depths were less than 3 m during all monitoring days, water samples are collected at mid-depth only .

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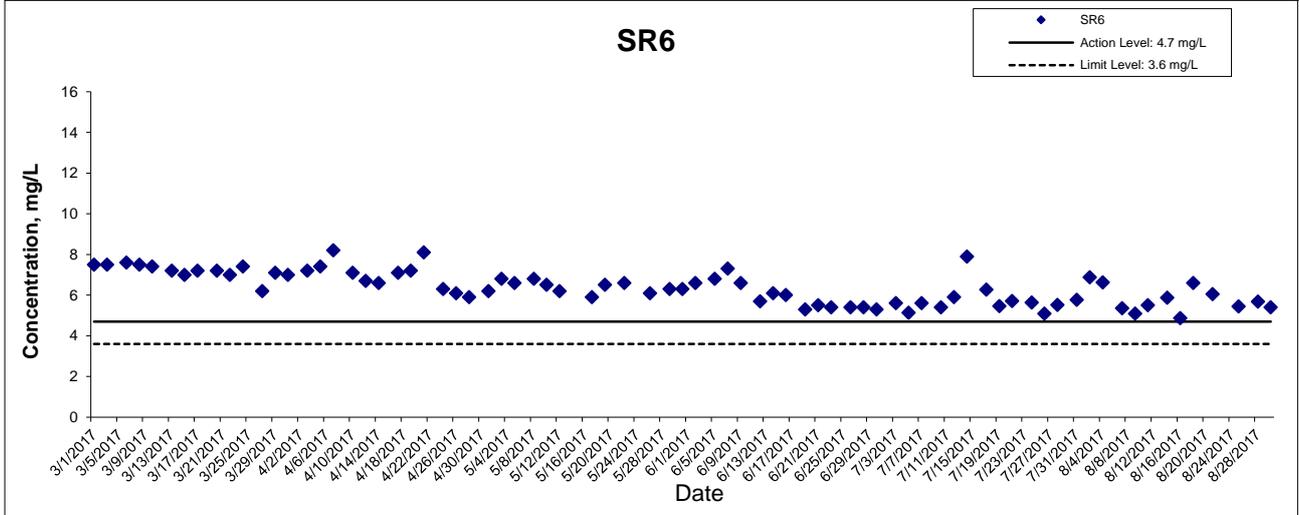
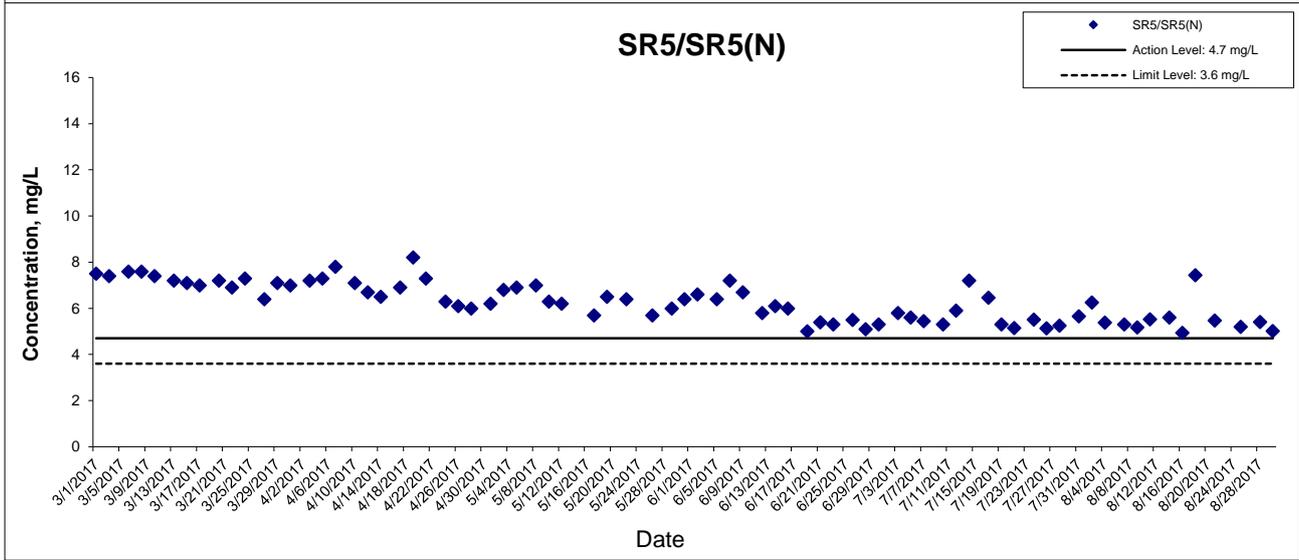
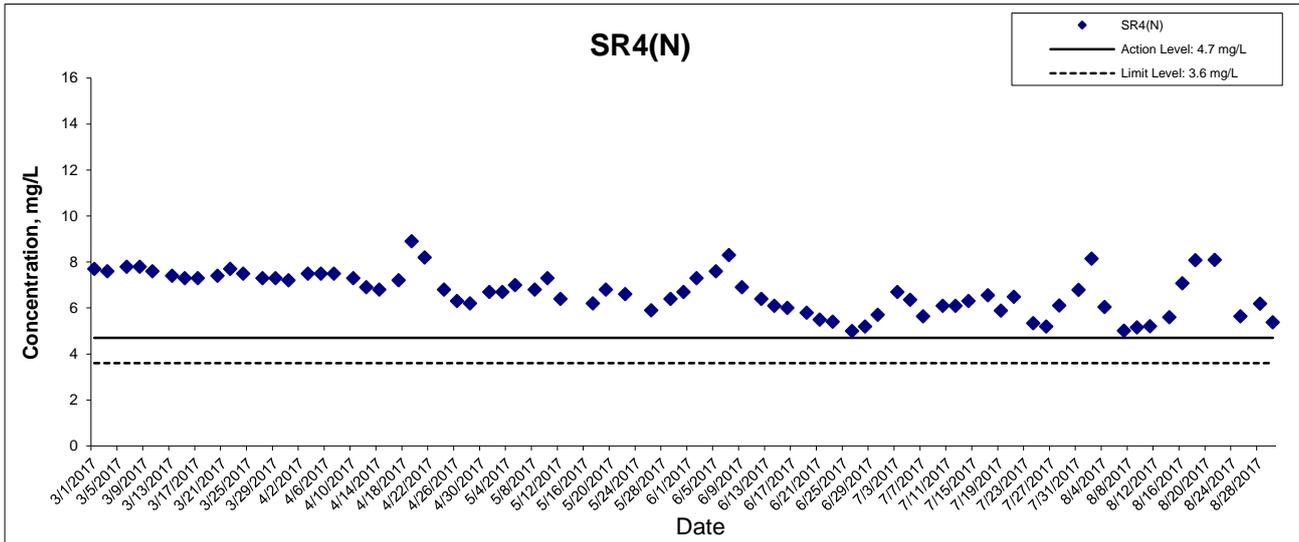
**HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
 Monitoring Results**



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## Dissolved Oxygen (Bottom) at Mid-Flood Tide



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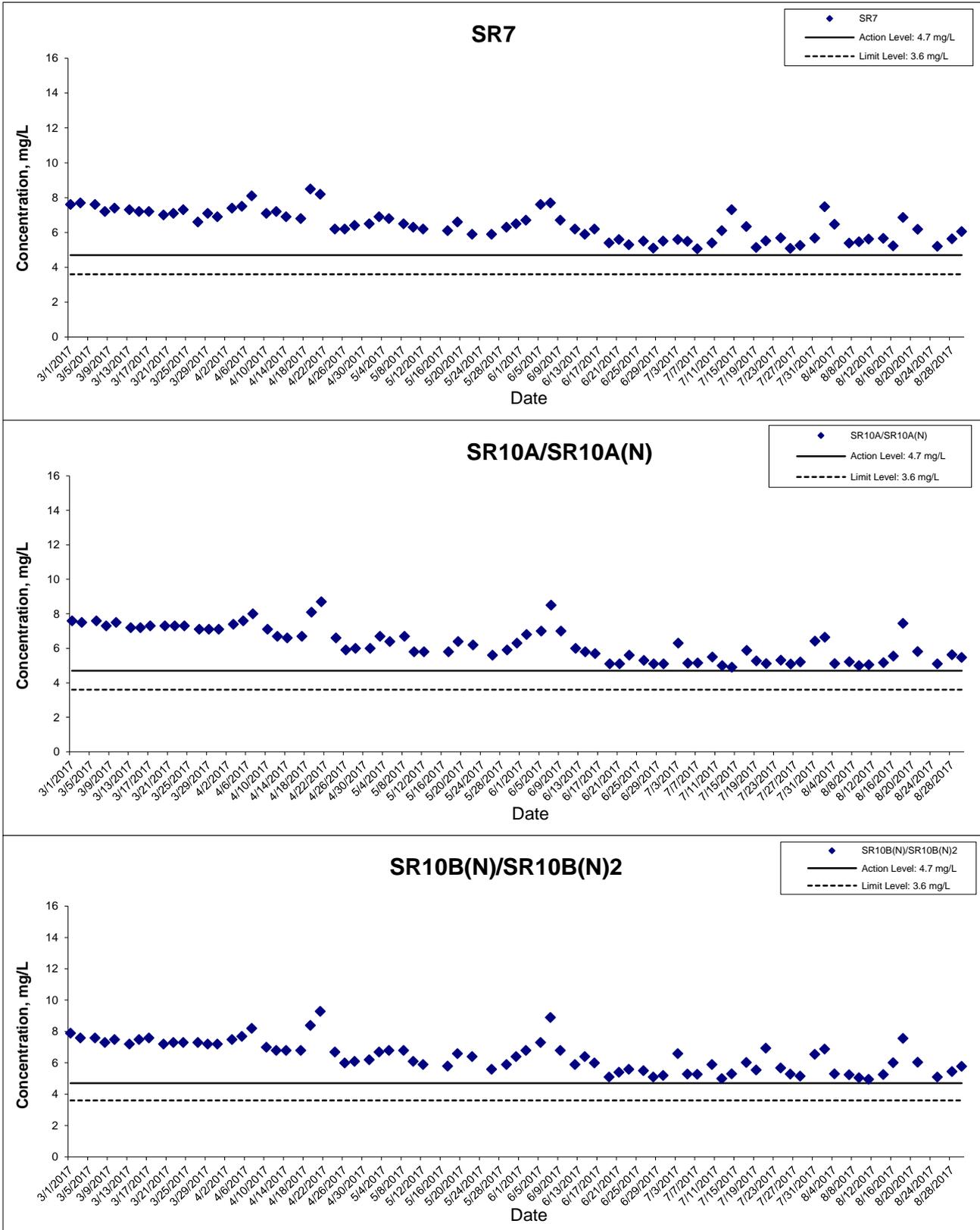
**HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



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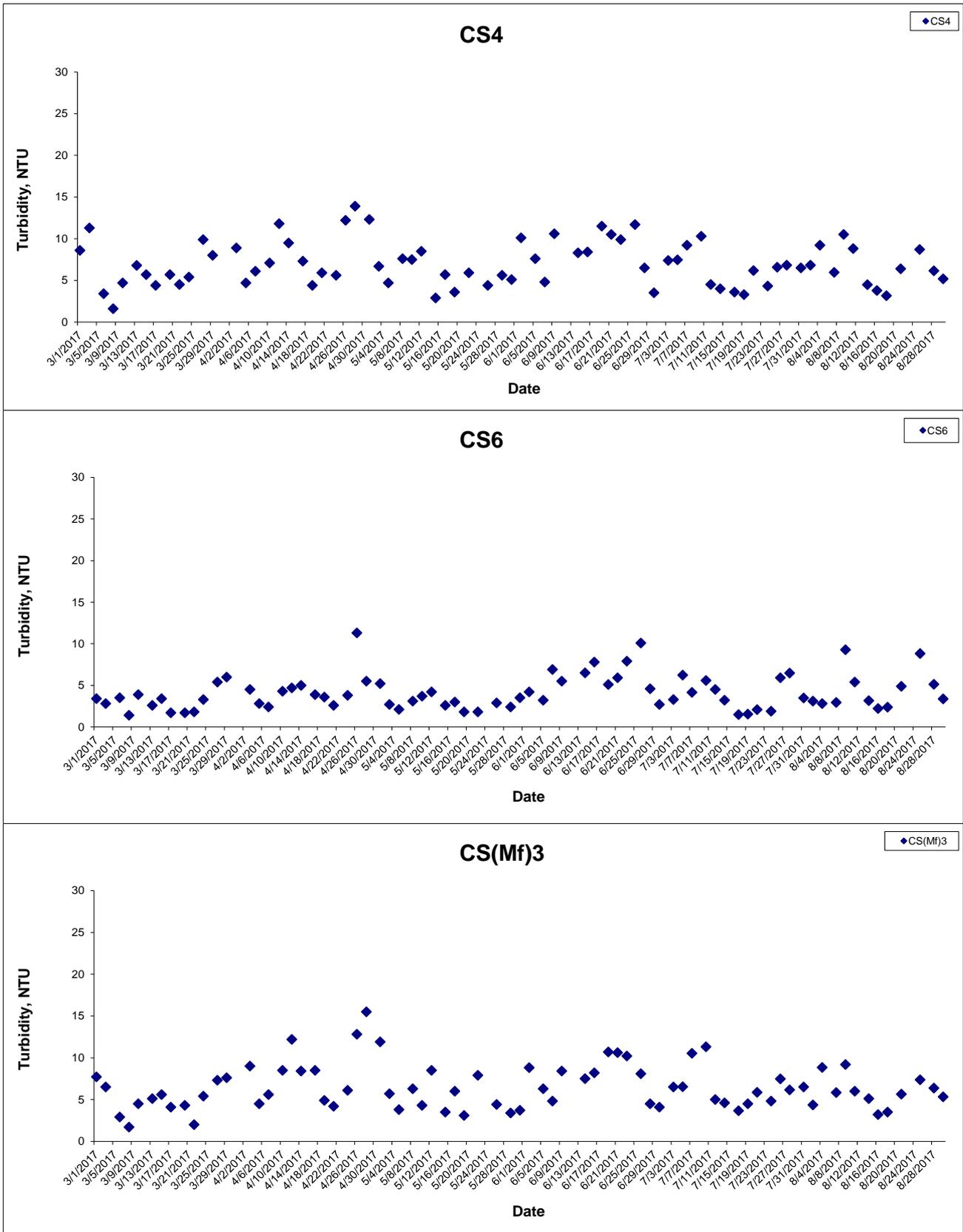
**HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



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## Turbidity at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

### Graphical Presentation of Impact Water Quality Monitoring Results



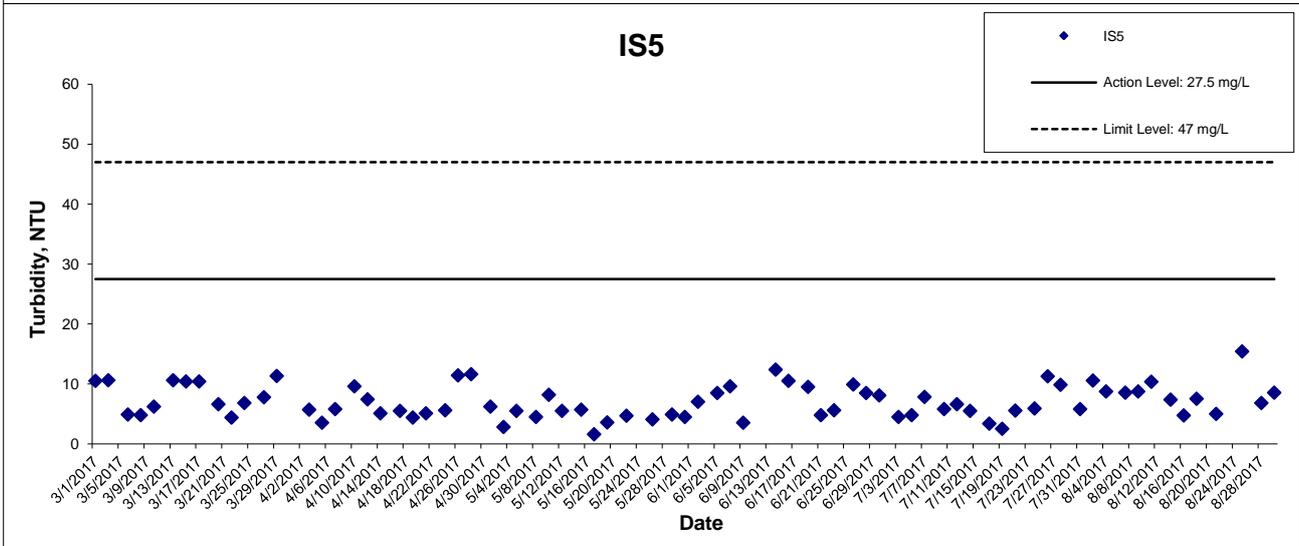
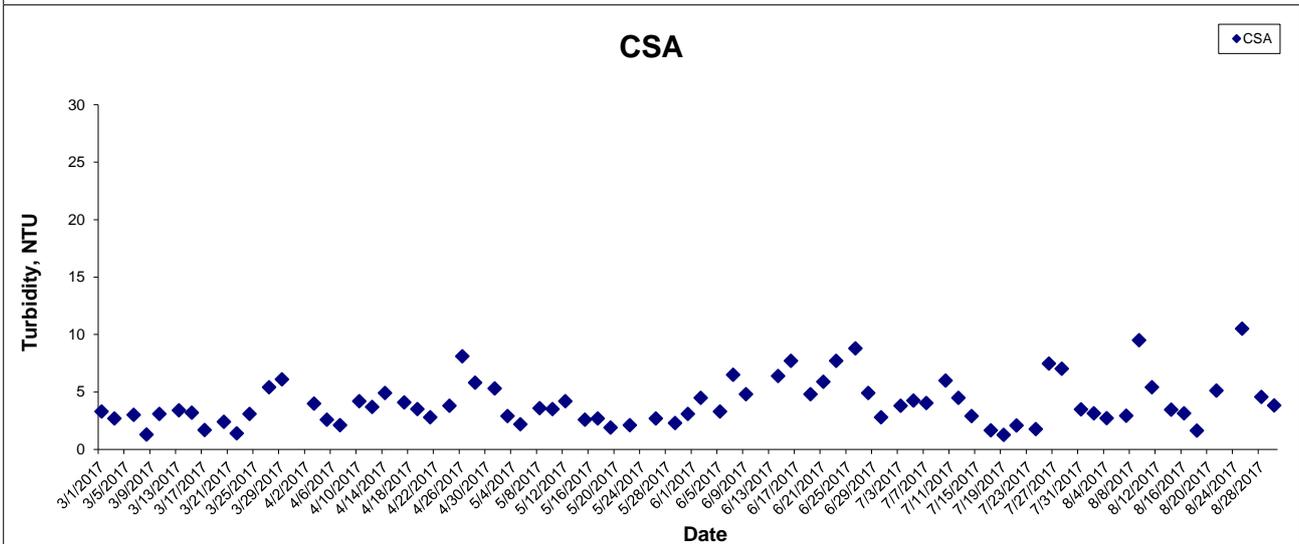
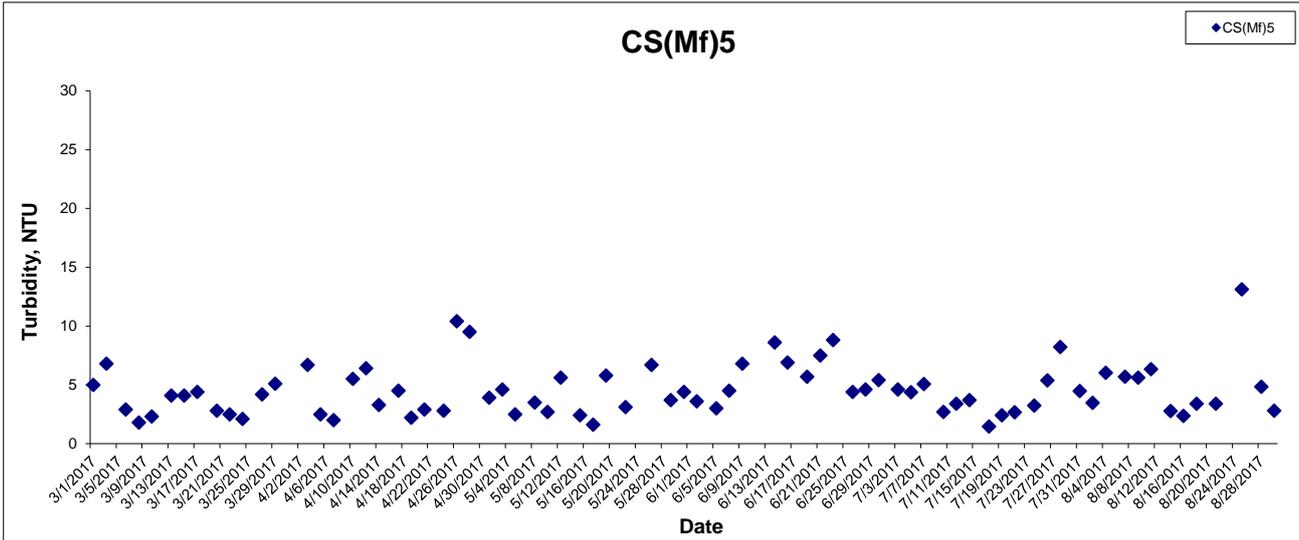
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Project No.: 60249820

Date: April 2018

Appendix G

## Turbidity at Mid-Ebb Tide



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**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



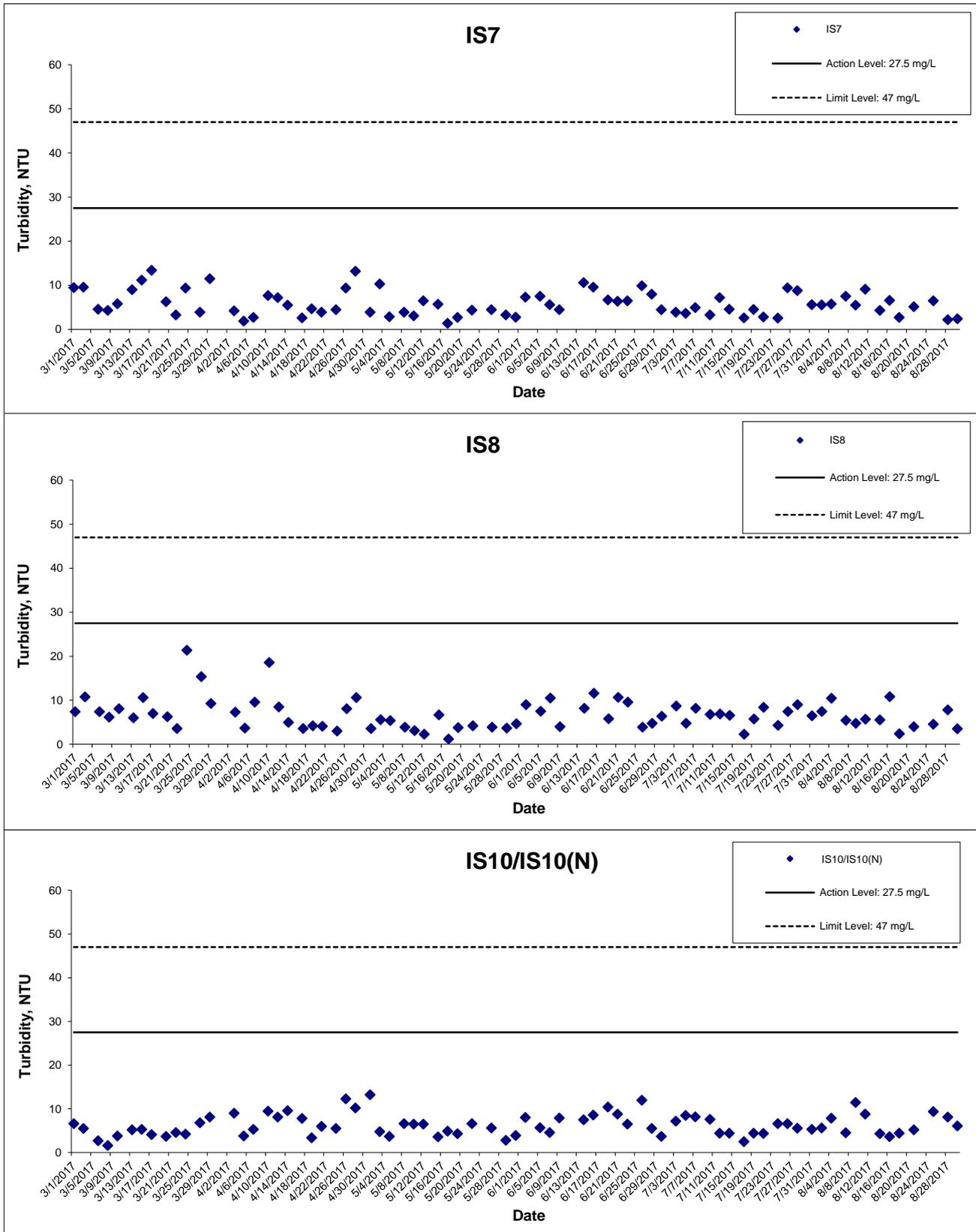
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Project No.: 60249820

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Appendix G

## Turbidity at Mid-Ebb Tide



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**HONG KONG - ZHUHAI - MACAO BRIDGE**

**HONG KONG BOUNDARY CROSSING FACILITIES**

**- RECLAMATION WORKS**



### Graphical Presentation of Impact Water Quality Monitoring Results

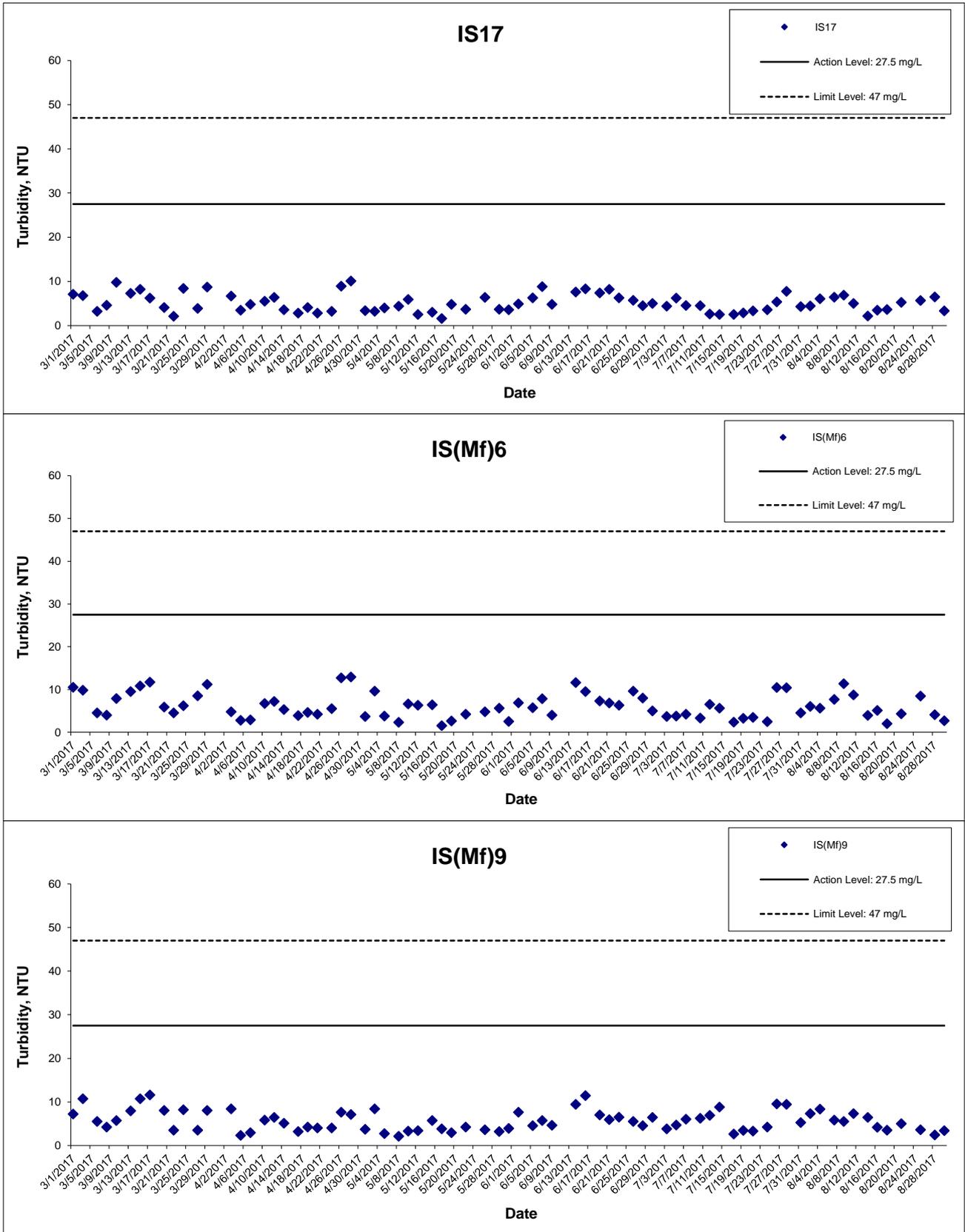
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Project No.: 60249820

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Appendix G

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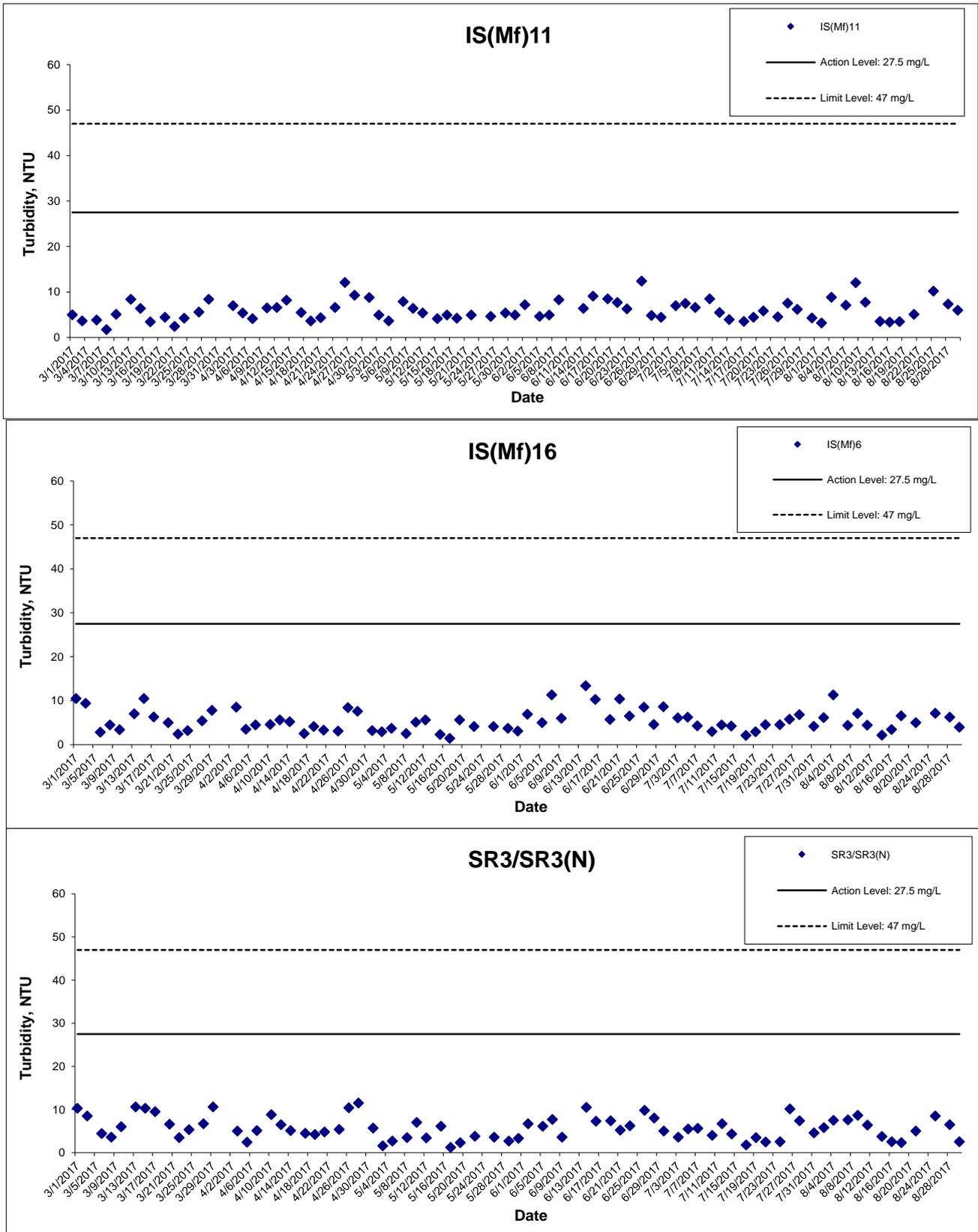
**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**



### Graphical Presentation of Impact Water Quality Monitoring Results

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**HONG KONG - ZHUHAI - MACAO BRIDGE**

**HONG KONG BOUNDARY CROSSING FACILITIES**

**- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



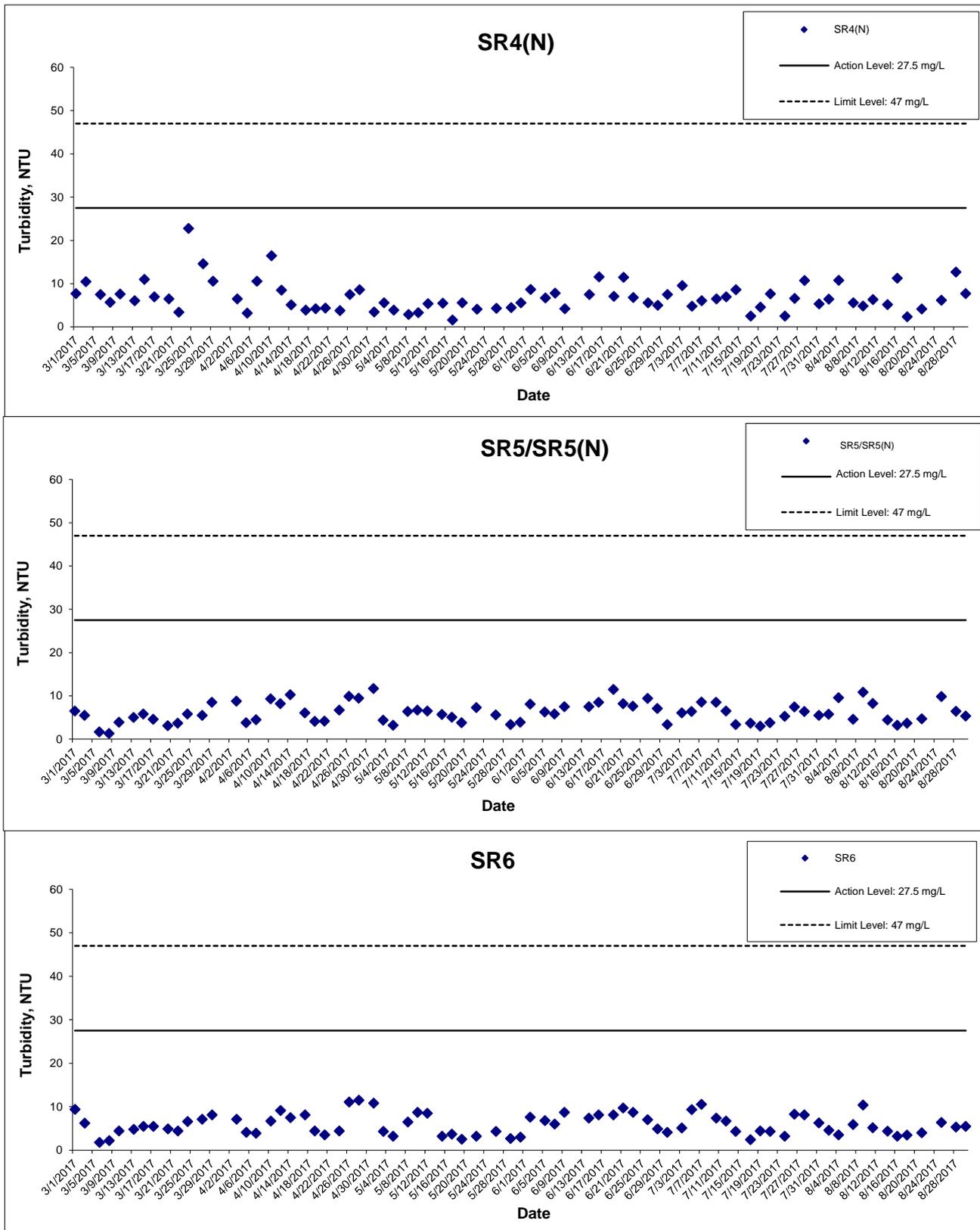
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Appendix G

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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



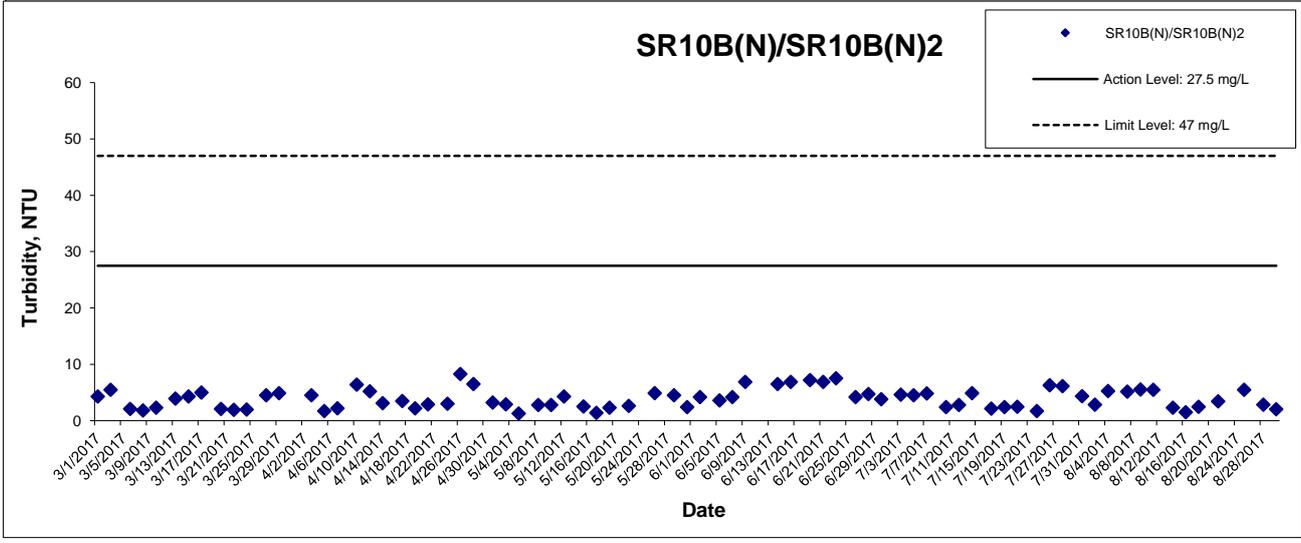
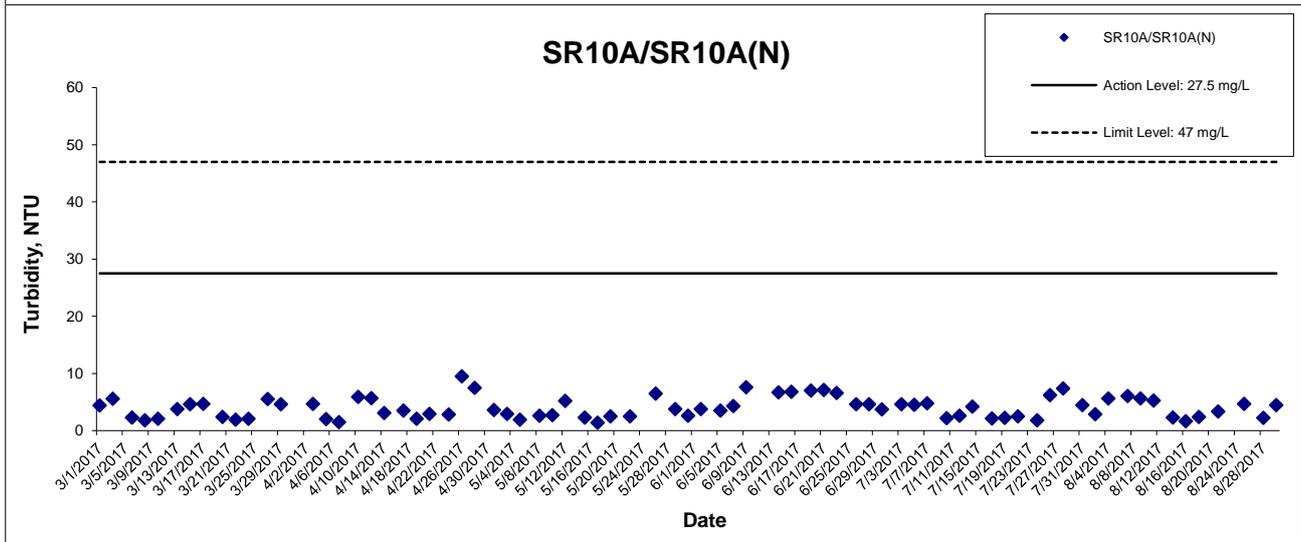
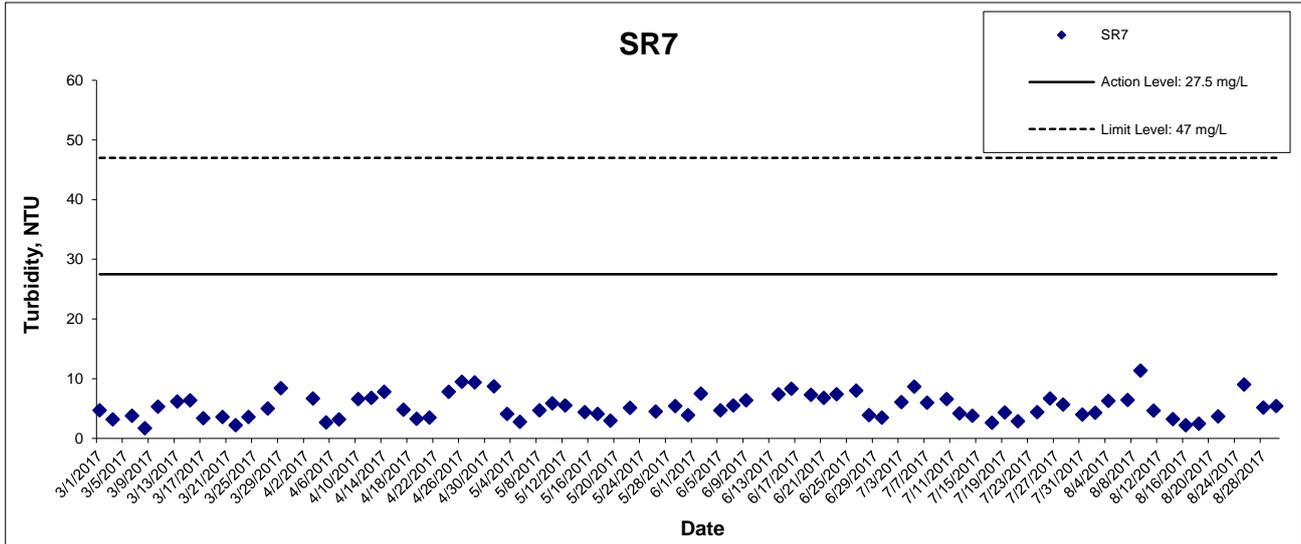
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Project No.: 60249820

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Appendix G

## Turbidity at Mid-Ebb Tide



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HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

### Graphical Presentation of Impact Water Quality Monitoring Results



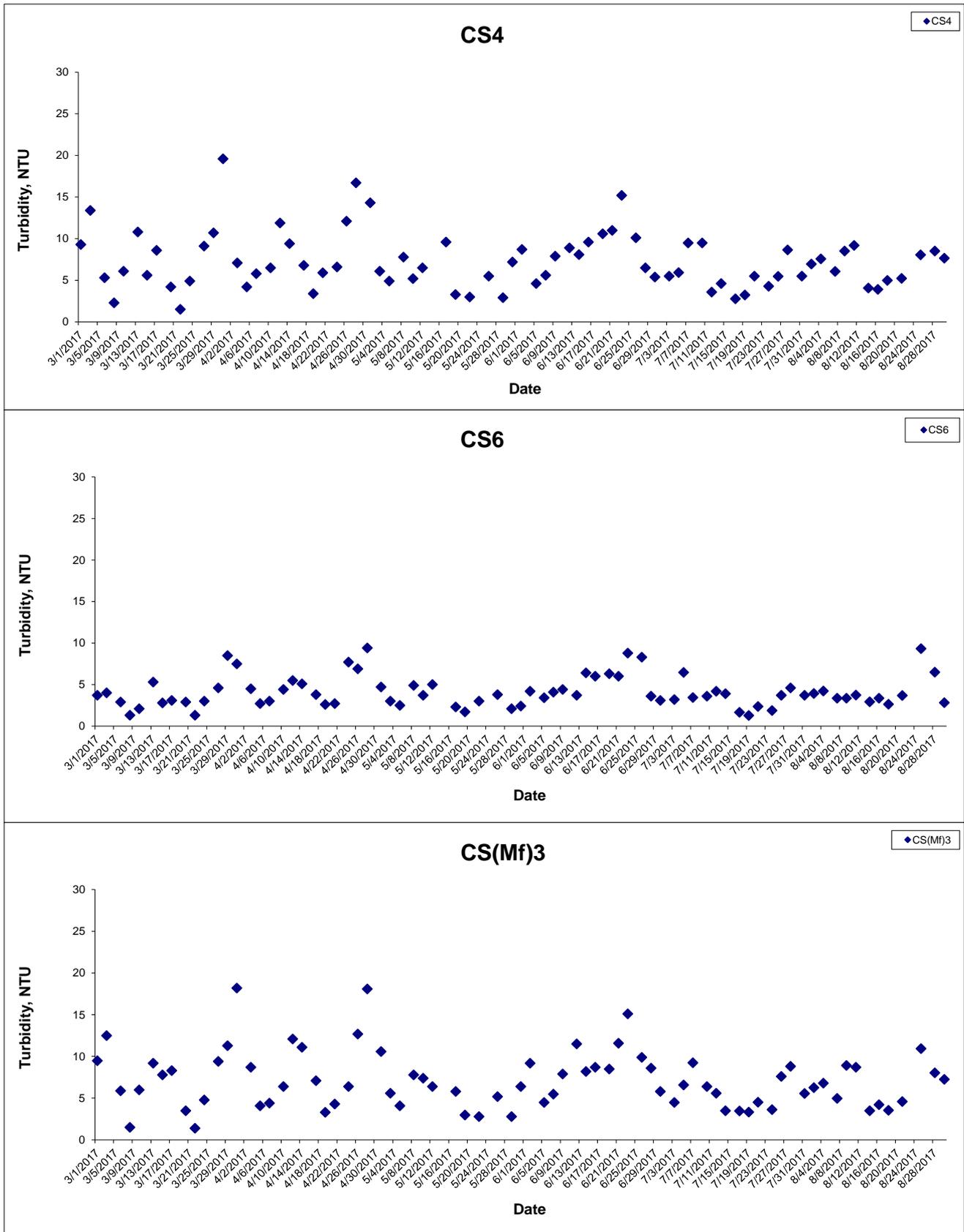
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**Project No.: 60249820**

**Date: April 2018**

**Appendix G**

## Turbidity at Mid-Flood Tide



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**HONG KONG BOUNDARY CROSSING FACILITIES**  
**- RECLAMATION WORKS**



### Graphical Presentation of Impact Water Quality Monitoring Results

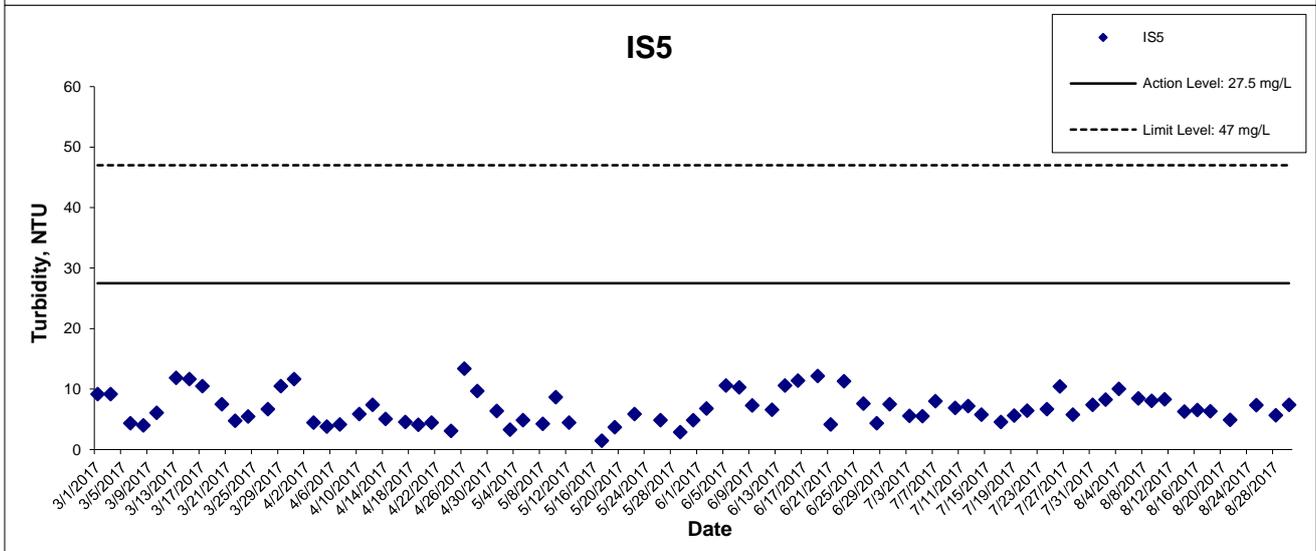
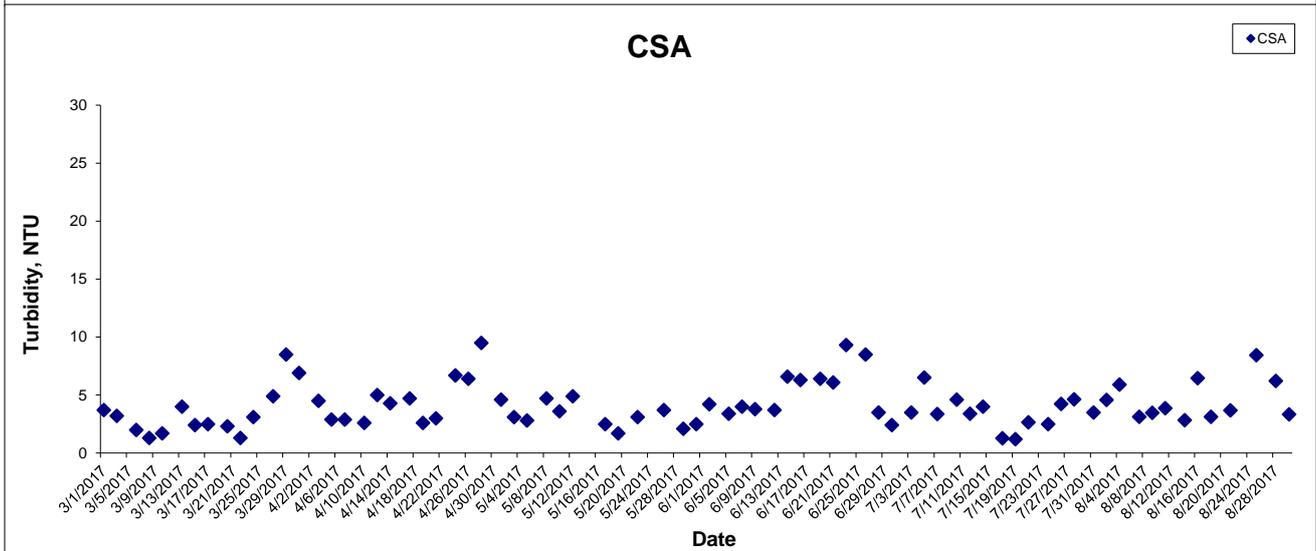
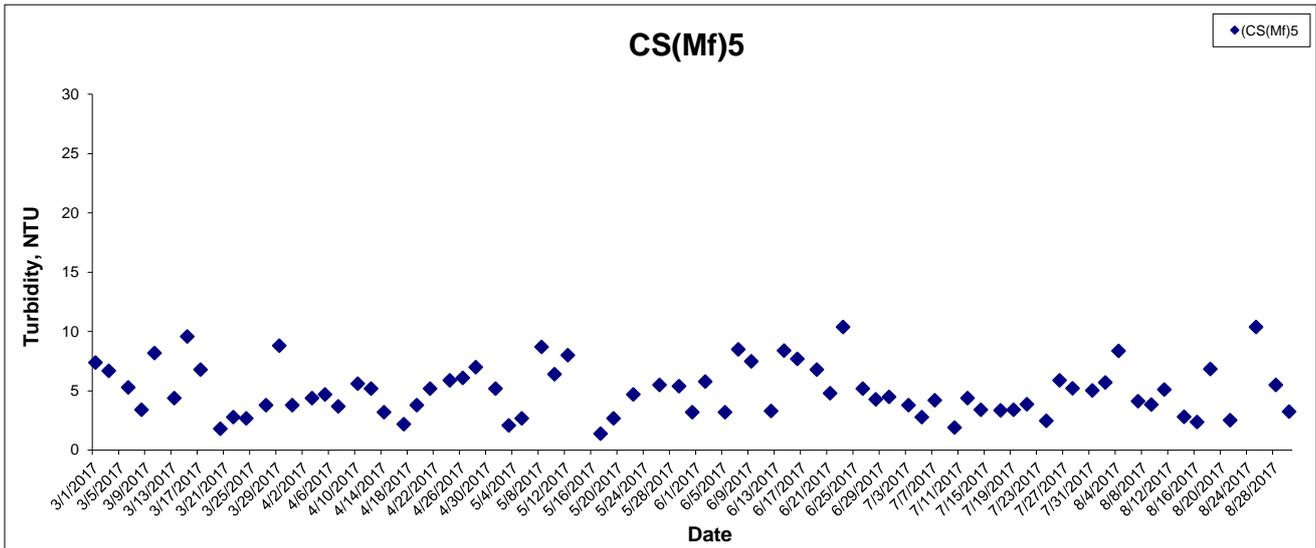
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Project No.: 60249820

Date: April 2018

Appendix G

## Turbidity at Mid-Flood Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS

### Graphical Presentation of Impact Water Quality Monitoring Results



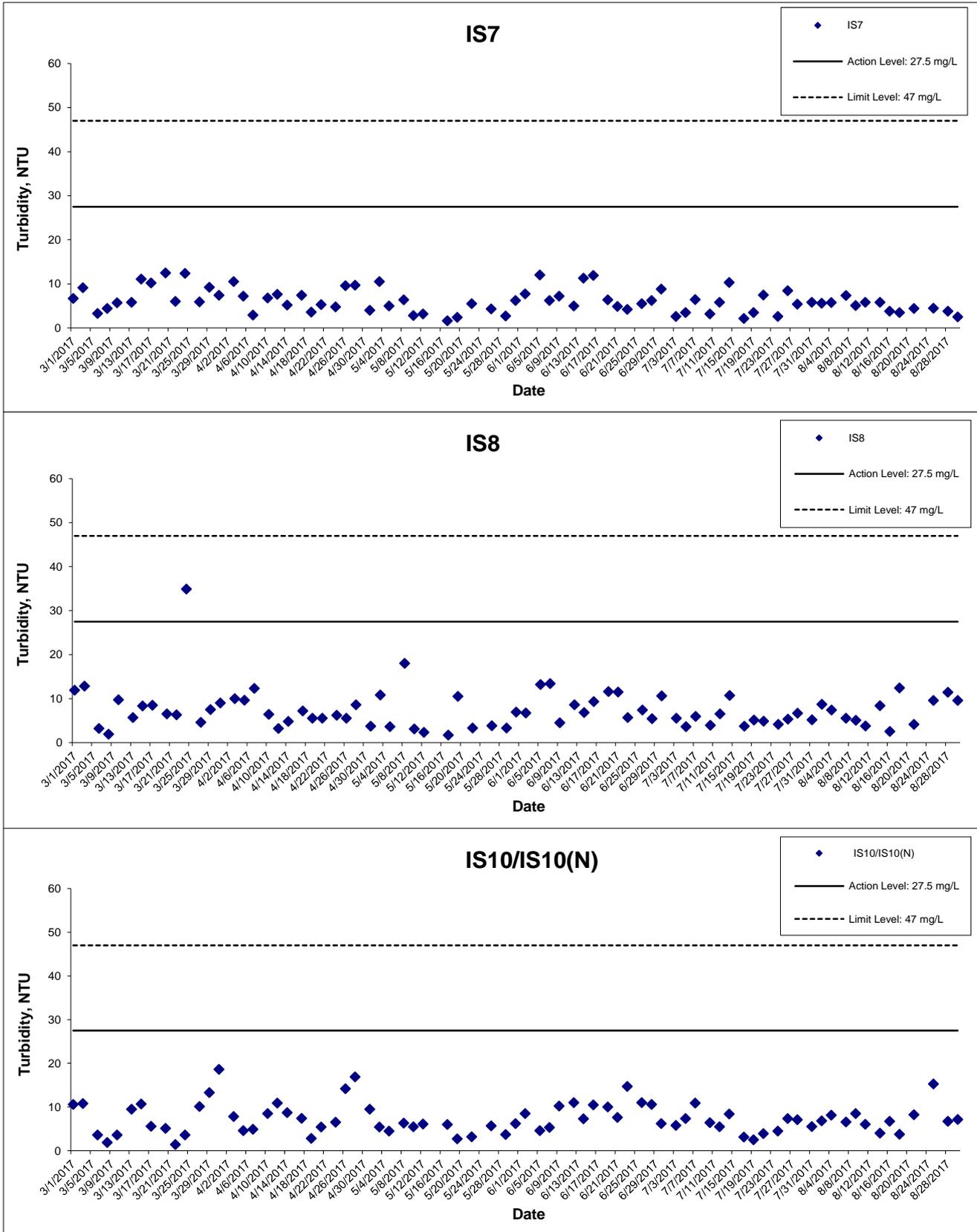
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## Turbidity at Mid-Flood Tide



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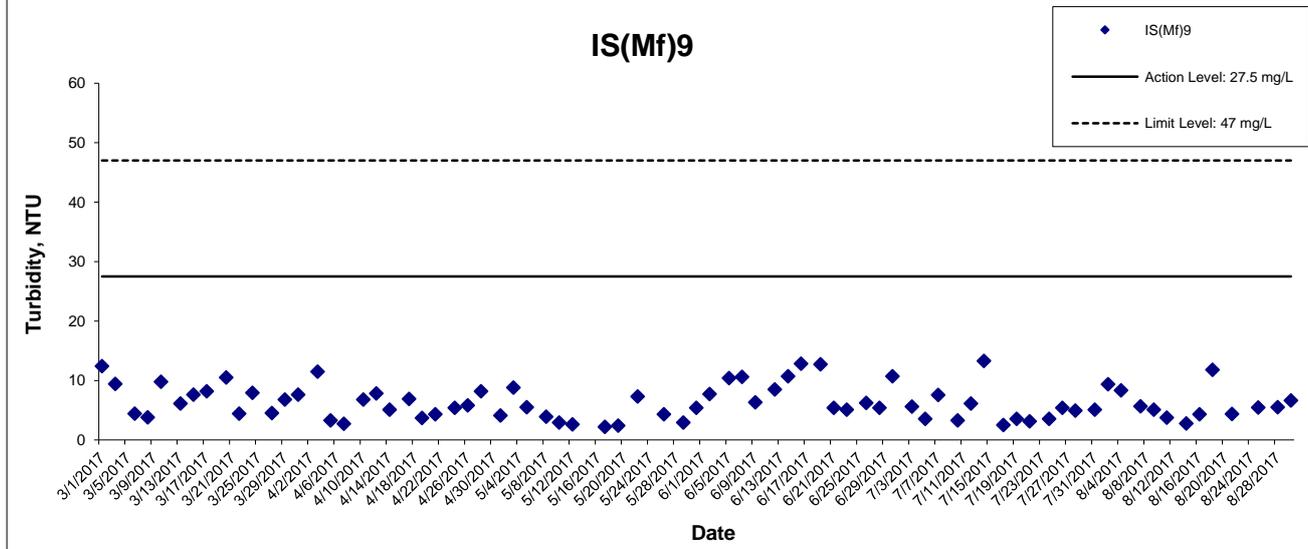
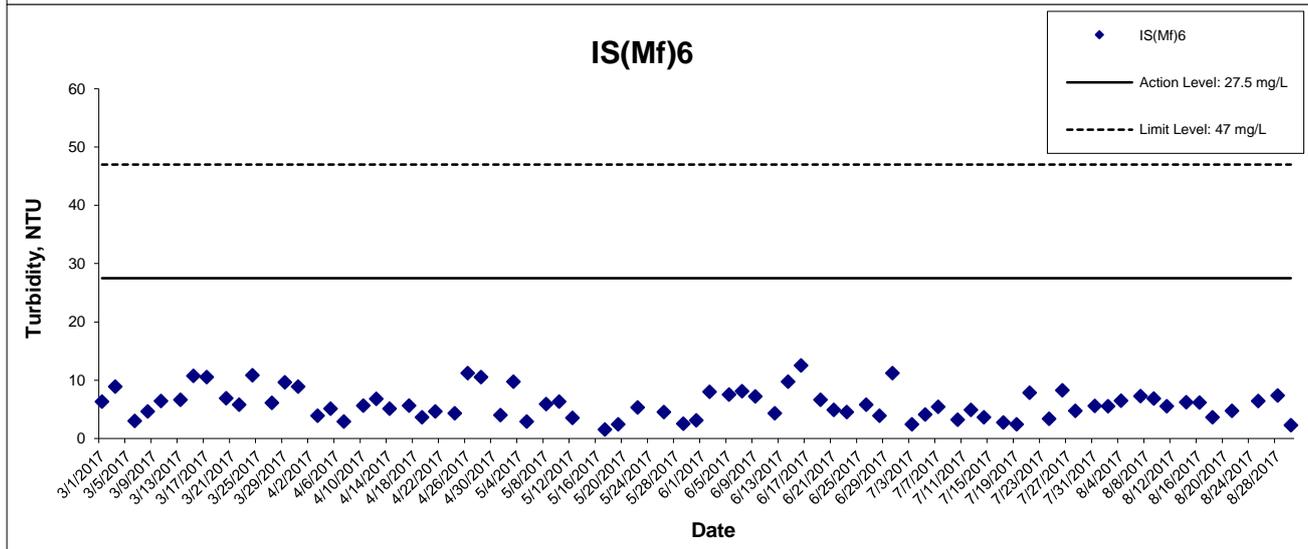
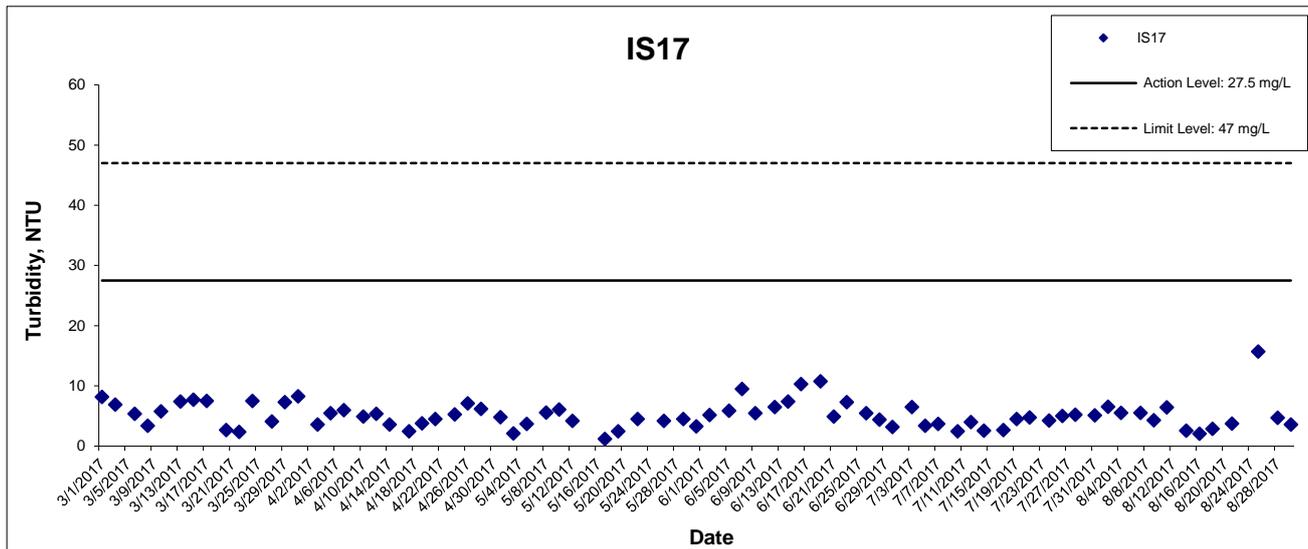
HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
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### Graphical Presentation of Impact Water Quality Monitoring Results



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**HONG KONG - ZHUHAI - MACAO BRIDGE**  
**HONG KONG BOUNDARY CROSSING FACILITIES**  
**- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality**  
**Monitoring Results**



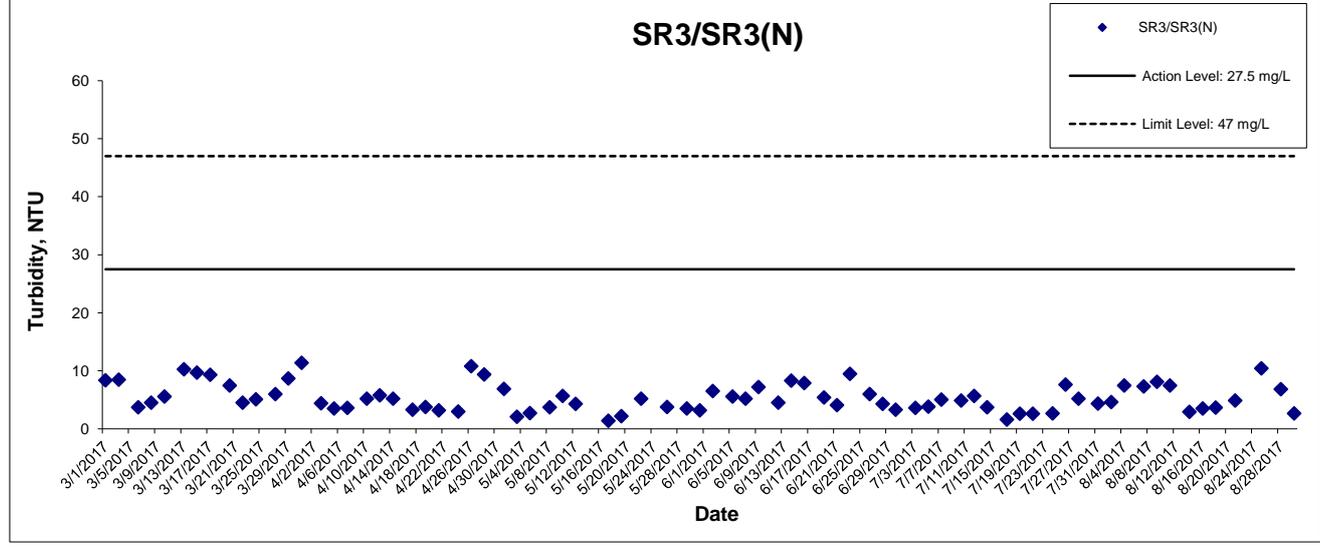
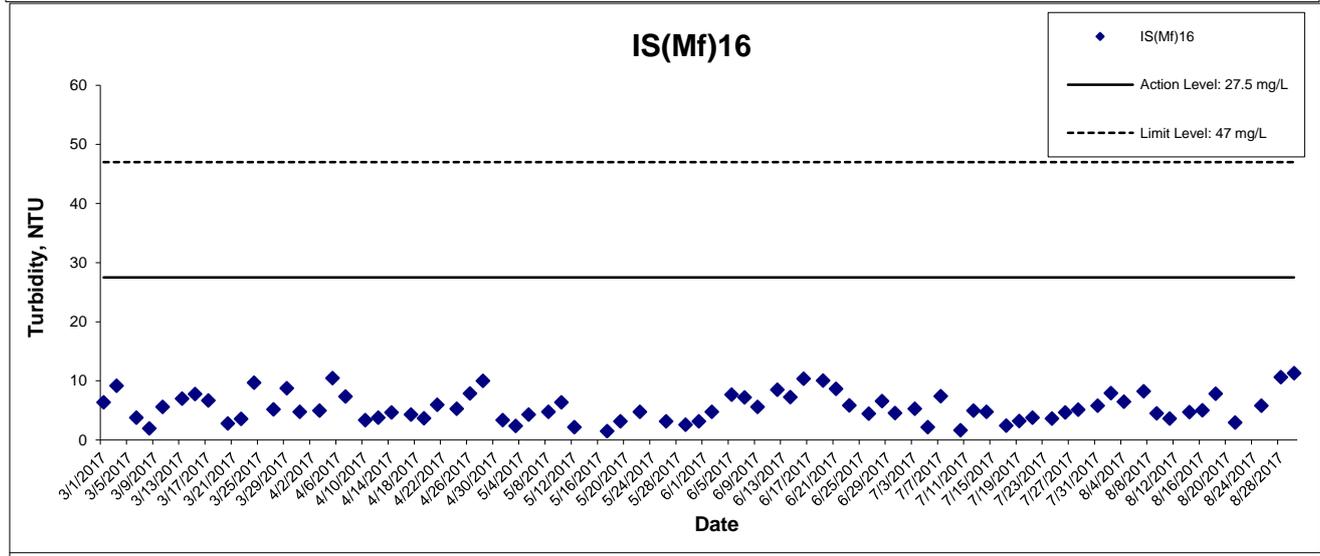
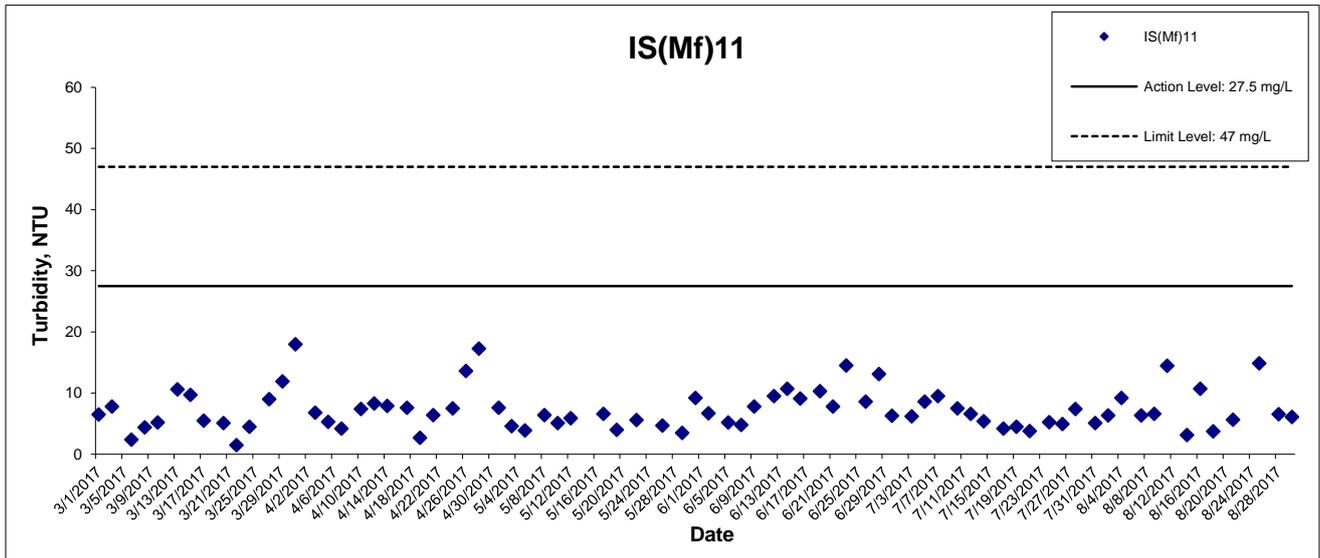
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Appendix G

## Turbidity at Mid-Flood Tide



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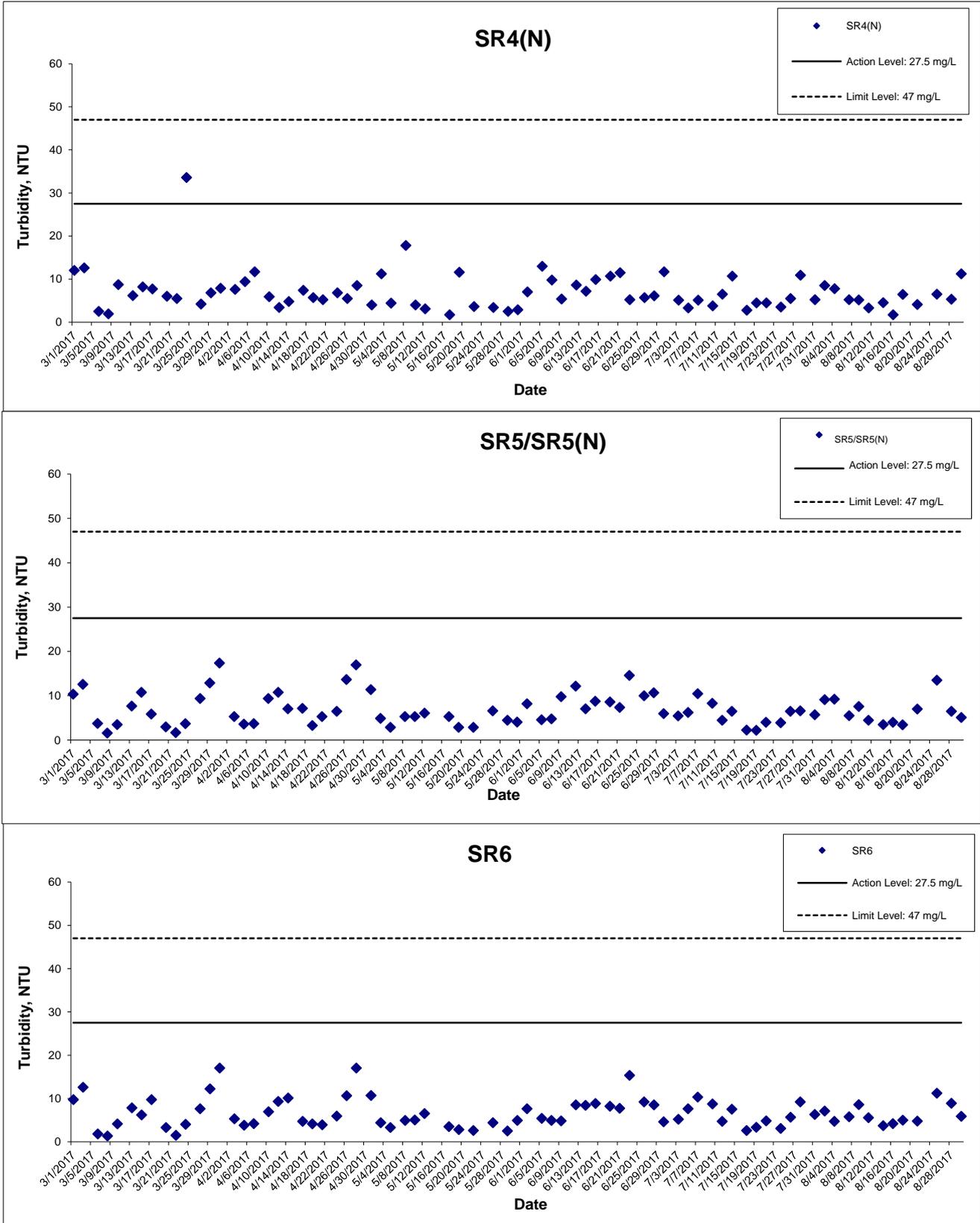
**HONG KONG - ZHUHAI - MACAO BRIDGE**  
**HONG KONG BOUNDARY CROSSING FACILITIES**  
**- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality**  
**Monitoring Results**



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

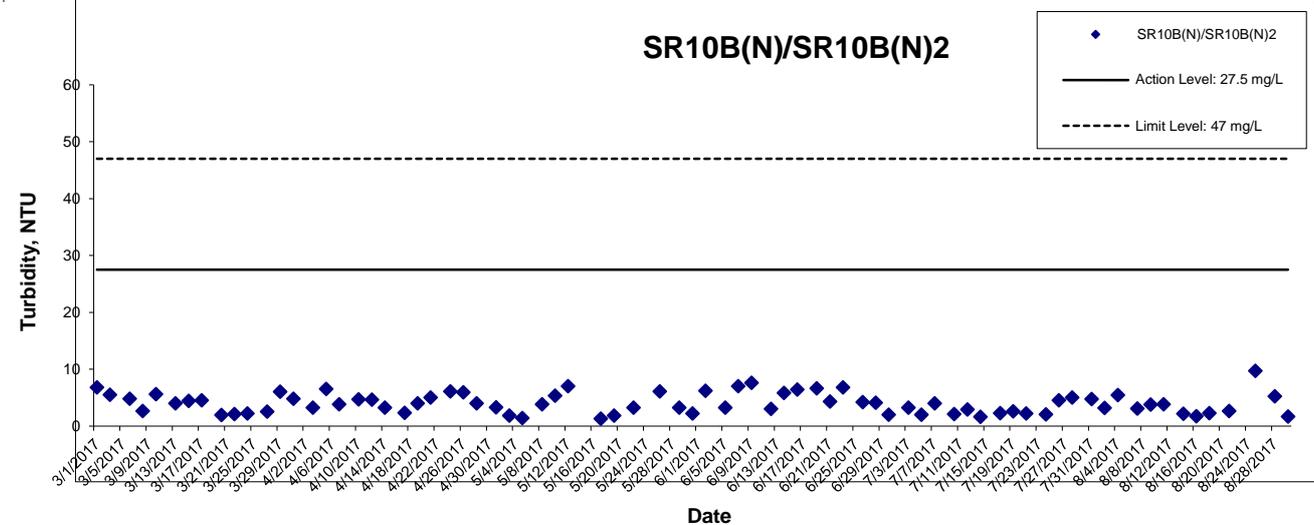
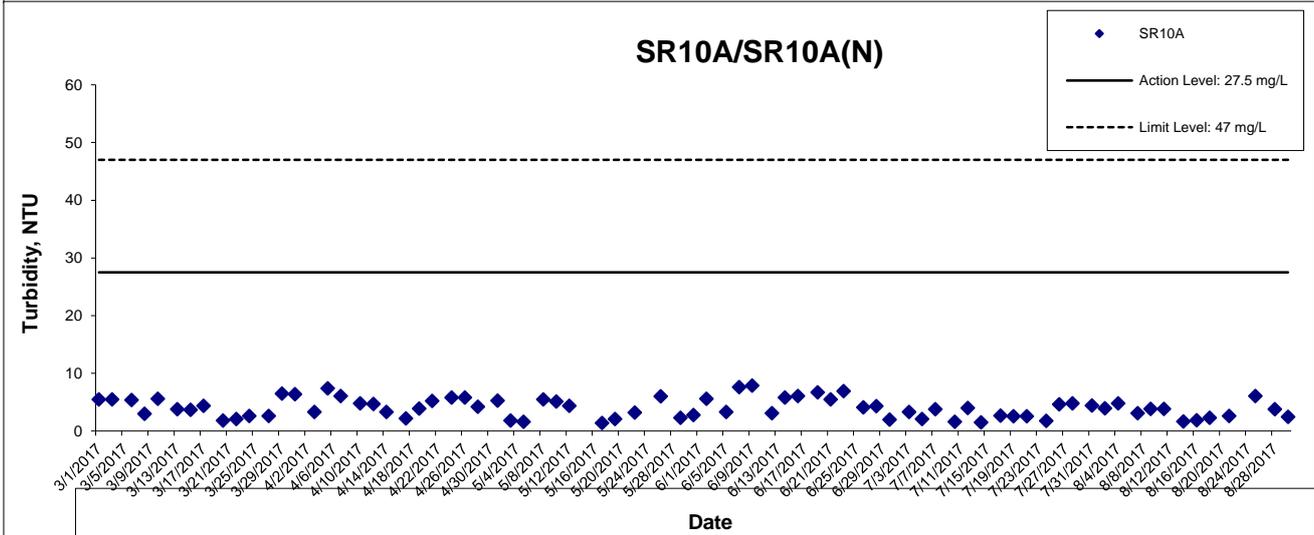
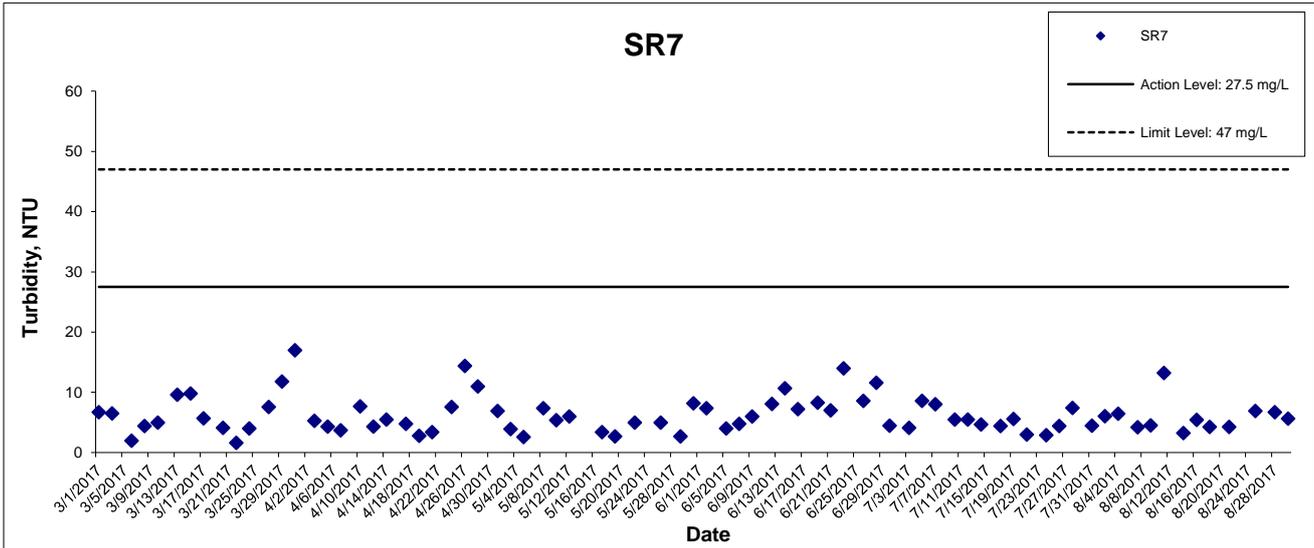
- RECLAMATION WORKS

### Graphical Presentation of Impact Water Quality Monitoring Results



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**HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
 Monitoring Results**



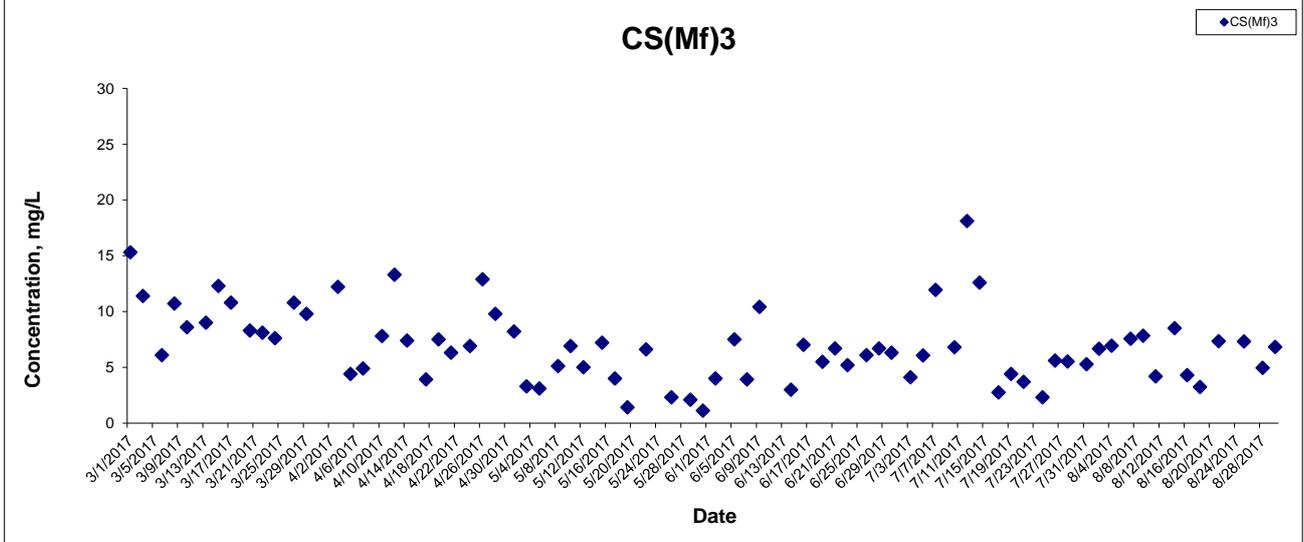
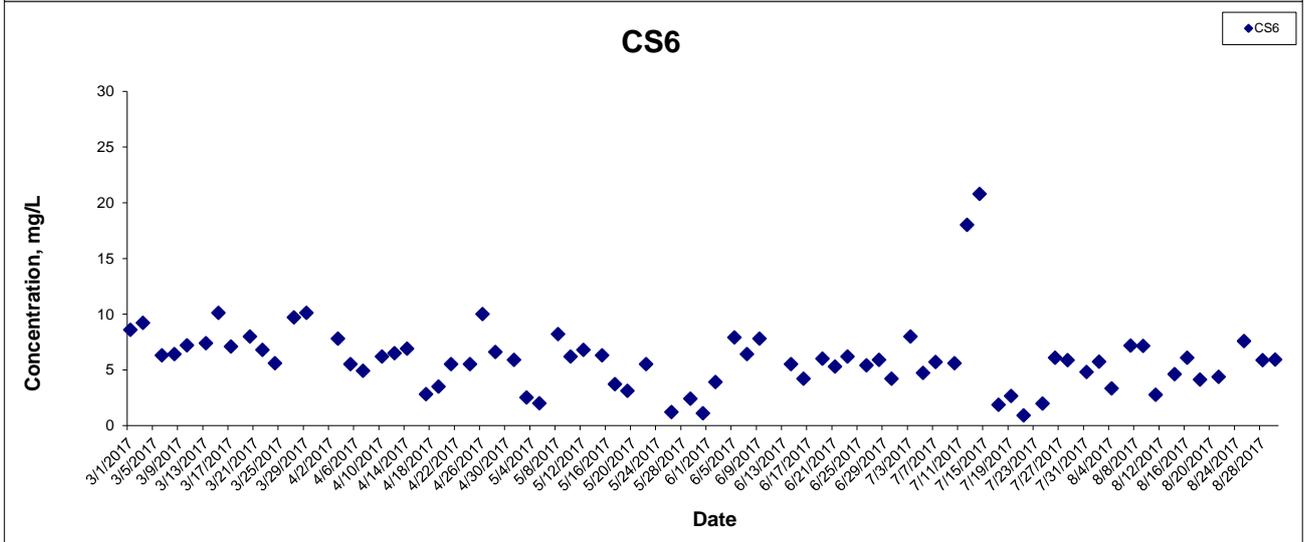
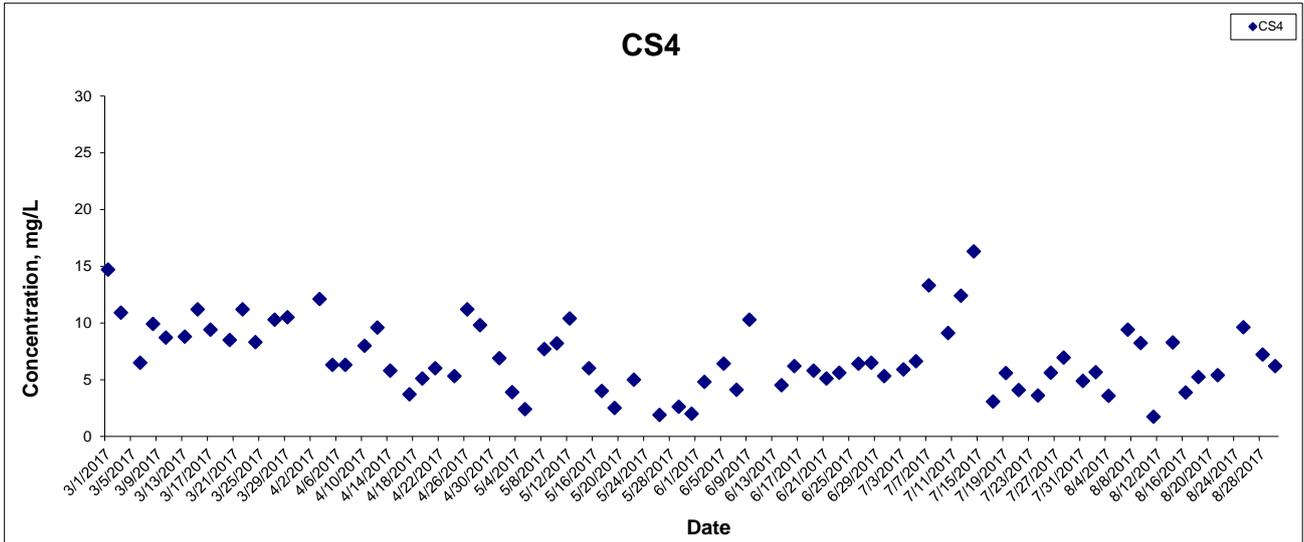
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**Project No.: 60249820**

**Date: April 2018**

**Appendix G**

## Suspended Solids at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality  
Monitoring Results



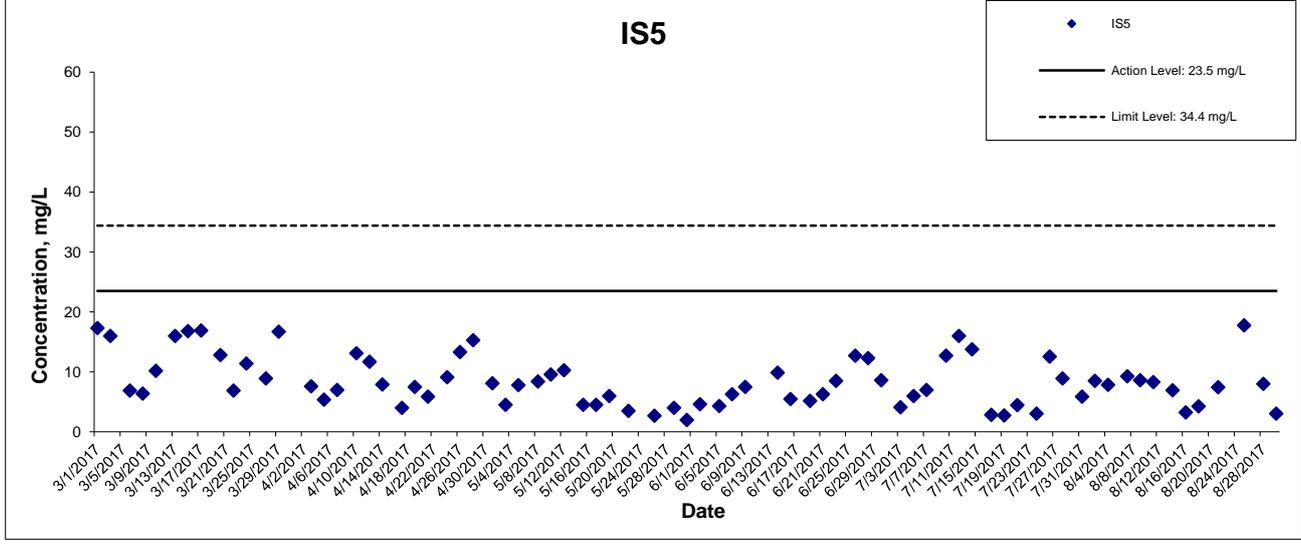
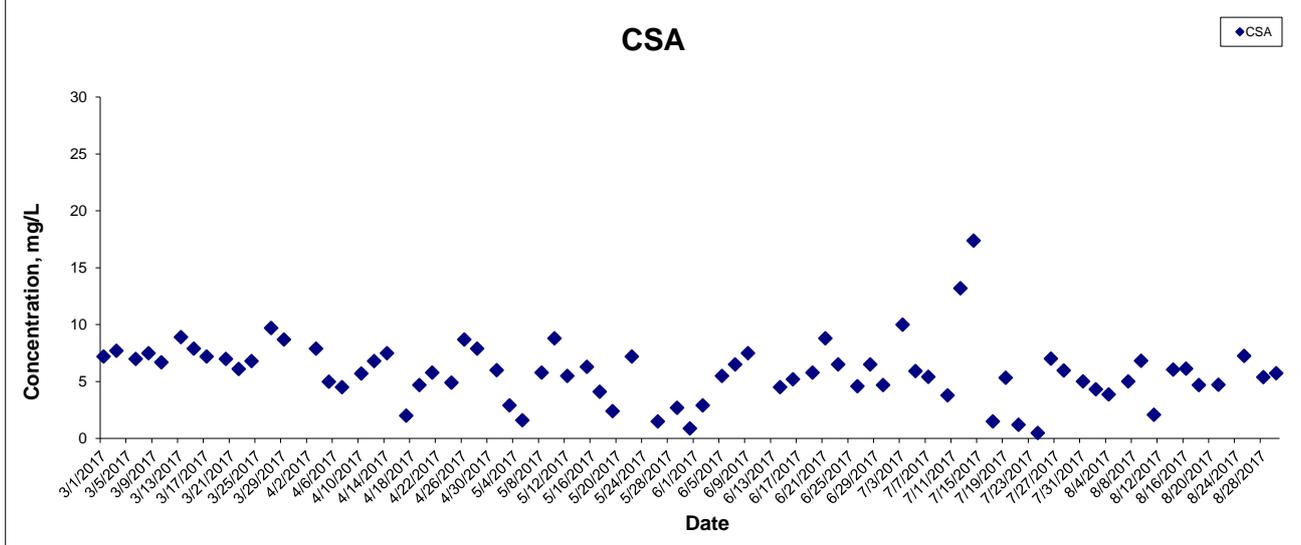
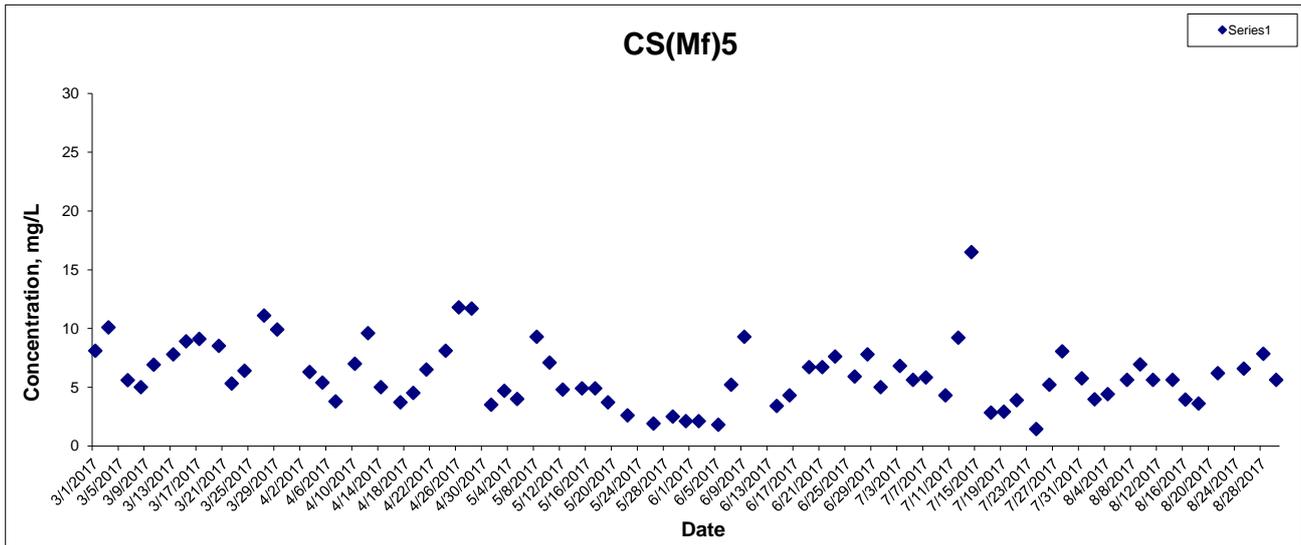
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Project No.: 60249820

Date: April 2018

Appendix G

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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



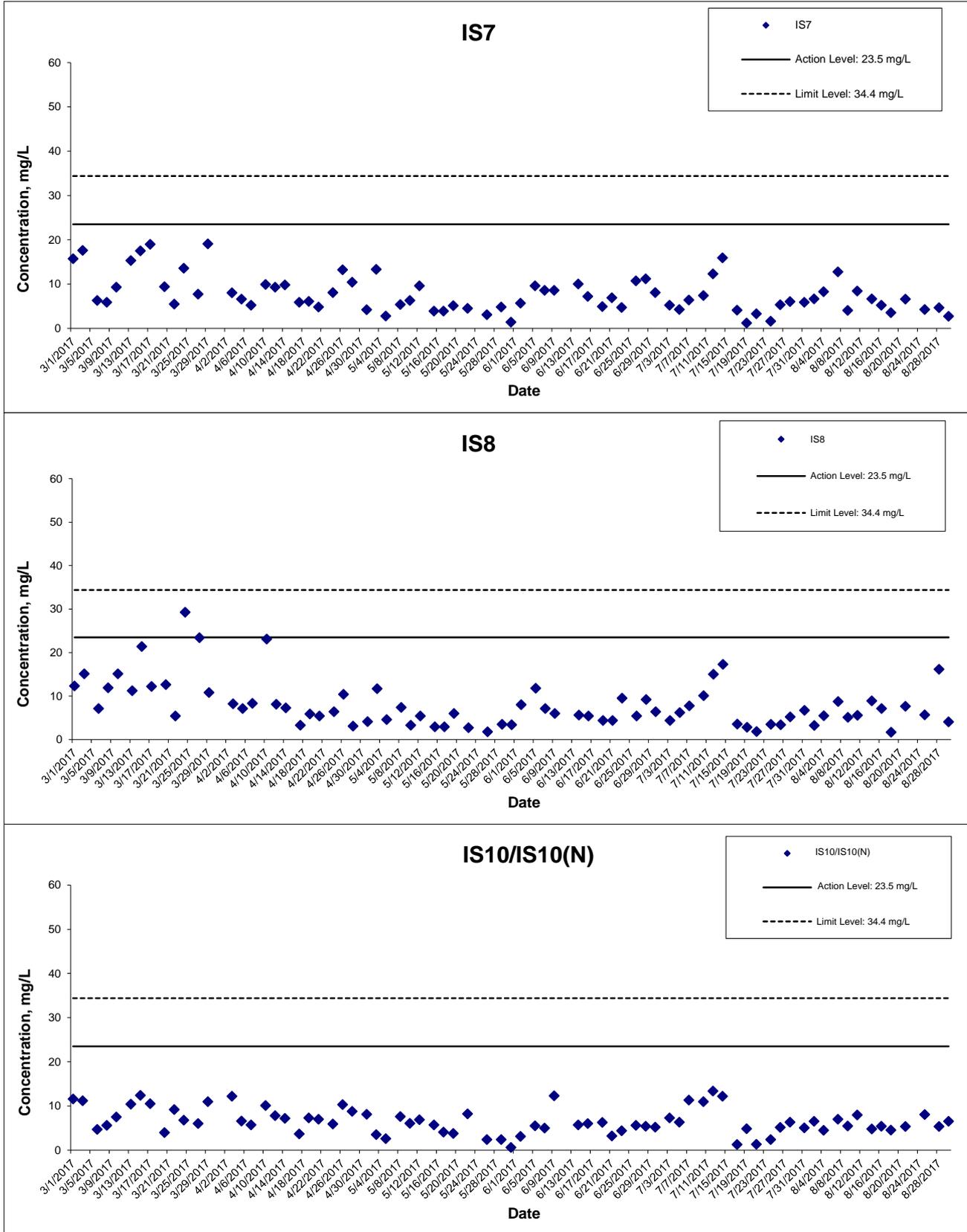
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**HONG KONG - ZHUHAI - MACAO BRIDGE  
HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

### Graphical Presentation of Impact Water Quality Monitoring Results



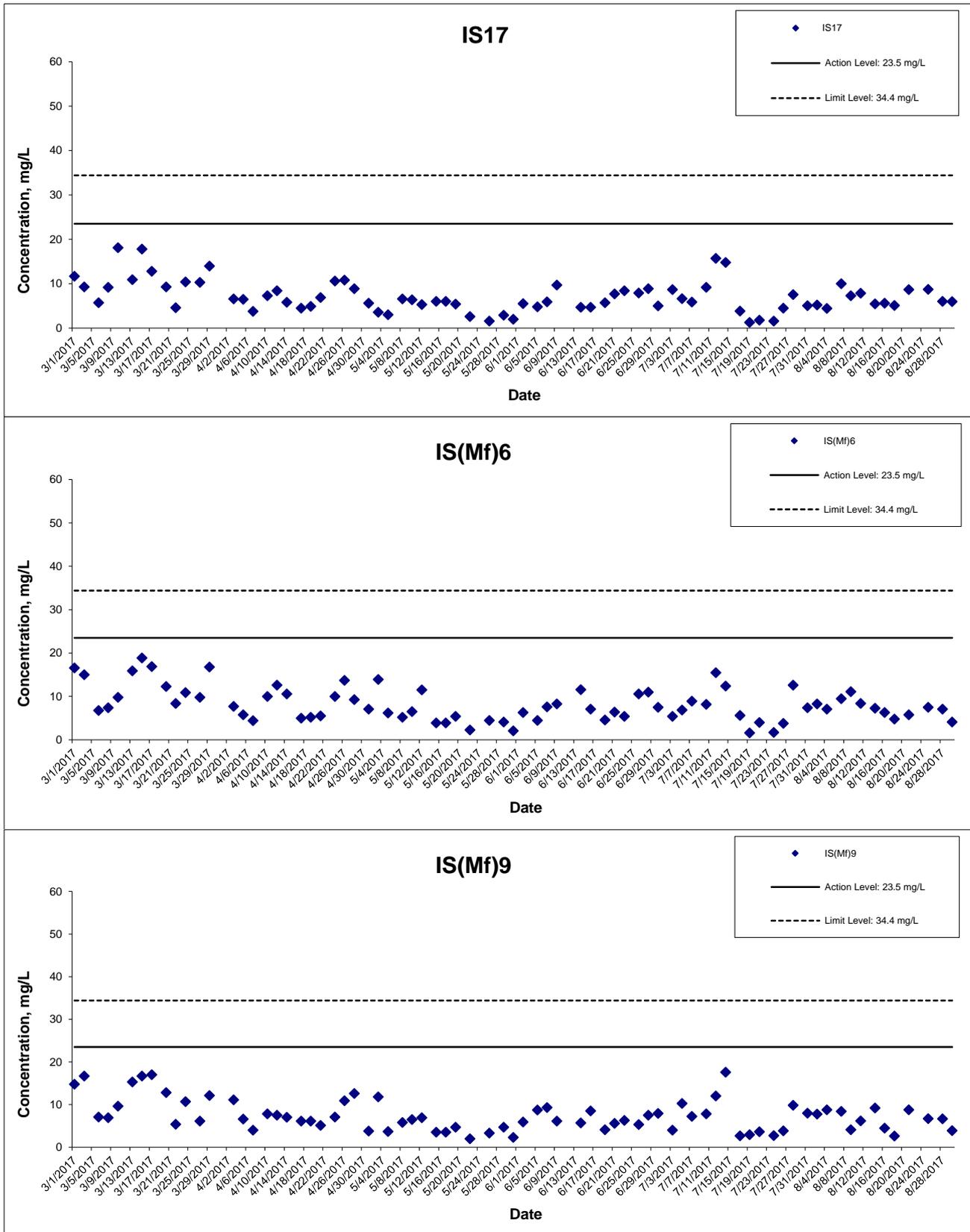
\*Water quality monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building effective since 1 September 2017.

Project No.: 60249820

Date: April 2018

Appendix G

## Suspended Solids at Mid-Ebb Tide



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HONG KONG - ZHUHAI - MACAO BRIDGE

HONG KONG BOUNDARY CROSSING FACILITIES

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Graphical Presentation of Impact Water Quality  
Monitoring Results



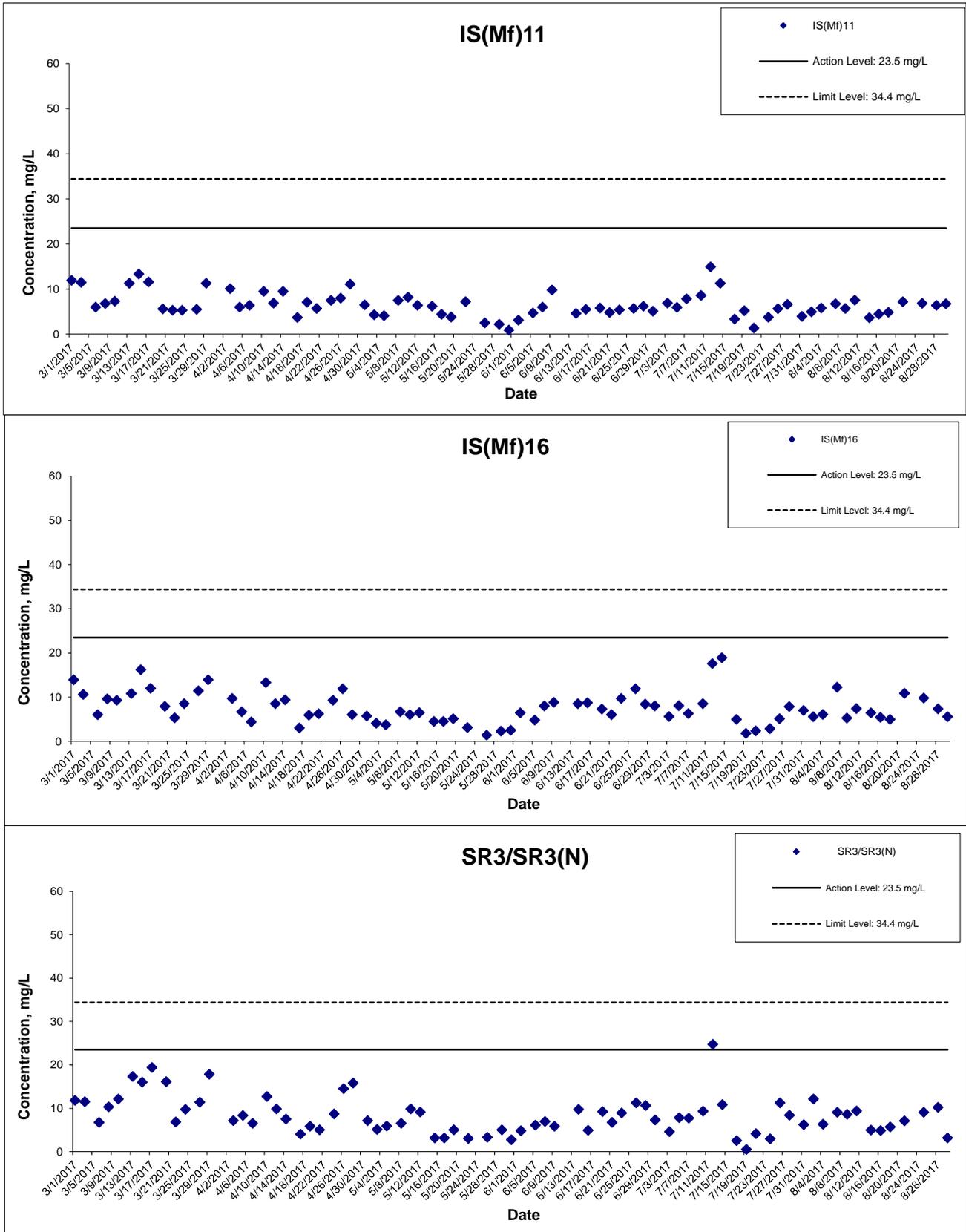
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Monitoring Results



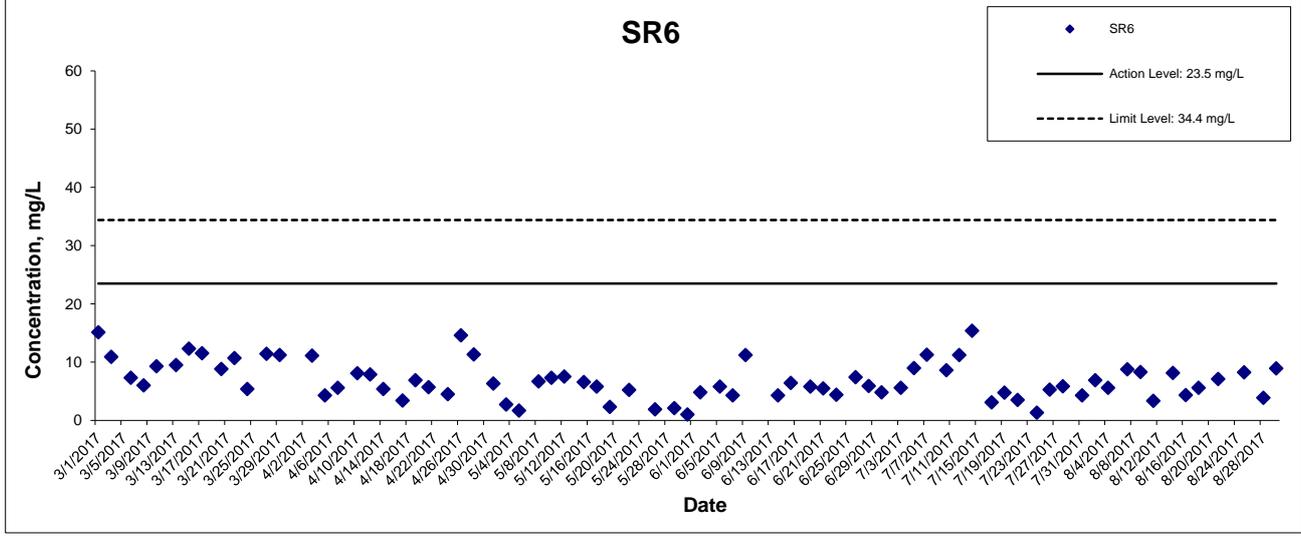
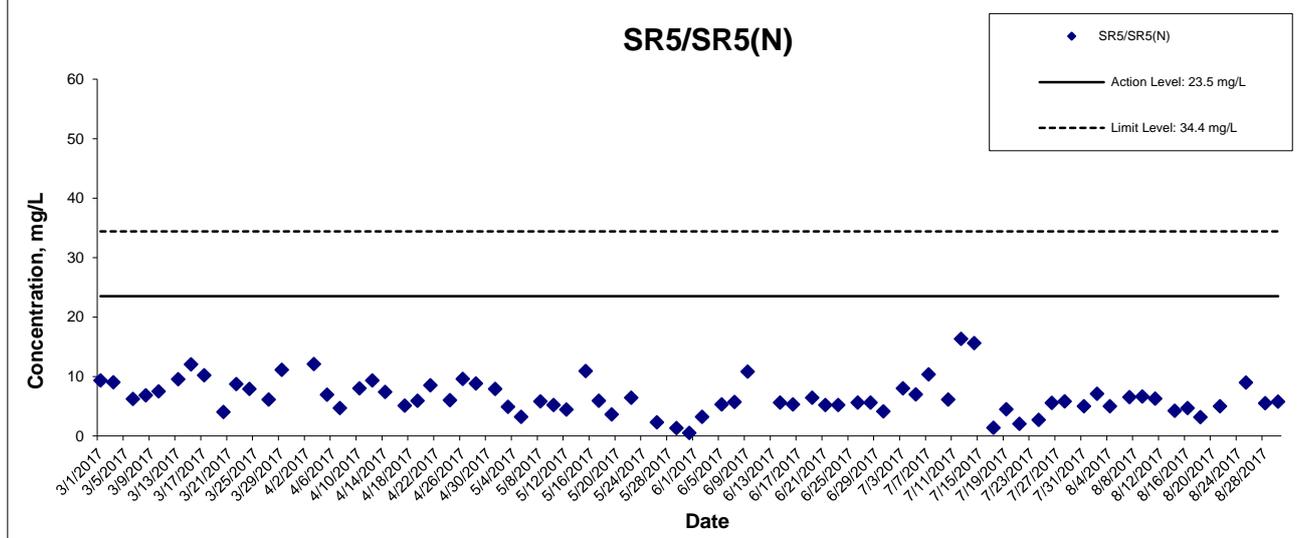
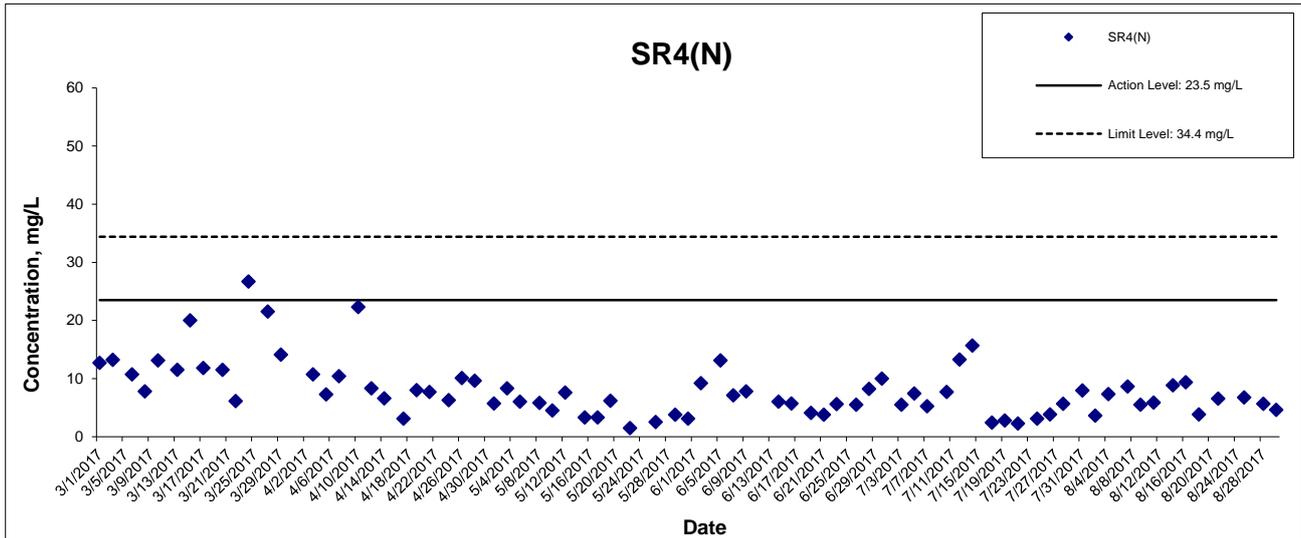
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HONG KONG BOUNDARY CROSSING FACILITIES  
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**Graphical Presentation of Impact Water Quality  
Monitoring Results**



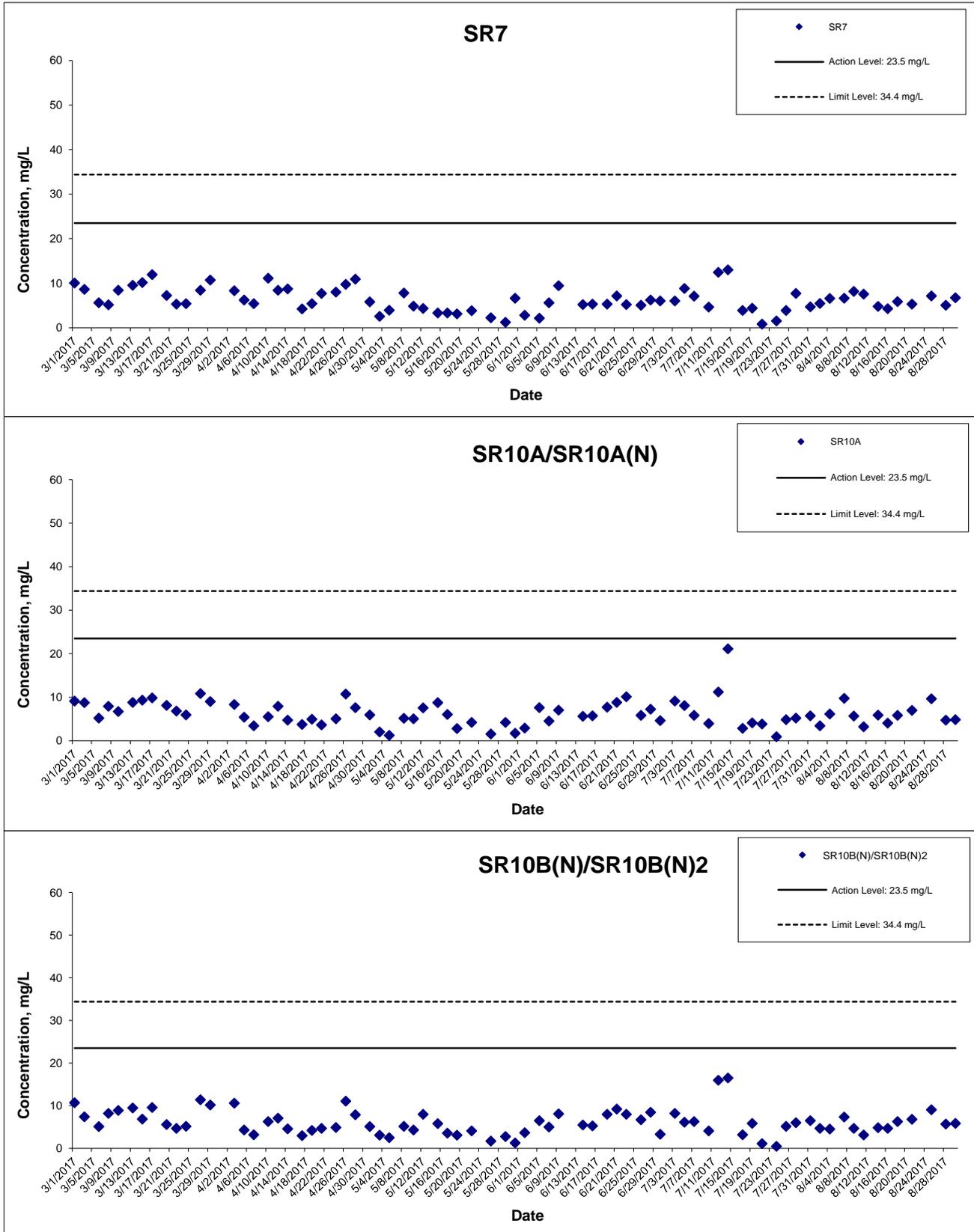
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Graphical Presentation of Impact Water Quality  
Monitoring Results



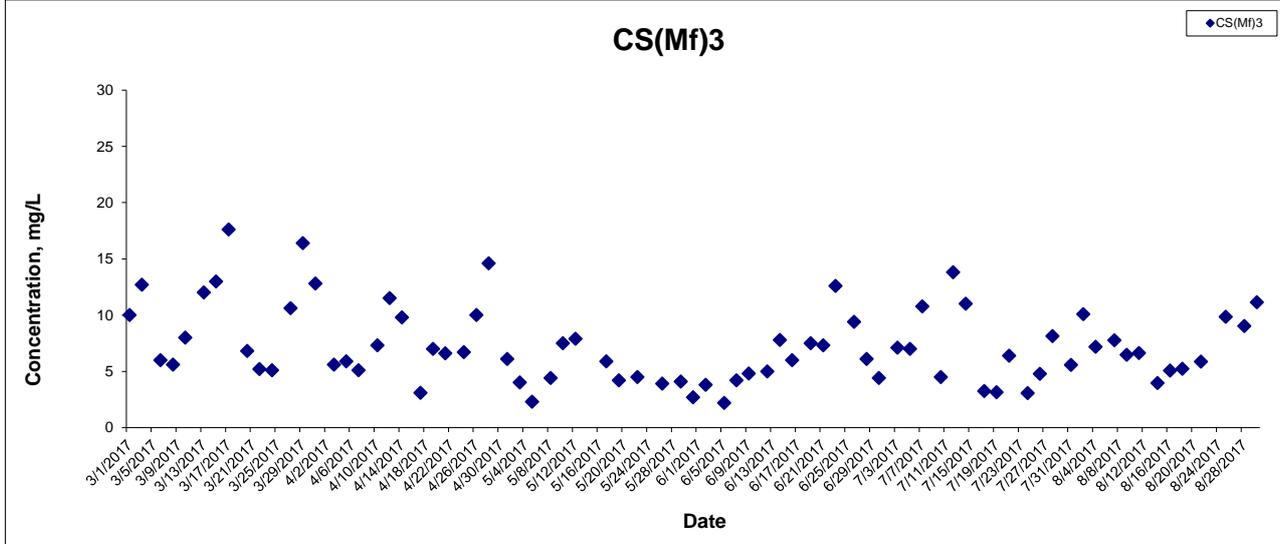
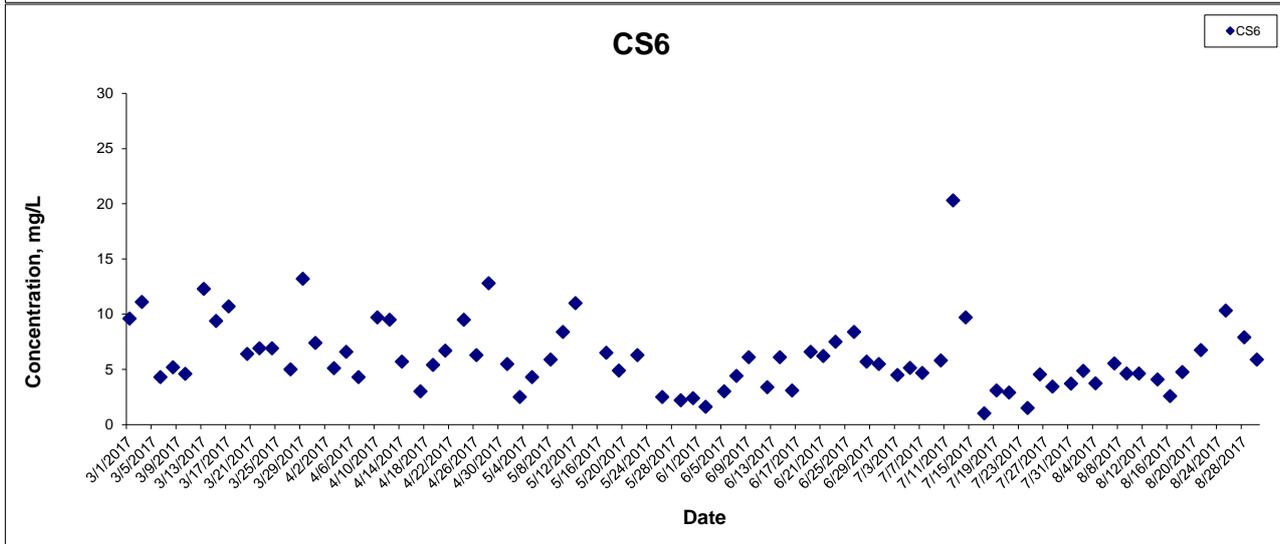
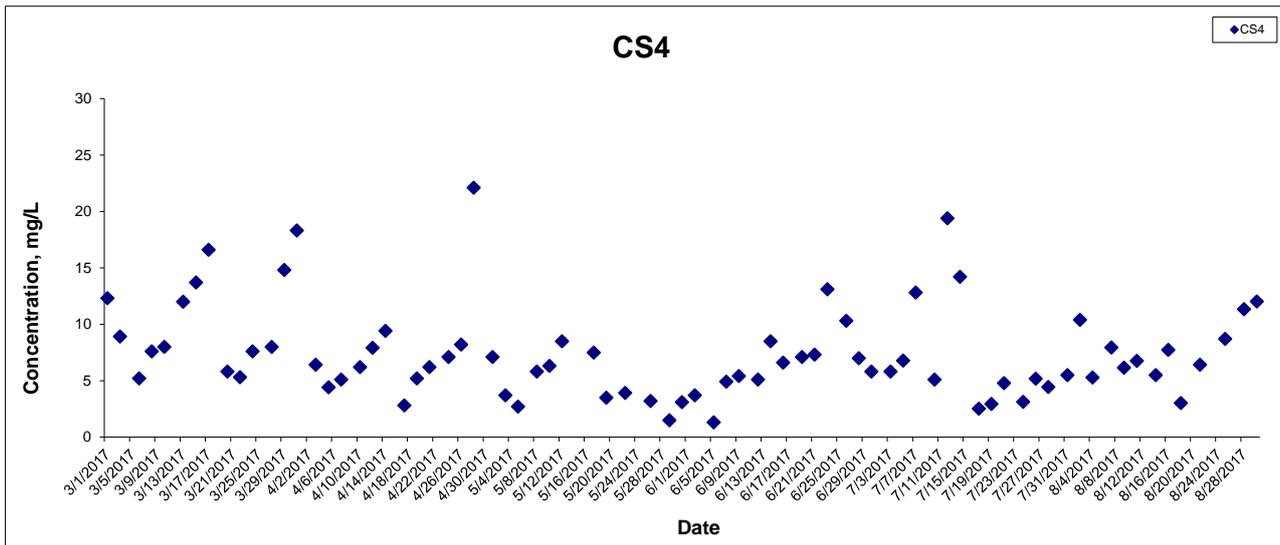
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## Suspended Solids at Mid-Flood Tide



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 HONG KONG BOUNDARY CROSSING FACILITIES  
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### Graphical Presentation of Impact Water Quality Monitoring Results



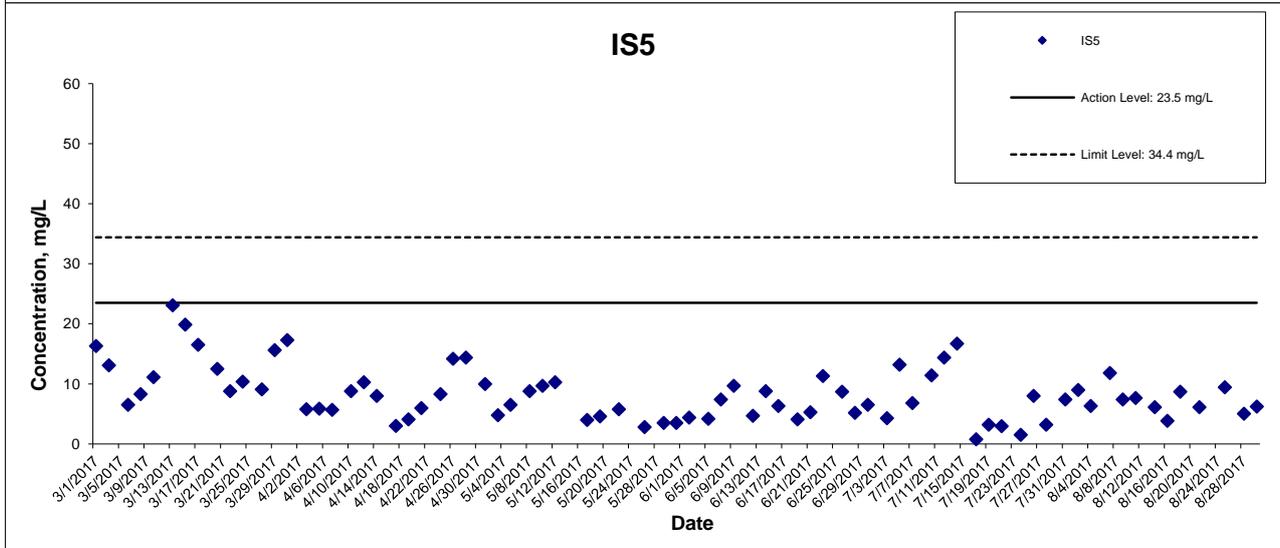
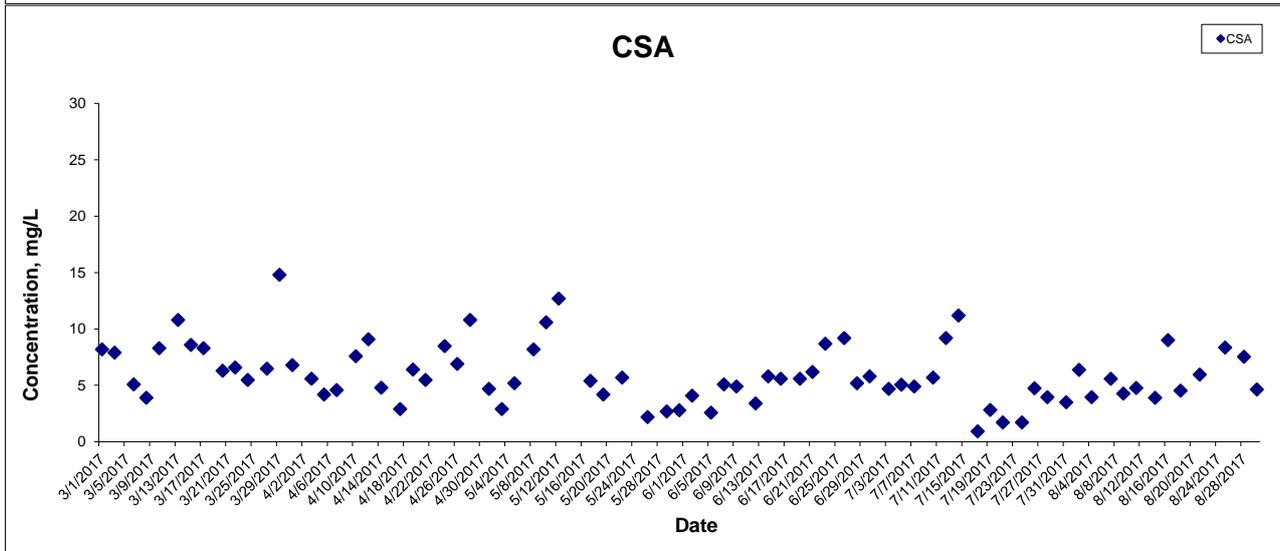
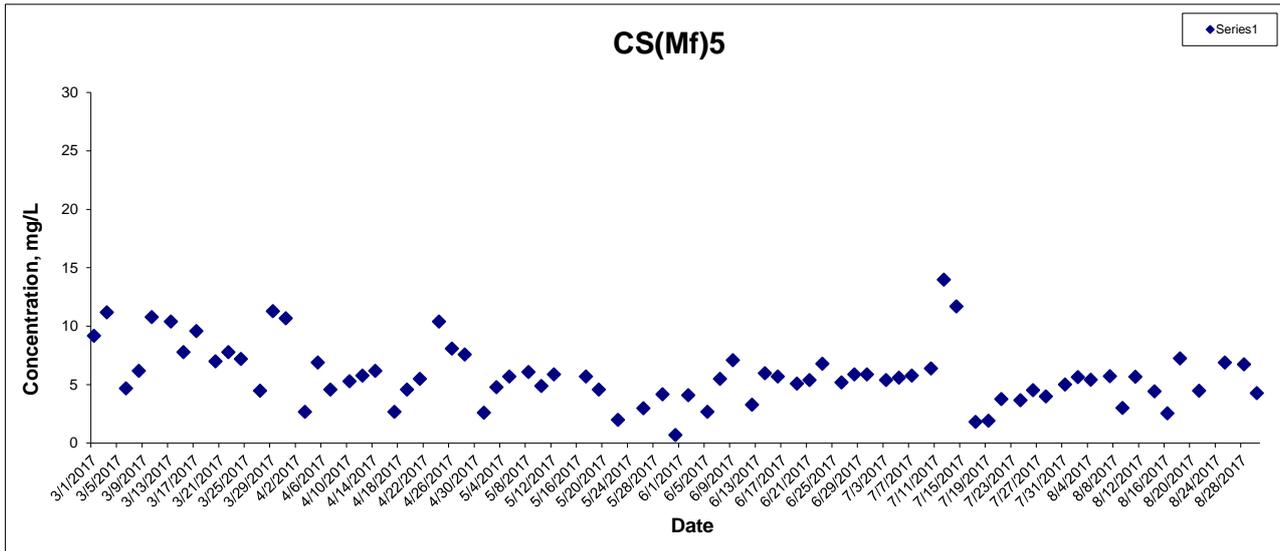
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## Suspended Solids at Mid-Flood Tide



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HONG KONG BOUNDARY CROSSING FACILITIES  
- RECLAMATION WORKS**

### Graphical Presentation of Impact Water Quality Monitoring Results



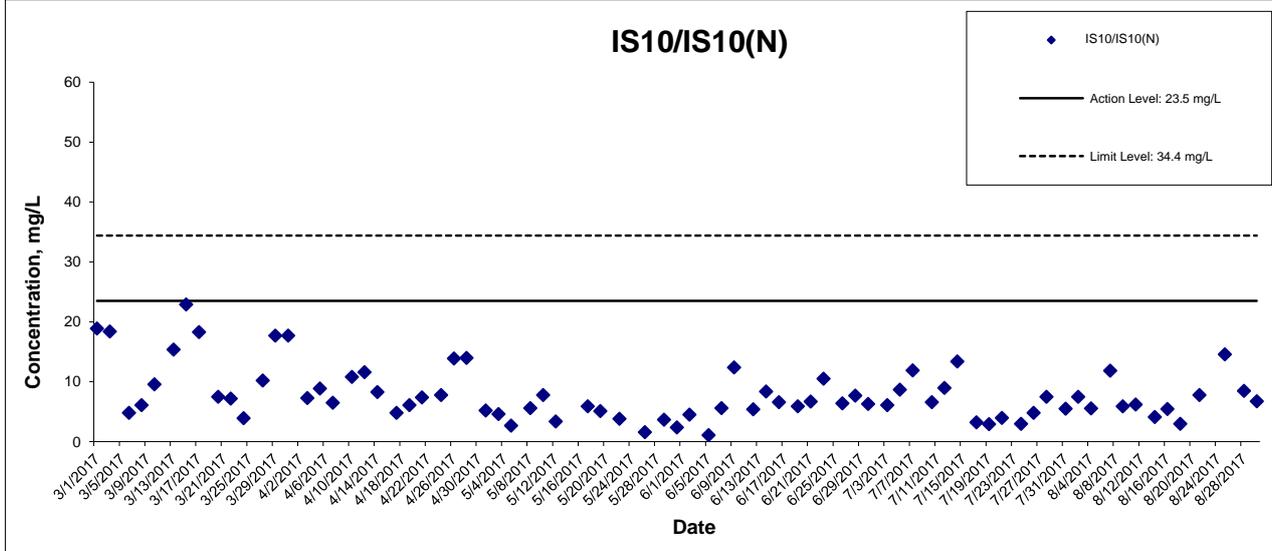
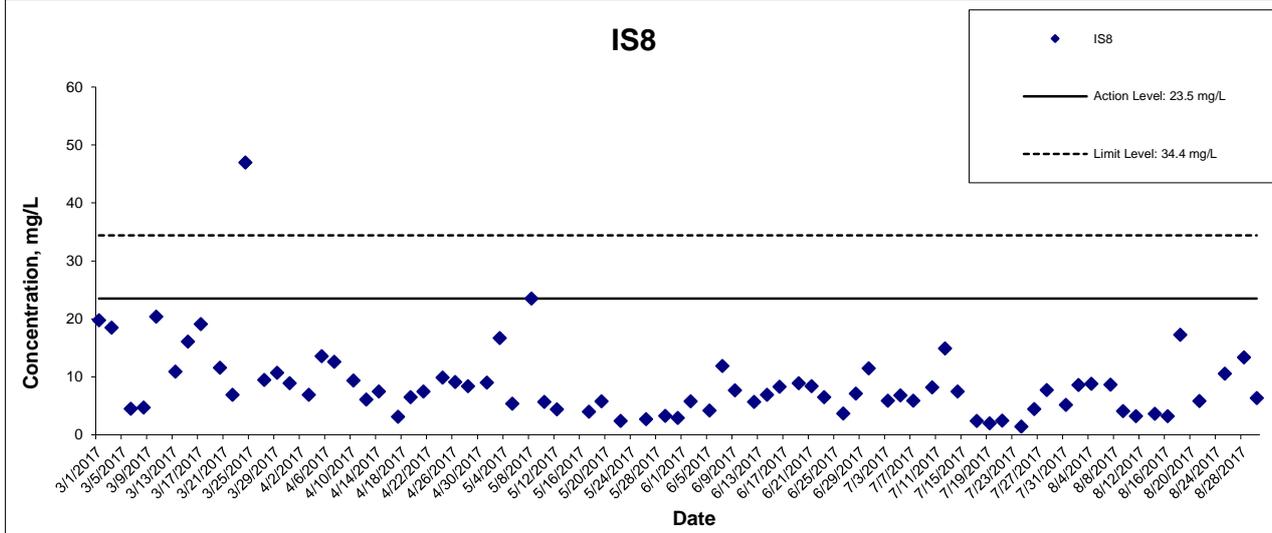
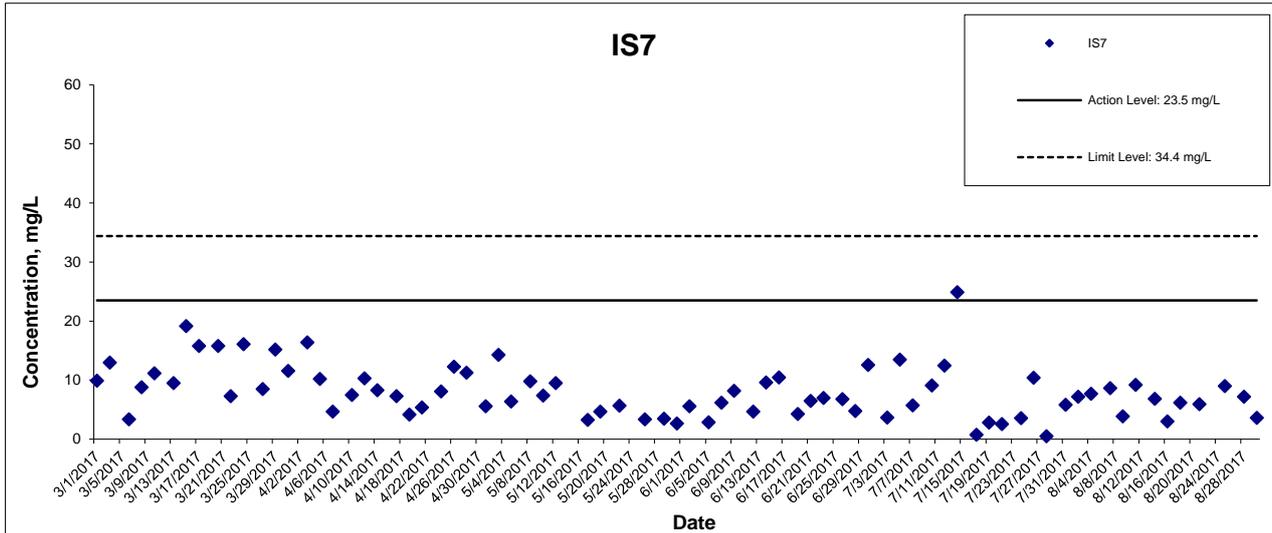
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**Appendix G**

## Suspended Solids at Mid-Flood Tide



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**HONG KONG BOUNDARY CROSSING FACILITIES**

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### Graphical Presentation of Impact Water Quality Monitoring Results



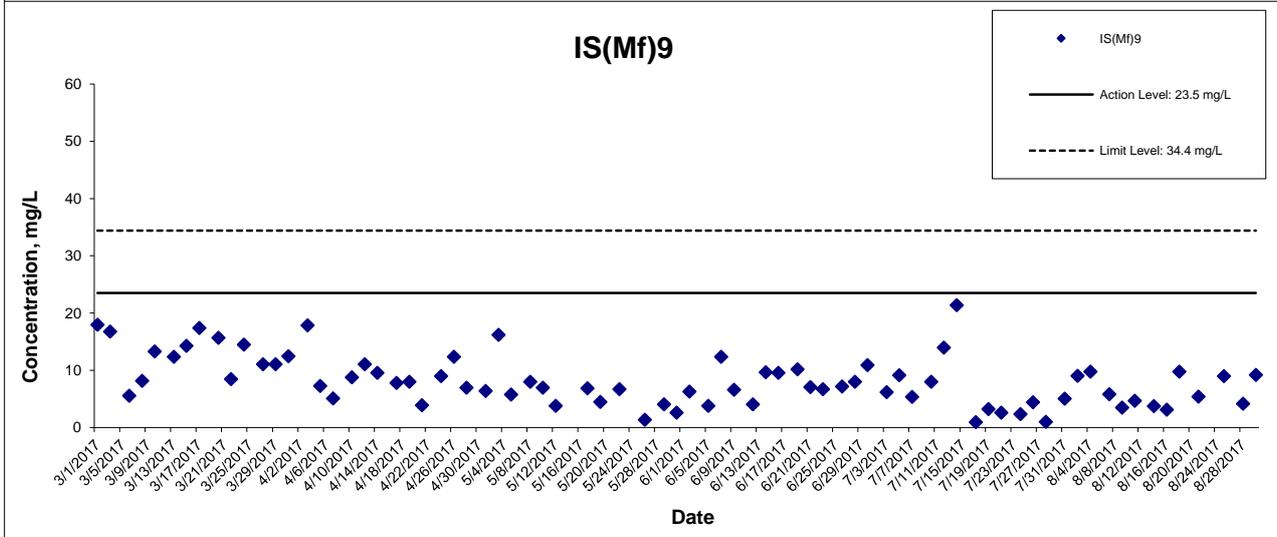
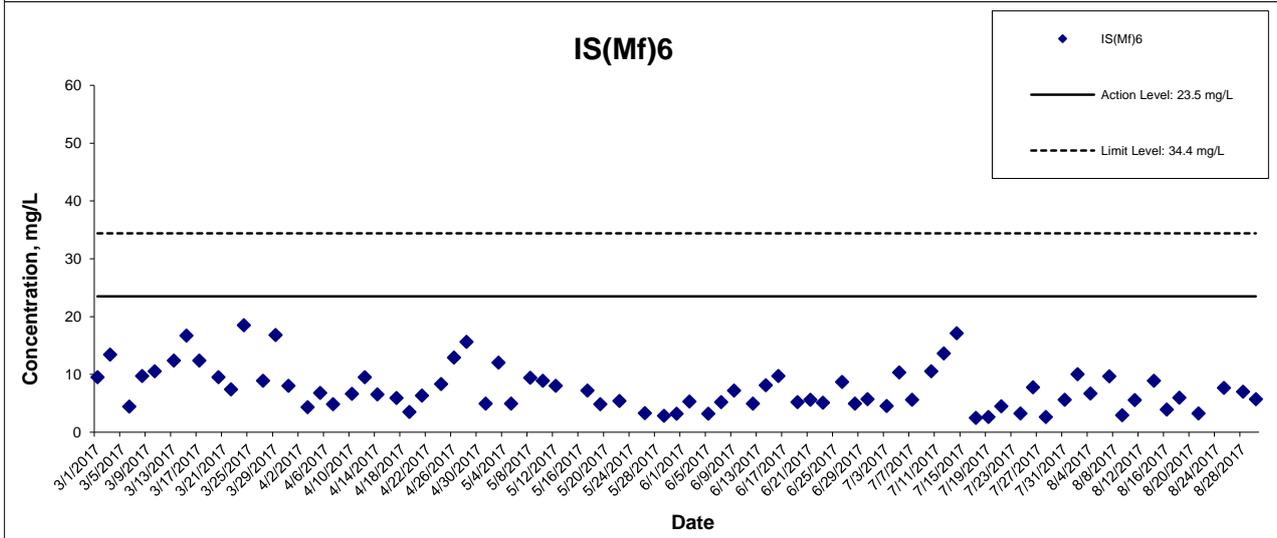
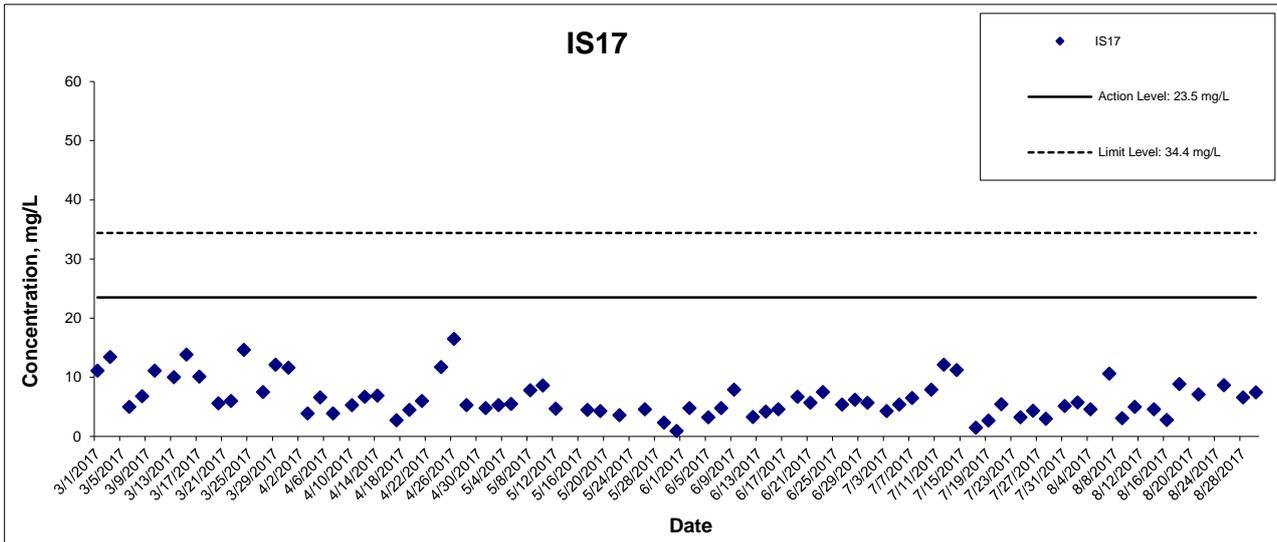
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## Suspended Solids at Mid-Flood Tide



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HONG KONG BOUNDARY CROSSING FACILITIES  
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**Graphical Presentation of Impact Water Quality  
Monitoring Results**



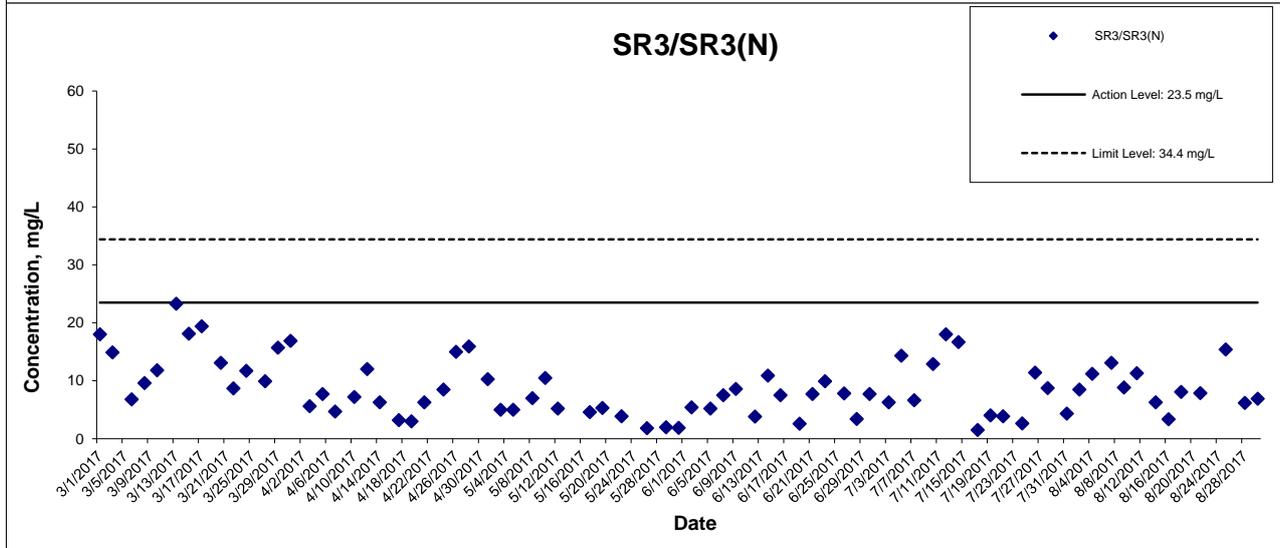
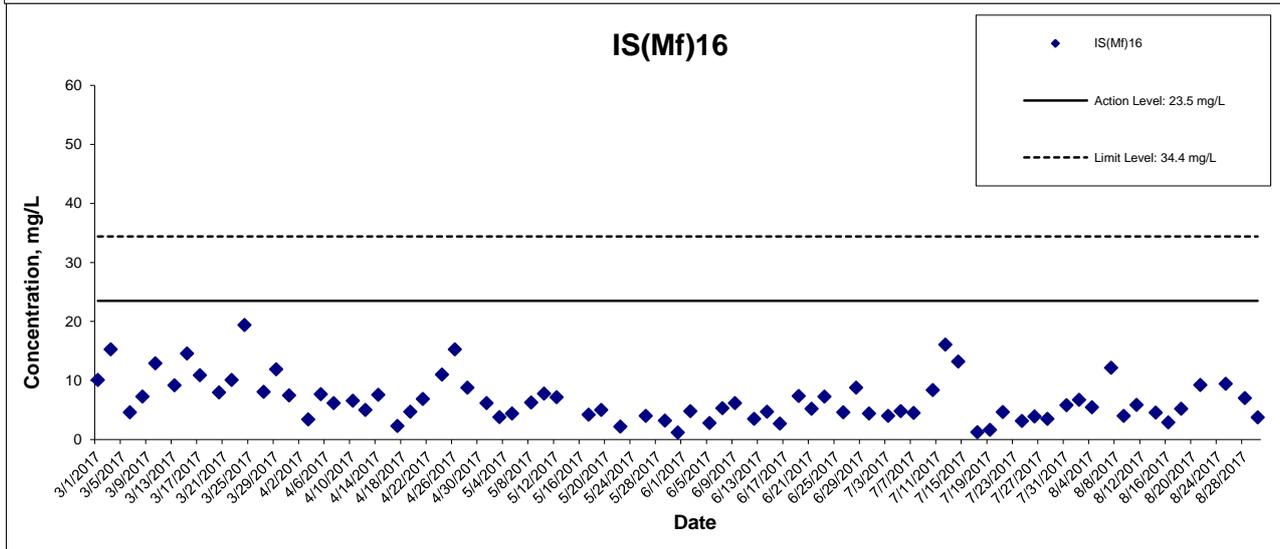
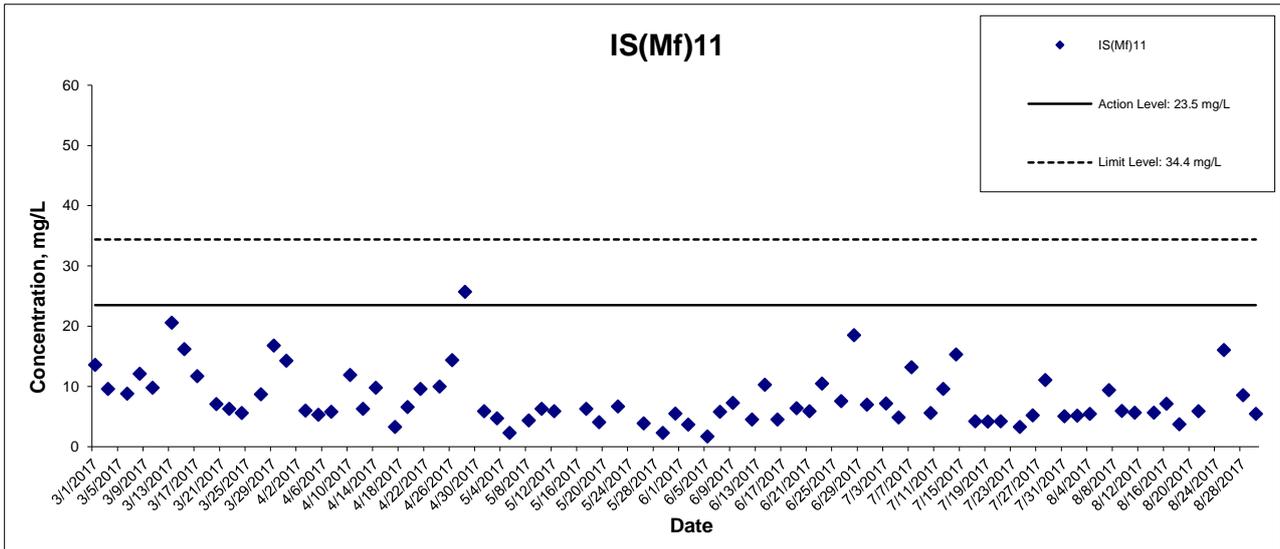
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 HONG KONG BOUNDARY CROSSING FACILITIES  
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### Graphical Presentation of Impact Water Quality Monitoring Results



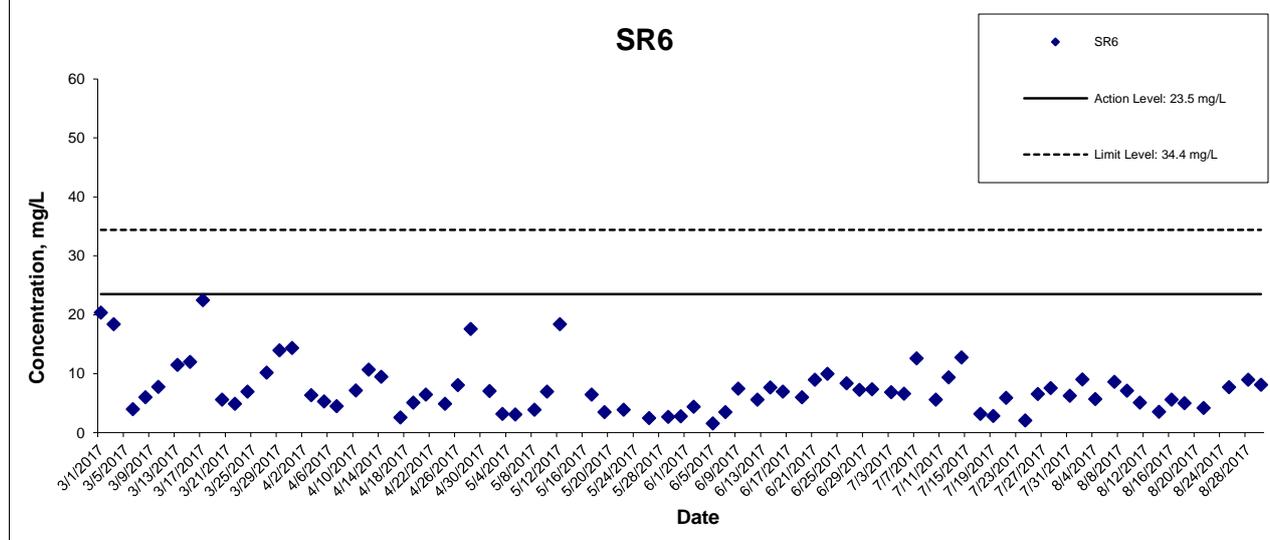
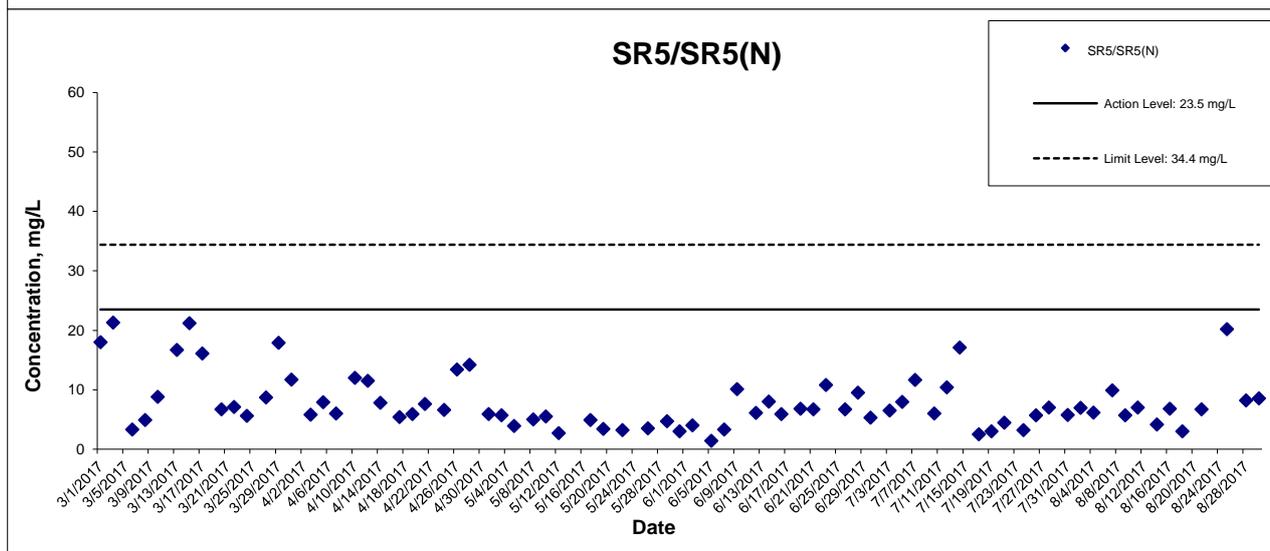
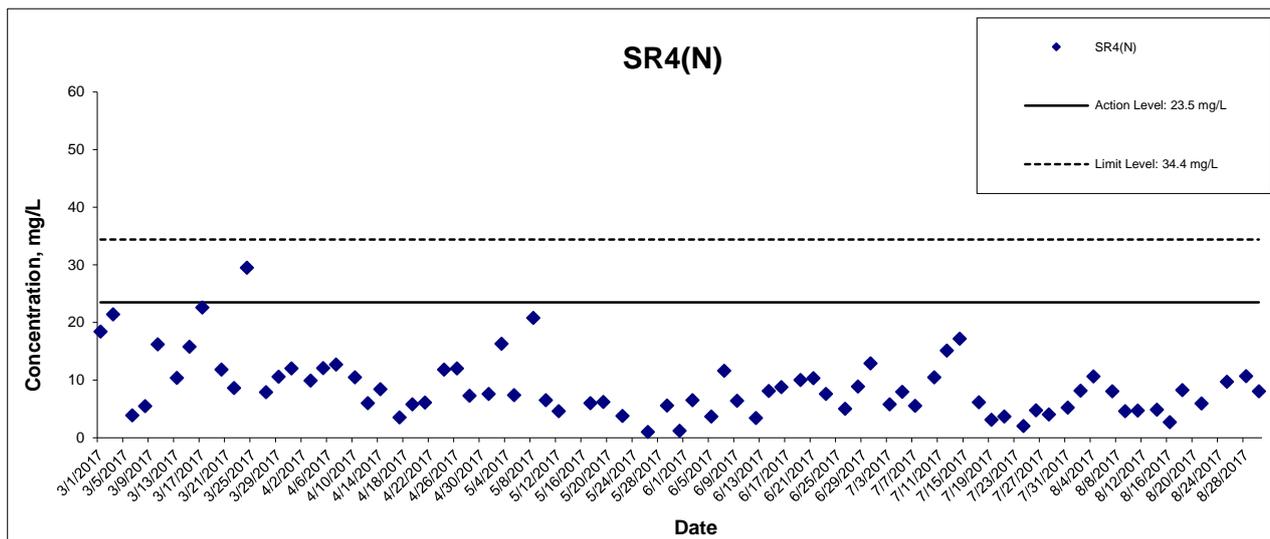
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## Suspended Solids at Mid-Flood Tide



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**Graphical Presentation of Impact Water Quality  
 Monitoring Results**



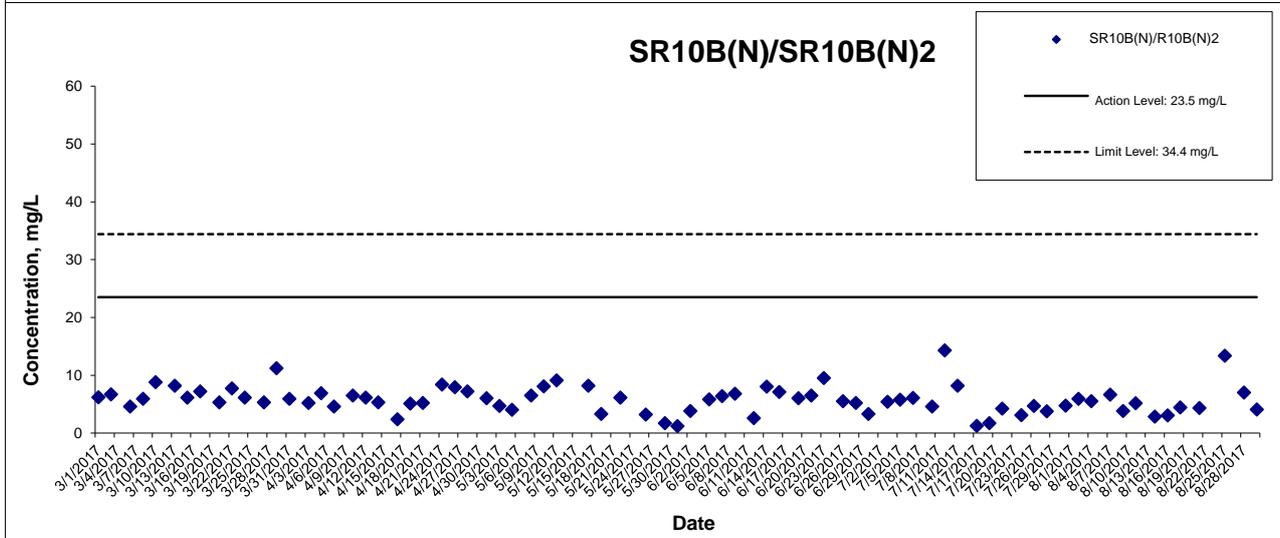
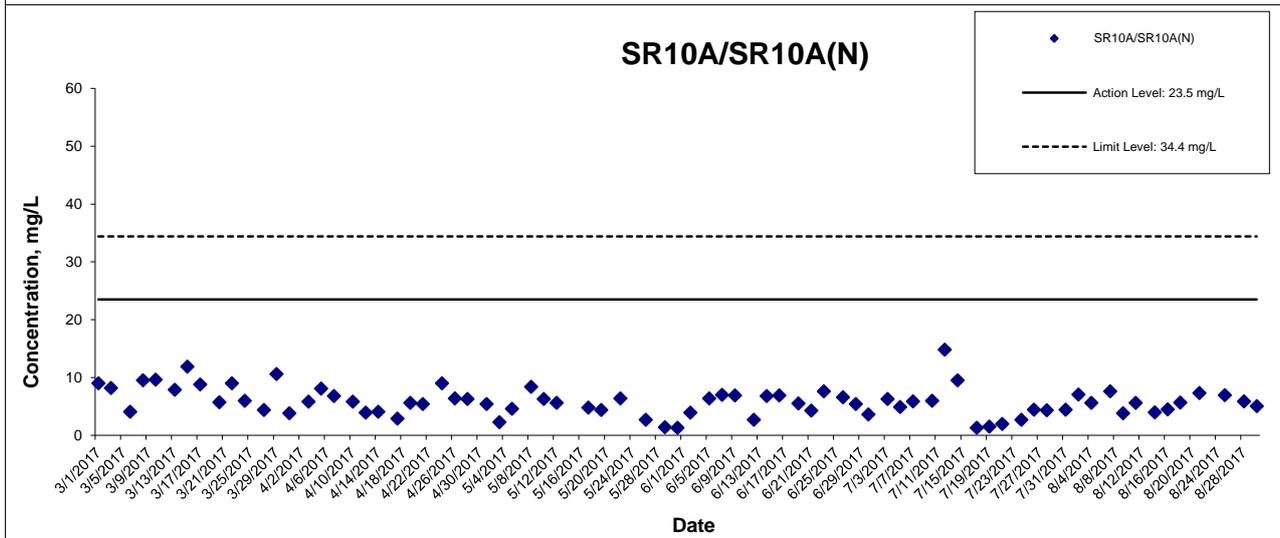
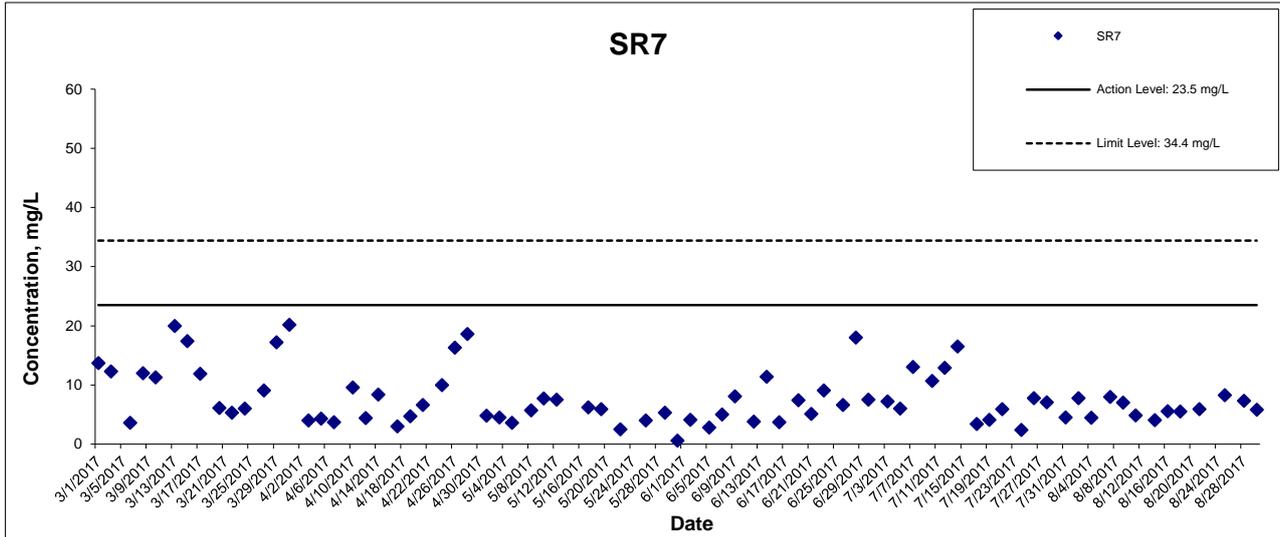
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**Appendix G**

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- RECLAMATION WORKS**

**Graphical Presentation of Impact Water Quality  
Monitoring Results**



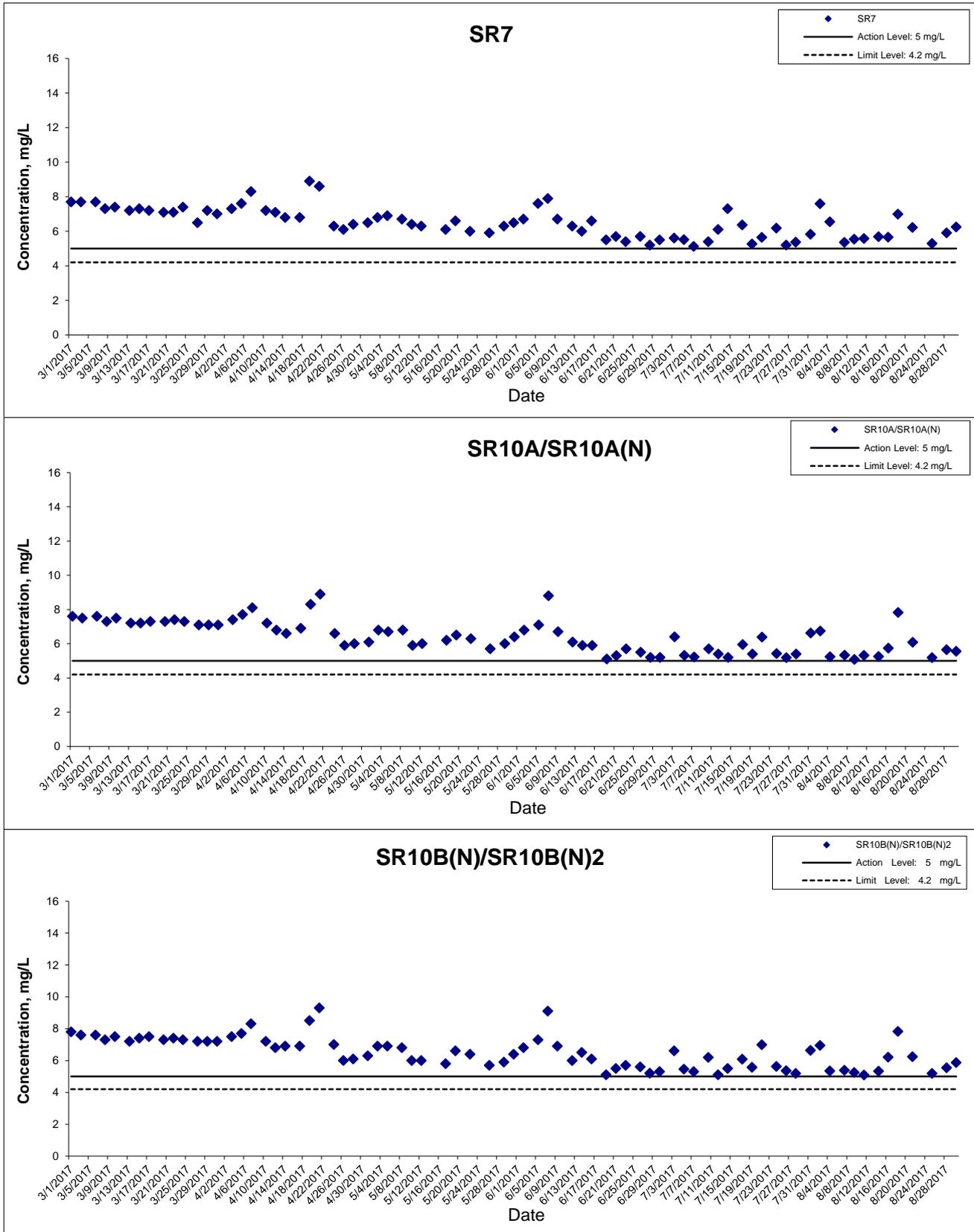
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Appendix G

## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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**HONG KONG - ZHUHAI - MACAO BRIDGE**

**HONG KONG BOUNDARY CROSSING FACILITIES**

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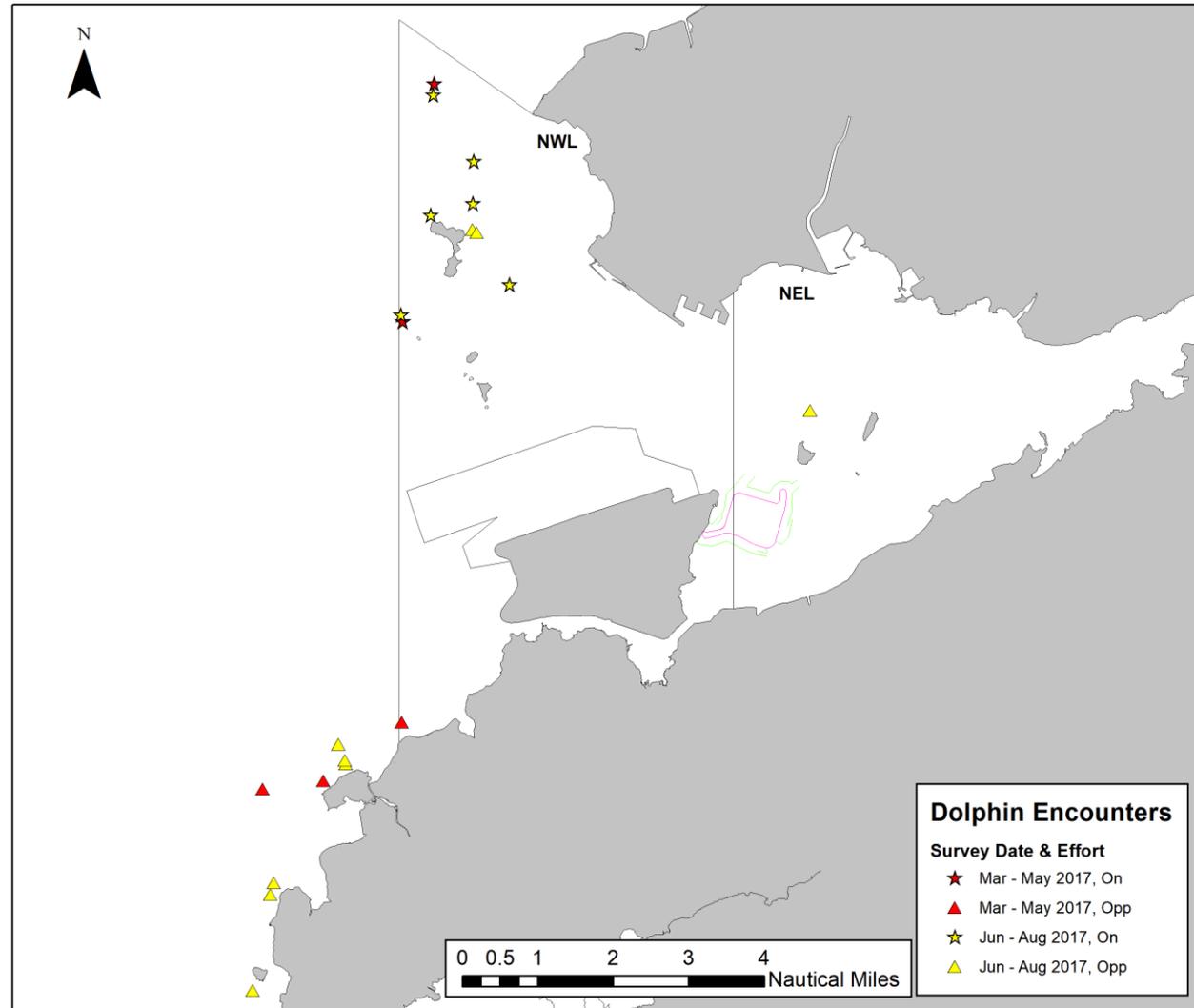
**Graphical Presentation of Impact Water Quality**

**Monitoring Results**

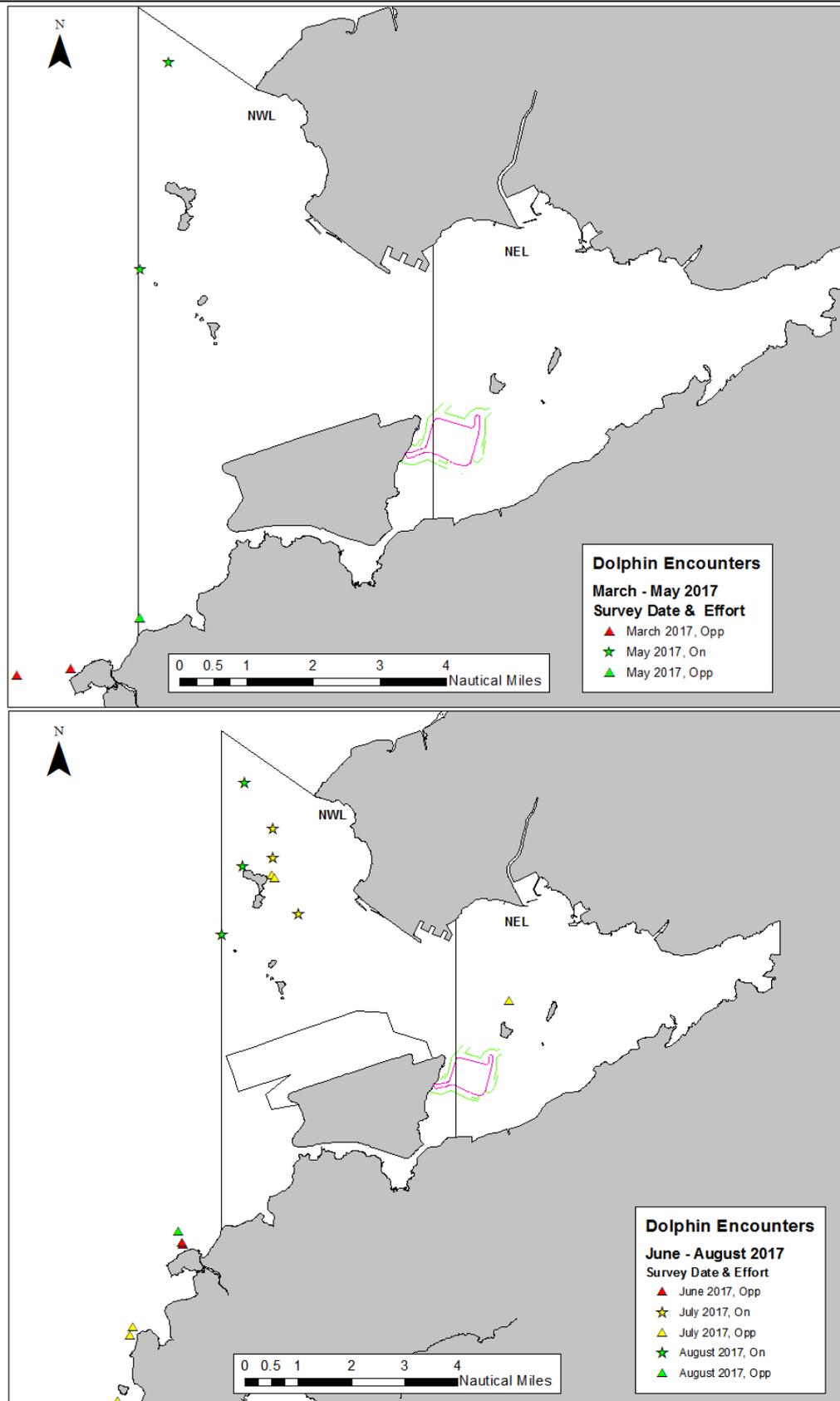
\*Water quality monitoring works for the Contract were covered by Contract No. HY/2013/01 Hong Kong-Zhuhai-Macao Bridge HKBCF – Passenger Clearance Building effective since 1 September 2017.



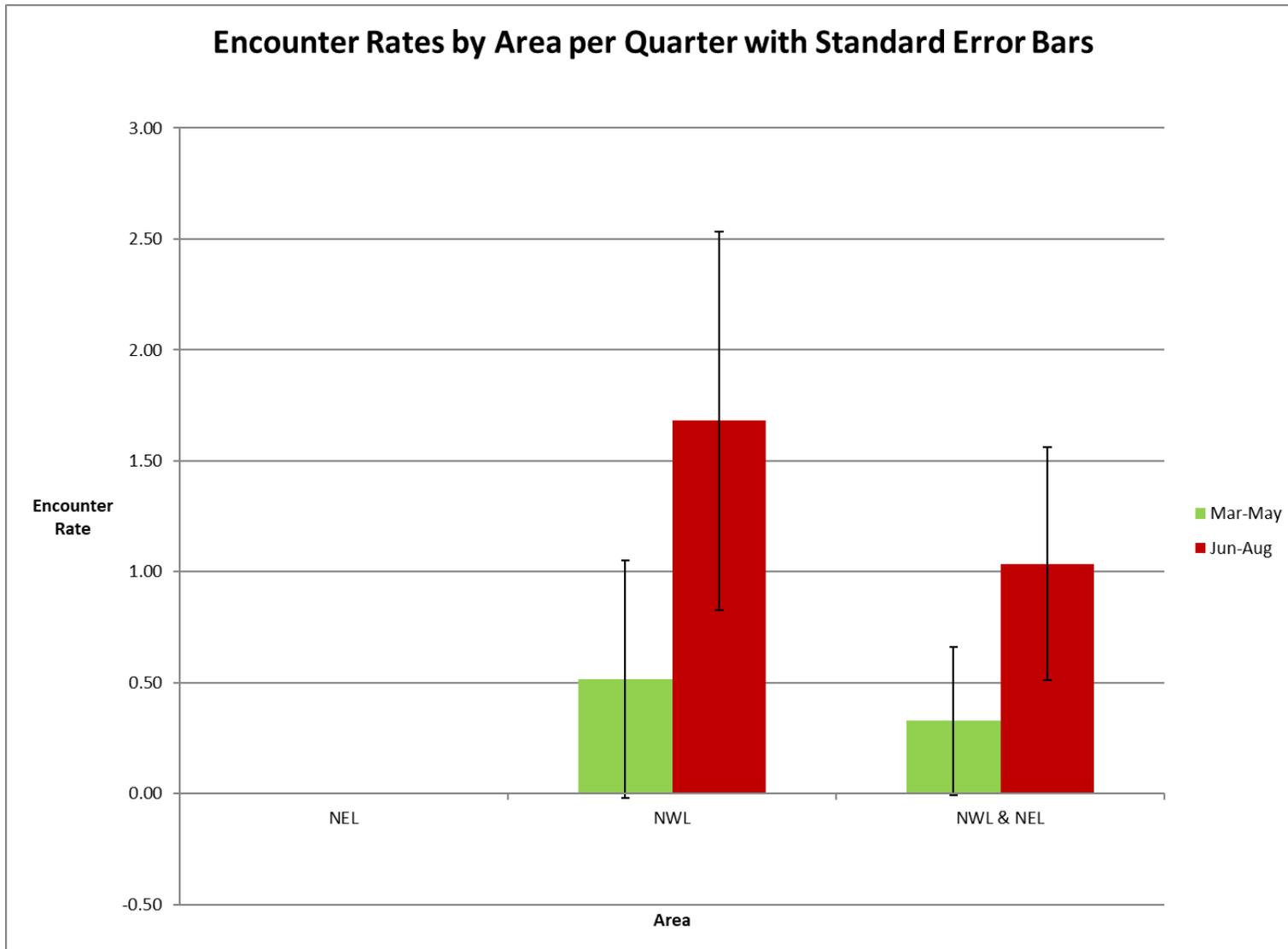
**Appendix H Impact Dolphin Monitoring Survey Findings and Analysis**



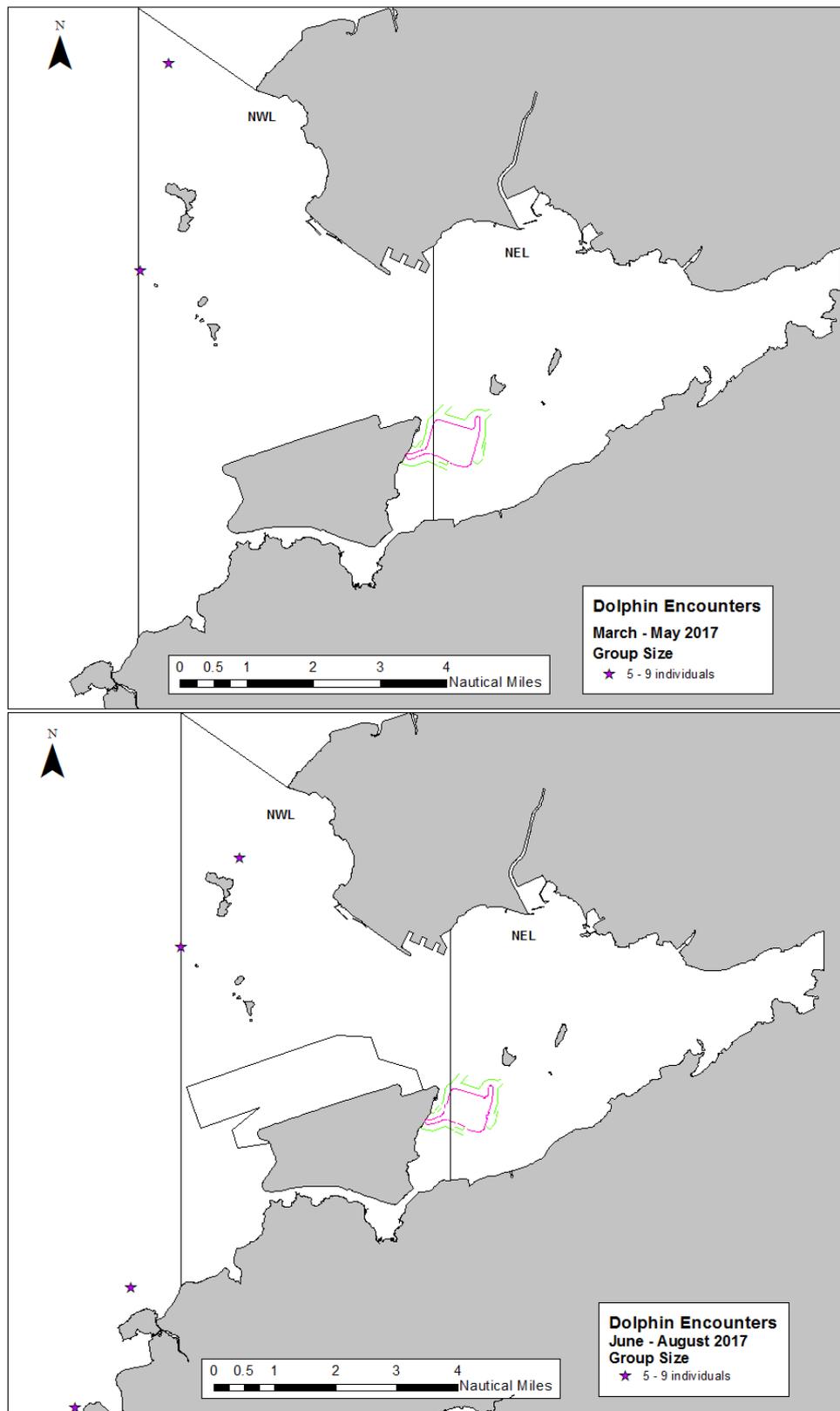
**Figure 1      Dolphin Sightings Recorded During Monitoring Surveys, March – August 2017**



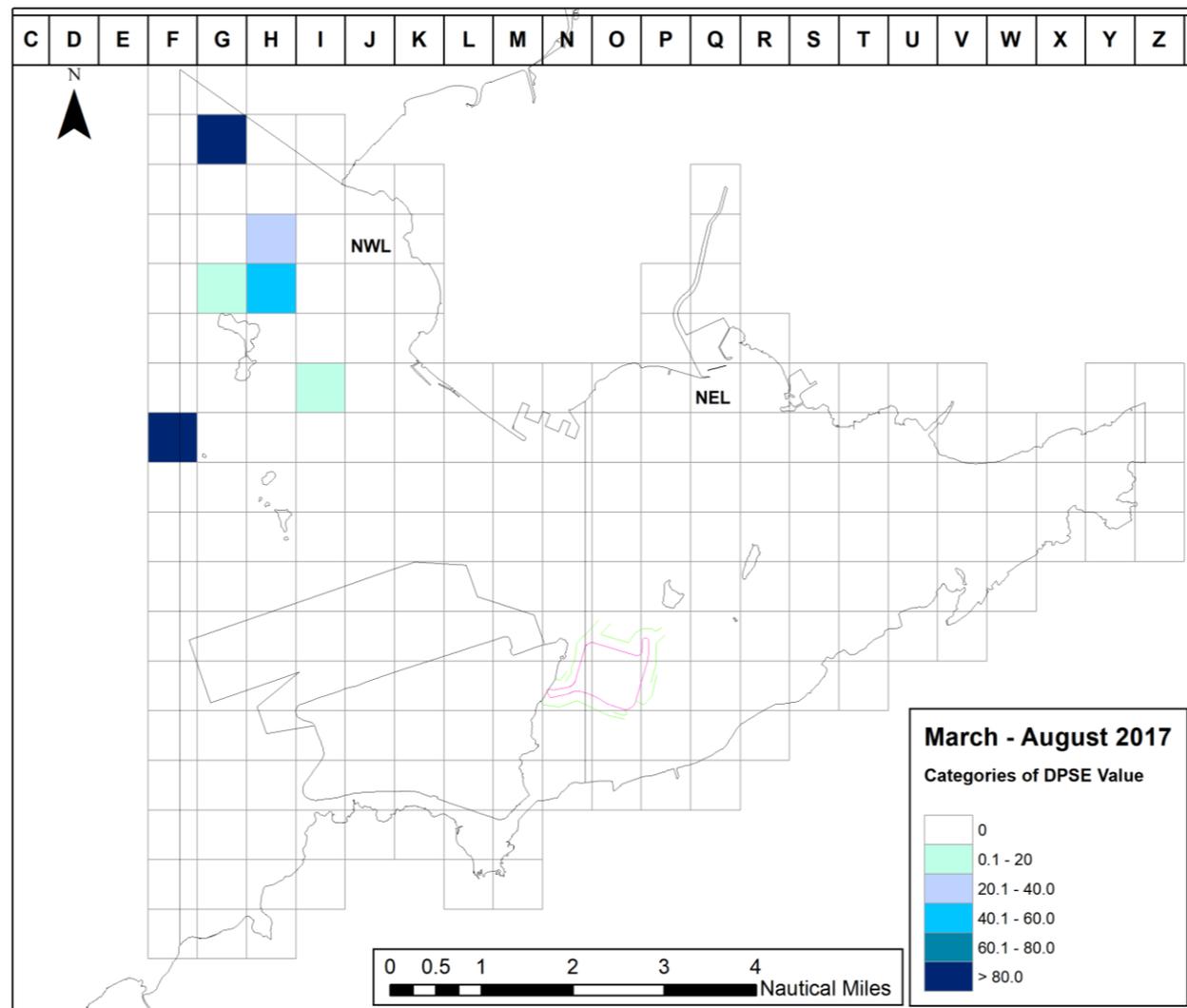
**Figure 2** Dolphin Sightings Recorded per Quarter During Monitoring Surveys, March – August 2017



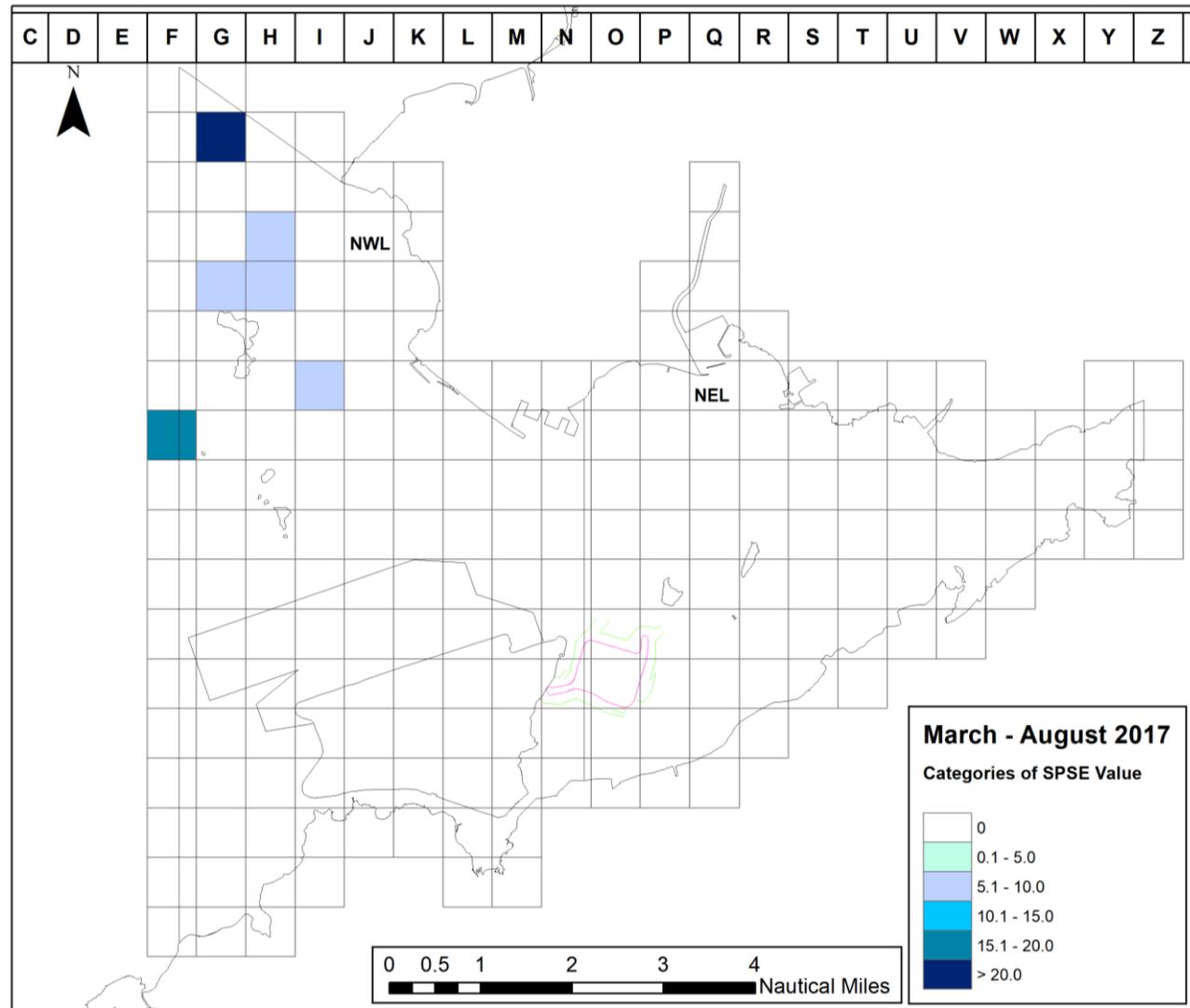
**Figure 3      Encounter Rates for NEL, NWL and Combined per Quarter for the Period March – August 2017**



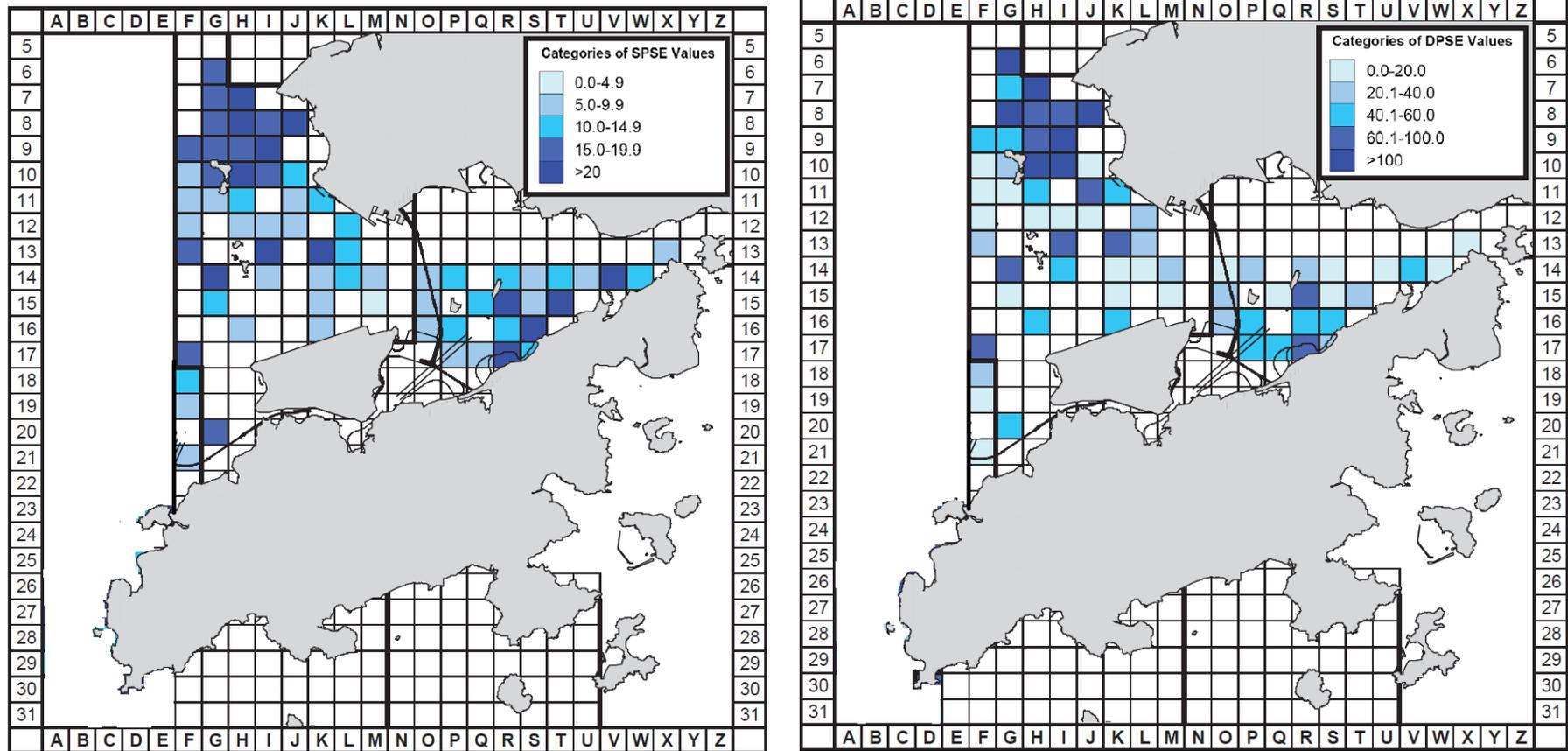
**Figure 4** Dolphin Group Sizes of More than Five Individuals, recorded between March – August 2017 (per quarter)



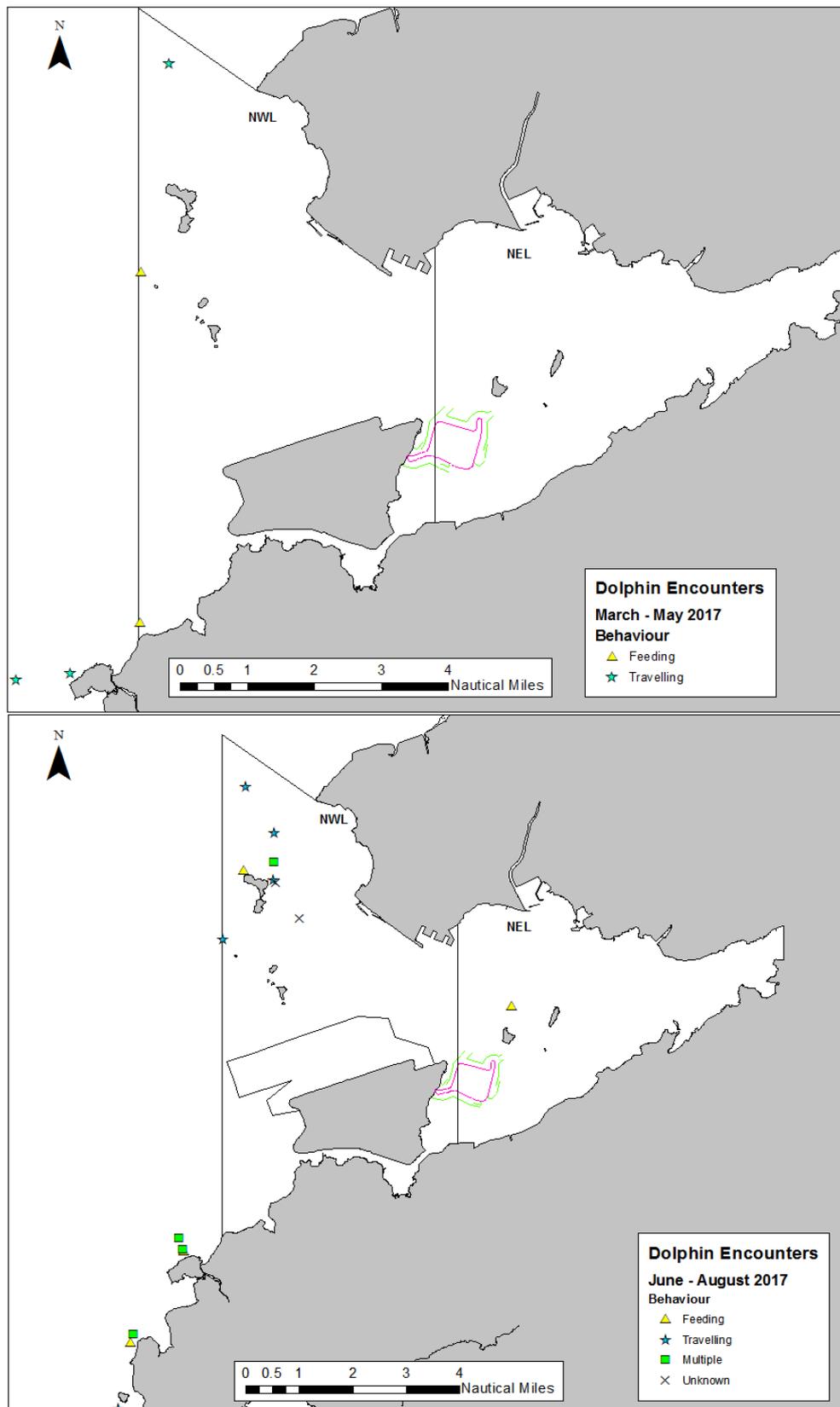
**Figure 5** Dolphin density DPSE (number of dolphins per 100 units of survey effort) for March – August 2017



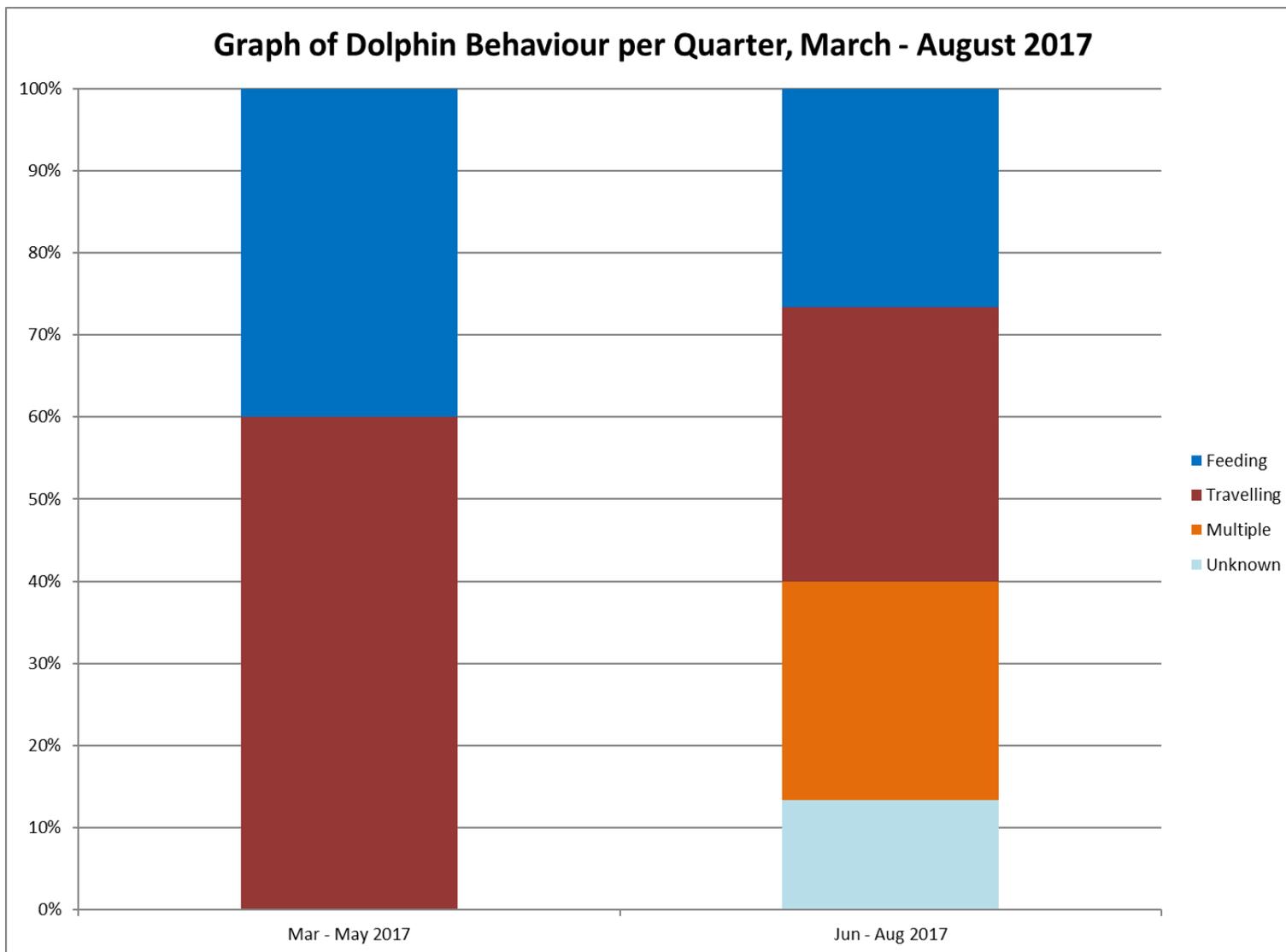
**Figure 6 Sighting density SPSE (number of sightings per 100 units of survey effort) for March – August 2017**



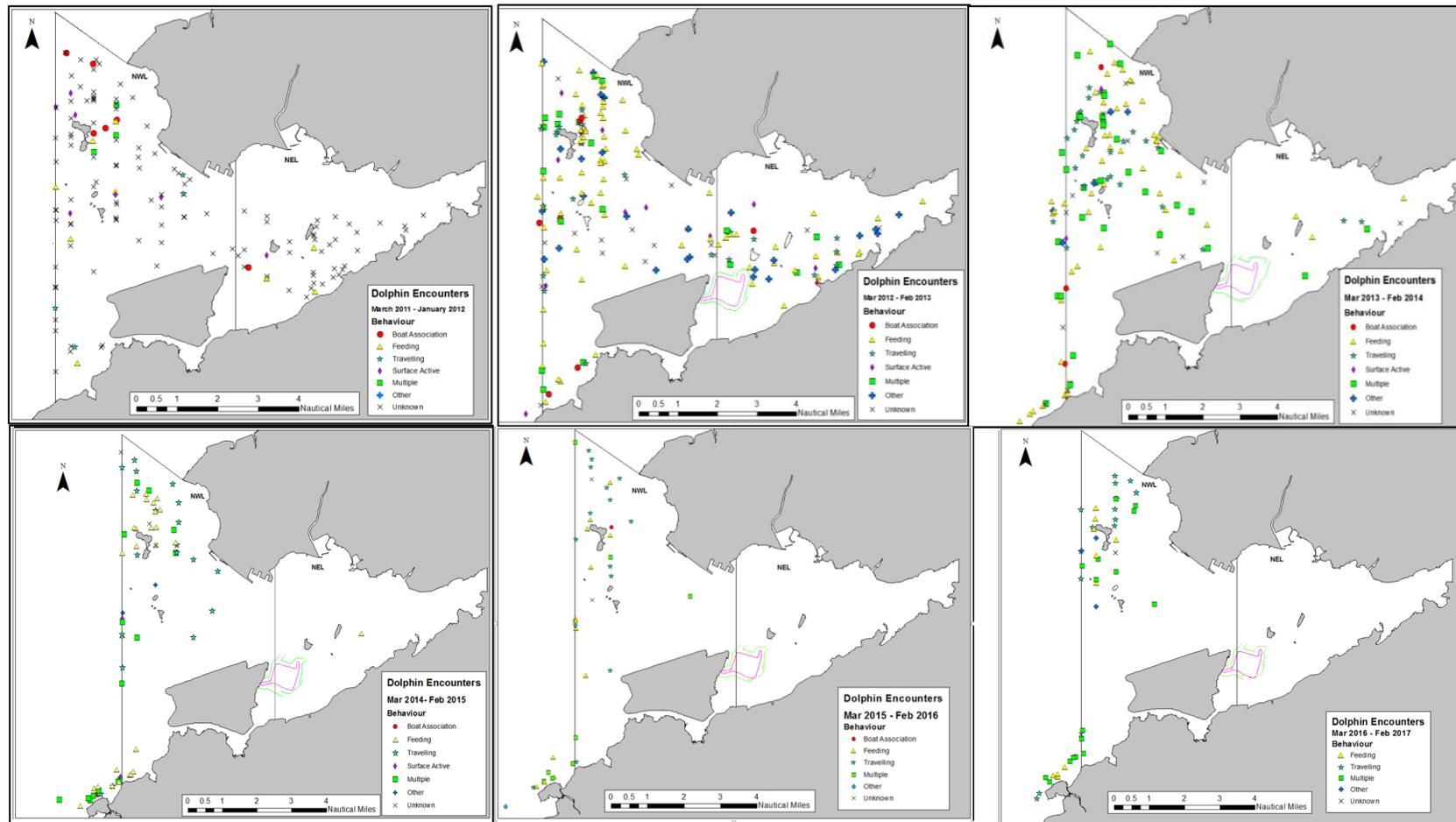
**Figure 7. Yearly Dolphin Density Maps (number of dolphins/dolphin groups per 100 units of survey effort). Derived from Baseline and Advanced Chinese White Dolphin Monitoring for the period between February 2011 – January 2012**



**Figure 8** Dolphin Behavioural Activities Recorded between March – August 2017 (per quarter)



**Figure 9. Dolphin Behavioural Activity per Quarter recorded between March – August 2017**



**Figure 10. A Comparison of the location of behaviours in 2011-12 to 2016-17. The island of Lung Kwu Chau, in the northern part of NWL, and the Tai O area, to the southern sector of NWL, are highlighted as important feeding areas.**

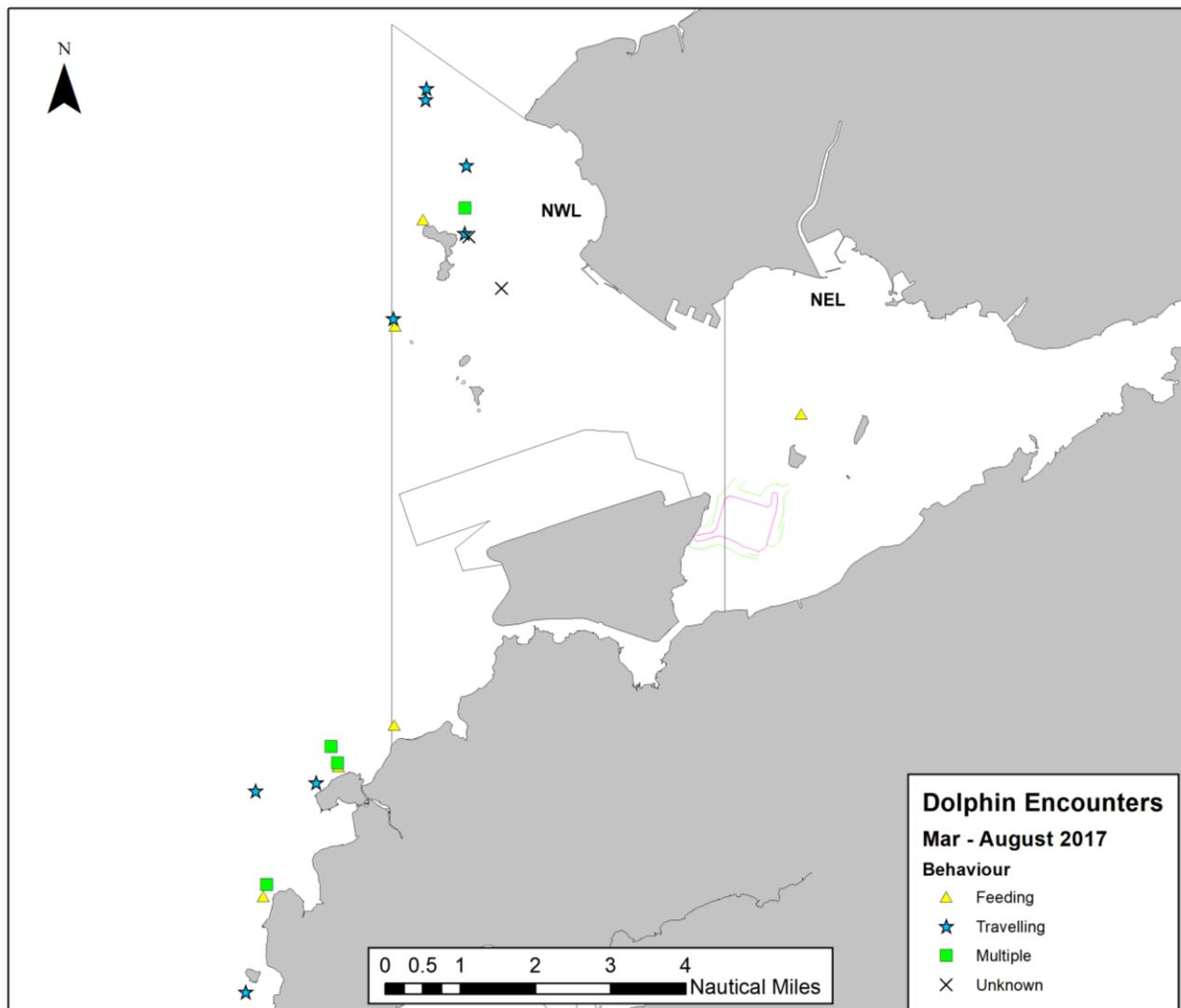


Figure 11. The location of behaviour recorded between March – August 2017. The island of Lung Kwu Chau, in the northern part of NWL, and the Tai O area, to the southern sector of NWL, are highlighted as important feeding areas

**Table 1. Impact Monitoring Survey Schedule and Details (March – August 2017)**

<b>Date</b>	<b>Location of Survey</b>	<b>No. Sightings ON</b>	<b>No. Sightings Opp</b>	<b>Total km ON EFFORT (favourable conditions)</b>
03/06/2017	NWL (1-6,21,22)	0	1	58.2
03/07/2017	NE and NW Lantau(7-20, 23)	0	0	49.7
03/20/2017	NE and NW Lantau(5-20, 23)	0	0	55.2
03/21/2017	NWL (1-4,21,22)	0	1	48.2
04/05/2017	NE and NW Lantau (6-20, 23)	0	0	47.9
04/06/2017	NWL (1-5,21,22)	0	0	54.4
04/18/2017	NE and NW Lantau (1-10, 21,22)	0	0	69.4
04/19/2017	NEL (11-20,23)	0	0	33.0
05/11/2017	NWL (1-6,21,22,24)	2	1	55.7
05/12/2017	NE and NW Lantau(7-20, 23)	0	0	44.5
05/17/2017	NWL (1-7,21,22,24)	0	0	56.6
05/18/2017	NE and NW Lantau(8-20, 23)	0	0	42.1
06/12/2017	NWL (1,21)	0	1	20.2
06/15/2017	NE and NW Lantau(2-20, 22,23,24)	0	0	79.4
06/26/2017	NWL (1-7,21,22,24)	0	1	53.9
06/27/2017	NE and NW Lantau(8-20, 23)	0	0	42.8
07/13/2017	NE and NW Lantau (5,20,23)	0	0	54.1
07/14/2017	NWL (1-4, 21, 22,24)	1	2	44.4
07/25/2017	NWL (1-4, 21, 22, 24)	2	4	44.5
07/26/2017	NE and NW Lantau(5-20, 23)	0	0	54.7
08/14/2017	NE and NW Lantau (5,20,23)	0	0	43.0
08/15/2017	NWL (1-4, 21, 22,24)	0	0	44.2
08/29/2017	NWL (1-4, 21, 22, 24)	3	1	44.1
08/30/2017	NE and NW Lantau(5-20, 23)	0	0	53.9

**Table 2. Impact Monitoring Survey Effort Summary (March – August 2017)**

Date	Area	Sea State (on effort)	Effort (km)	Season	Vessel	Type
03/06/2017	NWL	1	11.5	SPRING	HKDW	IMPACT
03/06/2017	NWL	2	38.5	SPRING	HKDW	IMPACT
03/06/2017	NWL	3	8.2	SPRING	HKDW	IMPACT
03/07/2017	NWL	1	8.6	SPRING	HKDW	IMPACT
03/07/2017	NWL	4	4	SPRING	HKDW	IMPACT
03/07/2017	NEL	1	37.1	SPRING	HKDW	IMPACT
03/20/2017	NWL	1	11.7	SPRING	HKDW	IMPACT
03/20/2017	NWL	2	6.6	SPRING	HKDW	IMPACT
03/20/2017	NEL	1	19.1	SPRING	HKDW	IMPACT
03/20/2017	NEL	2	17.8	SPRING	HKDW	IMPACT
03/21/2017	NWL	1	40.7	SPRING	HKDW	IMPACT
03/21/2017	NWL	2	7.5	SPRING	HKDW	IMPACT
04/05/2017	NWL	1	2	SPRING	HKDW	IMPACT
04/05/2017	NWL	2	7.3	SPRING	HKDW	IMPACT
04/05/2017	NWL	3	1.3	SPRING	HKDW	IMPACT
04/05/2017	NEL	1	1.1	SPRING	HKDW	IMPACT
04/05/2017	NEL	2	28.7	SPRING	HKDW	IMPACT
04/05/2017	NEL	3	7.5	SPRING	HKDW	IMPACT
04/06/2017	NWL	1	30.2	SPRING	HKDW	IMPACT
04/06/2017	NWL	2	24.2	SPRING	HKDW	IMPACT
04/18/2017	NWL	1	31.9	SPRING	HKDW	IMPACT
04/18/2017	NWL	2	33.8	SPRING	HKDW	IMPACT
04/18/2017	NEL	1	3.7	SPRING	HKDW	IMPACT
04/19/2017	NEL	1	5.3	SPRING	HKDW	IMPACT
04/19/2017	NEL	2	13.7	SPRING	HKDW	IMPACT
04/19/2017	NEL	3	14	SPRING	HKDW	IMPACT
05/11/2017	NWL	1	50.2	SPRING	HKDW	IMPACT
05/11/2017	NWL	2	5.5	SPRING	HKDW	IMPACT
05/12/2017	NWL	1	1.8	SPRING	HKDW	IMPACT
05/12/2017	NWL	2	5.5	SPRING	HKDW	IMPACT
05/12/2017	NEL	1	30.1	SPRING	HKDW	IMPACT
05/12/2017	NEL	2	7.1	SPRING	HKDW	IMPACT
05/17/2017	NWL	1	43.4	SPRING	HKDW	IMPACT
05/17/2017	NWL	2	13.2	SPRING	HKDW	IMPACT
05/18/2017	NWL	2	5.1	SPRING	HKDW	IMPACT
05/18/2017	NEL	1	25.6	SPRING	HKDW	IMPACT
05/18/2017	NEL	2	11.4	SPRING	HKDW	IMPACT
06/12/2017	NWL	2	13.3	SUMMER	HKDW	IMPACT
06/12/2017	NWL	3	6.9	SUMMER	HKDW	IMPACT
06/15/2017	NWL	2	23.7	SUMMER	HKDW	IMPACT

**Table 2. Impact Monitoring Survey Effort Summary (March – August 2017) (con)**

Date	Area	Sea State (on effort)	Effort (km)	Season	Vessel	Type
06/15/2017	NWL	3	18.4	SUMMER	HKDW	IMPACT
06/15/2017	NEL	1	6.3	SUMMER	HKDW	IMPACT
06/15/2017	NEL	2	28.7	SUMMER	HKDW	IMPACT
06/15/2017	NEL	3	2.3	SUMMER	HKDW	IMPACT
06/26/2017	NWL	1	6.5	SUMMER	HKDW	IMPACT
06/26/2017	NWL	2	17.9	SUMMER	HKDW	IMPACT
06/26/2017	NWL	3	29.5	SUMMER	HKDW	IMPACT
06/26/2017	NWL	4	10	SUMMER	HKDW	IMPACT
06/27/2017	NWL	2	5.2	SUMMER	HKDW	IMPACT
06/27/2017	NEL	1	14.1	SUMMER	HKDW	IMPACT
06/27/2017	NEL	2	23.5	SUMMER	HKDW	IMPACT
07/13/2017	NWL	1	3.3	SUMMER	HKDW	IMPACT
07/13/2017	NWL	2	9	SUMMER	HKDW	IMPACT
07/13/2017	NWL	3	4.9	SUMMER	HKDW	IMPACT
07/13/2017	NEL	1	27.8	SUMMER	HKDW	IMPACT
07/13/2017	NEL	2	9.1	SUMMER	HKDW	IMPACT
07/14/2017	NWL	1	20.6	SUMMER	HKDW	IMPACT
07/14/2017	NWL	2	9.7	SUMMER	HKDW	IMPACT
07/14/2017	NWL	3	14.1	SUMMER	HKDW	IMPACT
07/25/2017	NWL	1	12.5	SUMMER	HKDW	IMPACT
07/25/2017	NWL	2	27.5	SUMMER	HKDW	IMPACT
07/25/2017	NWL	3	4.5	SUMMER	HKDW	IMPACT
07/26/2017	NWL	1	8.4	SUMMER	HKDW	IMPACT
07/26/2017	NWL	2	9.3	SUMMER	HKDW	IMPACT
07/26/2017	NEL	1	30.3	SUMMER	HKDW	IMPACT
07/26/2017	NEL	2	6.7	SUMMER	HKDW	IMPACT
08/14/2017	NWL	3	6.5	SUMMER	HKDW	IMPACT
08/14/2017	NWL	4	10.1	SUMMER	HKDW	IMPACT
08/14/2017	NEL	1	23.3	SUMMER	HKDW	IMPACT
08/14/2017	NEL	2	6.7	SUMMER	HKDW	IMPACT
08/14/2017	NEL	3	6.5	SUMMER	HKDW	IMPACT
08/14/2017	NEL	4	0.7	SUMMER	HKDW	IMPACT
08/15/2017	NWL	2	17.6	SUMMER	HKDW	IMPACT
08/15/2017	NWL	3	26.6	SUMMER	HKDW	IMPACT
08/15/2017	NWL	4	0.4	SUMMER	HKDW	IMPACT
08/29/2017	NWL	1	32.8	SUMMER	HKDW	IMPACT
08/29/2017	NWL	2	11.3	SUMMER	HKDW	IMPACT
08/30/2017	NWL	1	15.6	SUMMER	HKDW	IMPACT
08/30/2017	NWL	2	1.5	SUMMER	HKDW	IMPACT
08/30/2017	NEL	1	15.9	SUMMER	HKDW	IMPACT
08/30/2017	NEL	2	20.9	SUMMER	HKDW	IMPACT

**Table 3. Sightings of Individually Identified Chinese White Dolphin (*Sousa chinensis*) between March 2012 – August 2017 and baseline sightings**

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 134		2016/05/23	1251	NWL
HZMB 132		2016/05/23	1244	NWL
HZMB 131		2016/03/22	1215	NWL
HZMB 130		2017/07/25	1413	NWL
		2016/09/05	1301	NWL
		2016/02/04	1199	NWL
HZMB 129		2017/01/05	1354	NWL
		2017/01/05	1353	NWL
		2016/01/07	1189	NWL
		2015/10/22	1156	NWL
		2015/09/07	1143	NWL
		2015/08/25	1138	NWL
HZMB 128		2015/01/03	1056	NWL
HZMB 127		2015/01/03	1056	NWL
HZMB 126		2016/05/23	1244	NWL
		2015/02/23	1068	NWL
		2015/01/03	1054	NWL
HZMB 125		2016/05/23	1249	NWL
		2016/03/07	1208	NWL
		2014/10/13	1019	NWL
HZMB 124		2014/09/22	1005	NWL
HZMB 123		2014/08/25	998	NWL
HZMB 122		2015/10/22	1156	NWL
		2014/08/04	989	NWL
HZMB 121		2016/07/18	1276	NWL
		2014/07/14	968	NWL
HZMB 120		2014/05/31	951	NWL
HZMB 119		2014/04/19	940	NWL
HZMB 118		2014/01/06	890	NWL
HZMB 117		2014/06/17	964	NWL
		2014/01/06	888	NWL
HZMB 116		2014/08/25	999	NWL
HZMB 115		2014/07/14	972	NWL
		2014/07/14	971	NWL
		2013/12/26	879	NWL
		2013/12/26	879	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 114		2017/01/05	1351	NWL
		2016/11/03	1328	NWL
		2016/06/06	1261	NWL
		2015/11/05	1162	NWL
		2013/10/24	827	NWL
HZMB 113		2013/10/24	827	NWL
HZMB 112		2013/10/15	815	NWL
HZMB 111		2013/10/15	815	NWL
HZMB 110		2016/01/18	1193	NWL
		2013/10/15	812	NWL
HZMB 108		2015/06/11	1118	NWL
		2013/08/30	780	NEL
HZMB 107		2015/07/28	1126	NWL
		2014/10/13	1019	NWL
		2014/05/31	951	NWL
		2013/08/21	770	NWL
HZMB 106		2013/08/21	769	NWL
HZMB 105		2014/05/31	951	NWL
		2013/07/08	711	NWL
HZMB 104		2013/07/08	711	NWL
HZMB 103		2013/07/08	711	NWL
HZMB 102		2013/07/08	706	NWL
HZMB 101		2013/07/08	706	NWL
HZMB 100		2013/07/08	706	NWL
HZMB 099		2013/06/13	681	NWL
		2013/06/13	680	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 098	NL104	2017/05/11	1393	NWL
		2017/01/05	1353	NWL
		2015/02/23	1077	NWL
		2014/12/18	1044	NWL
		2014/08/04	992	NWL
		2014/01/06	888	NWL
		2013/11/02	849	NWL
		2013/11/02	845	NWL
		2013/10/24	831	NWL
		2013/07/08	711	NWL
		2013/05/24	659	NWL
		2011/11/07	Baseline	NWL
		2011/11/05	Baseline	NWL
		2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/10/28	Baseline	NWL
		2011/09/23	Baseline	NWL
2011/09/16	Baseline	NWL		
HZMB 097		2013/05/09	647	NWL
HZMB 096		2013/04/01	621	NWL
HZMB 095		2013/08/30	780	NEL
		2013/06/25	697	NWL
		2013/06/13	682	NWL
		2013/04/01	621	NWL
HZMB 094		2016/08/30	1299	NWL
		2014/10/13	1019	NWL
		2014/05/31	954	NWL
		2014/02/17	910	NWL
		2013/06/26	703	NWL
		2013/06/25	698	NWL
		2013/03/18	601	NWL
HZMB 093		2013/05/24	657	NWL
		2013/02/21	587	NWL
HZMB 092		2015/04/20	1097	NWL
		2013/02/21	589	NWL
		2013/02/15	581	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 091		2013/02/15	579	NWL
HZMB 090		2013/06/25	697	NWL
		2013/06/13	682	NWL
		2013/02/15	579	NWL
HZMB 089		2013/02/15	579	NWL
HZMB 088		2013/02/15	579	NWL
HZMB 087		2013/02/15	579	NWL
HZMB 086	NL242	2015/03/19	1086	NWL
		2013/05/09	642	NWL
		2013/02/15	579	NWL
		2011/10/10	Baseline	NWL
HZMB 085		2014/10/13	1019	NWL
		2014/05/31	954	NWL
HZMB 084		2013/06/26	703	NWL
		2013/02/15	579	NWL
		2013/02/14	575	NWL
HZMB 083	NL136	2016/11/03	1332	NWL
		2016/08/30	1298	NWL
		2015/12/01	1180	NWL
		2015/05/11	1104	NWL
		2013/12/19	863	NWL
		2013/03/28	607	NWL
		2013/02/15	579	NWL
		2013/01/28	568	NWL
		2013/01/28	564	NWL
		2012/04/19	267	NWL
		2011/10/28	Baseline	NWL
		2011/10/28	Baseline	NWL
		2011/10/10	Baseline	NEL
2011/09/06	Baseline	NWL		
HZMB 082		2014/10/20	1024	NWL
		2013/02/21	587	NWL
		2013/02/15	579	NWL
		2013/01/28	563	NWL
HZMB 081		2013/01/28	559	NWL
		2013/01/28	557	NWL
HZMB 080		2013/01/28	556	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 079		2013/01/28	556	NWL
HZMB 078		2013/02/15	579	NWL
		2013/01/08	552	NWL
HZMB 077		2013/12/26	878	NWL
		2013/07/08	706	NWL
		2012/12/11	541	NWL
HZMB 076		2013/07/08	706	NWL
		2012/12/11	541	NWL
HZMB 075		2012/12/06	525	NEL
HZMB 074		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/21	594	NEL
		2012/12/10	529	NEL
		2012/12/06	525	NEL
HZMB 073		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/21	594	NEL
		2012/12/10	529	NEL
		2012/12/06	525	NEL
HZMB 072		2012/10/24	476	NWL
HZMB 071		2012/10/24	475	NWL
		2012/10/12	466	NWL
HZMB 070		2012/10/24	476	NWL
HZMB 069		2015/06/04	1116	NWL
		2013/08/21	774	NWL
		2013/07/08	711	NWL
		2012/10/24	476	NWL
HZMB 068		2014/10/20	1025	NWL
		2013/11/01	839	NWL
		2012/10/24	476	NWL
HZMB 067		2012/10/24	475	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 066	NL93	2013/01/28	559	NWL
		2012/12/11	537	NWL
		2012/10/24	475	NWL
		2012/10/12	466	NWL
		2011/11/07	Baseline	NWL
		2011/11/05	Baseline	NWL
HZMB 064		2015/03/19	1086	NWL
		2014/06/17	964	NWL
		2013/05/09	647	NWL
		2013/01/28	561	NWL
		2012/10/24	475	NWL
		2012/10/12	466	NWL
HZMB 063		2013/05/09	647	NWL
		2012/10/12	466	NWL
HZMB 062		2012/12/06	525	NEL
		2012/10/11	457	NWL
HZMB 060		2012/09/18	447	NWL
HZMB 059		2013/02/21	591	NWL
		2012/09/18	445	NWL
HZMB 057		2012/09/18	440	NWL
HZMB 056		2012/09/18	442	NWL
		2012/09/05	433	NEL
HZMB 055		2012/09/04	425	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 054	CH34	2017/07/25	1417	NWL
		2017/05/11	1393	NWL
		2016/11/03	1331	NWL
		2016/05/12	1238	NWL
		2015/12/01	1180	NWL
		2015/04/20	1097	NWL
		2015/01/15	1062	NWL
		2014/05/31	953	NWL
		2014/01/06	888	NWL
		2013/11/07	854	NWL
		2013/11/02	845	NWL
		2013/10/24	831	NWL
		2013/08/30	780	NEL
		2013/07/08	711	NWL
		2013/09/18	448	NWL
		2012/09/05	432	NEL
		2011/11/07	Baseline	NWL
		2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/11/01	Baseline	NEL
2011/11/01	Baseline	NEL		
2011/10/28	Baseline	NWL		
2011/10/06	Baseline	NWL		
HZMB 053		2012/09/04	425	NWL
HZMB 052		2012/09/04	423	NWL
HZMB 051	NL213	2015/05/11	1104	NWL
		2014/08/04	989	NWL
		2013/05/09	644	NWL
		2013/04/01	622	NWL
		2013/02/15	582	NWL
		2013/02/15	581	NWL
		2013/01/28	559	NWL
		2013/01/28	556	NWL
		2012/09/04	422	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 050		2014/07/14	971	NWL
		2014/01/10	900	NWL
		2014/01/06	888	NWL
		2013/02/15	579	NWL
		2012/09/04	421	NWL
HZMB 049		2015/10/09	1151	NWL
		2014/07/29	982	NWL
		2012/09/03	419	NWL
HZMB 048		2012/09/03	419	NWL
HZMB 047		2015/04/28	1100	NWL
		2012/09/03	412	NWL
HZMB 046		2012/09/03	412	NWL
HZMB 045		2016/05/23	1249	NWL
		2014/02/17	910	NWL
		2013/06/13	682	NWL
		2013/02/15	579	NWL
		2012/11/01	495	NWL
HZMB 044	NL98	2017/01/05	1350	NWL
		2016/05/23	1247	NWL
		2016/01/18	1194	NWL
		2014/10/13	1019	NWL
		2014/02/17	910	NWL
		2013/12/19	864	NWL
		2013/11/02	845	NWL
		2013/11/01	842	NWL
		2013/10/15	819	NWL
		2013/05/09	648	NWL
		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/15	579	NWL
		2012/11/01	495	NWL
		2011/11/07	Baseline	NWL
2011/11/06	Baseline	NEL		
2011/11/01	Baseline	NEL		
2011/10/06	Baseline	NEL		
HZMB 043		2012/09/03	407	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 042	NL260	2015/10/22	1156	NWL
		2013/12/19	863	NWL
		2012/11/01	495	NWL
		2011/11/07	Baseline	NWL
HZMB 041	NL24	2014/06/05	960	NEL
		2014/02/17	910	NWL
		2013/11/02	845	NWL
		2013/05/09	648	NWL
		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/15	579	NWL
		2012/11/01	495	NWL
		2011/11/06	Baseline	NEL
		2011/11/05	Baseline	NWL
		2011/11/05	Baseline	NWL
HZMB 040		2014/02/17	910	NWL
		2014/01/06	893	NWL
		2013/10/15	821	NWL
		2013/07/08	714	NWL
		2013/07/08	711	NWL
		2013/02/21	589	NWL
		2012/11/01	493	NWL
HZMB 038		2016/05/23	1246	NWL
		2012/11/01	490	NWL
HZMB 037		2012/11/01	490	NWL
HZMB 036		2017/01/05	1351	NWL
		2017/01/05	1350	NWL
		2012/09/03	407	NWL
		2012/11/01	490	NWL
HZMB 035		2013/02/15	579	NWL
		2012/11/01	490	NWL
HZMB 034		2012/11/01	493	NWL
HZMB 028		2014/11/17	1035	NWL
		2013/04/01	625	NWL
		2012/08/06	373	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 027		2013/12/19	863	NWL
		2013/02/15	579	NWL
		2013/01/28	568	NWL
		2013/01/28	564	NWL
		2012/06/14	299	NWL
HZMB 026		2014/10/13	1018	NWL
		2013/06/25	697	NWL
		2013/05/09	642	NWL
		2013/01/28	561	NWL
		2012/06/13	295	NEL
HZMB 025		2013/02/22	596	NEL
		2013/02/21	591	NWL
		2012/12/06	525	NEL
		2012/10/11	457	NWL
		2012/06/13	295	NEL
HZMB 024		2013/03/18	601	NWL
		2012/06/13	295	NEL
HZMB 023		2017/01/05	1353	NWL
		2016/11/03	1330	NWL
		2015/10/09	1153	NWL
		2015/10/09	1152	NWL
		2015/04/20	1097	NWL
		2014/12/18	1044	NWL
		2014/11/17	1035	NWL
		2014/01/06	888	NWL
		2013/07/08	715	NWL
		2013/07/08	711	NWL
		2013/04/01	619	NWL
		2013/02/21	589	NWL
		2013/02/15	579	NWL
2012/07/10	330	NWL		

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 022		2017/01/05	1353	NWL
		2016/11/03	1330	NWL
		2016/04/21	1219	NWL
		2015/09/07	1143	NWL
		2015/04/20	1097	NWL
		2014/12/18	1044	NWL
		2014/11/17	1035	NWL
		2014/08/04	991	NWL
		2014/01/06	888	NWL
		2013/10/24	827	NWL
		2013/07/08	715	NWL
		2013/07/08	711	NWL
		2013/04/01	619	NWL
		2013/02/21	589	NWL
		2013/02/15	579	NWL
		2012/07/10	330	NWL
HZMB 021	NL37	2016/03/22	1215	NWL
		2012/07/10	330	NWL
		2011/09/16	Baseline	NWL
HZMB 020		2012/07/10	330	NWL
HZMB 019		2012/07/10	330	NWL
HZMB 018		2014/02/17	910	NWL
		2013/05/09	647	NWL
		2013/02/21	594	NEL
		2012/12/10	529	NEL
		2012/07/10	330	NWL
HZMB 017		2012/07/10	330	NWL
HZMB 016		2013/07/08	706	NWL
		2012/12/11	539	NWL
		2012/09/18	446	NWL
		2012/09/04	421	NWL
		2012/07/10	330	NWL
HZMB 015		2012/07/10	330	NEL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 014	NL176	2015/08/25	1139	NWL
		2013/12/26	880	NWL
		2012/08/06	373	NWL
		2012/06/13	295	NEL
		2011/11/06	Baseline	NEL
		2011/11/01	Baseline	NEL
		2011/11/01	Baseline	NEL
HZMB 013		2012/05/28	281	NWL
HZMB 012		2012/05/28	281	NWL
HZMB 011	EL01	2013/02/22	597	NEL
		2013/02/21	592	NEL
		2013/02/14	572	NEL
		2012/11/06	517	NEL
		2012/09/19	452	NWL
		2012/03/31	261	NEL
		2011/11/02	Baseline	NWL
		2011/11/01	Baseline	NEL
HZMB 009		2015/03/19	1084	NWL
		2012/05/28	281	NWL
HZMB 008		2015/07/06	1122	NWL
		2012/05/28	281	NWL
HZMB 007	NL246	2012/12/10	529	NEL
		2011/11/06	Baseline	NEL
		2011/09/16	Baseline	NWL
HZMB 006		2015/10/22	1158	NWL
		2013/02/21	594	NEL
		2012/12/11	539	NWL
		2012/11/01	495	NWL
		2012/03/29	250	NWL
HZMB 005		2015/02/09	1070	NWL
		2015/02/09	1069	NWL
		2013/11/09	860	NWL
		2013/11/07	858	NWL
		2013/10/15	813	NWL
		2012/12/10	532	NWL
		2012/08/06	374	NWL
		2012/05/28	287	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 004		2015/07/28	1126	NWL
		2012/09/04	421	NWL
		2012/03/31	262	NWL
HZMB 003	NL179	2013/10/15	812	NWL
		2013/06/25	697	NWL
		2012/12/10	529	NEL
		2012/03/31	261	NWL
		2011/11/06	Baseline	NEL
		2011/09/16	Baseline	NWL
HZMB 002	WL111	2014/05/31	951	NWL
		2013/12/26	878	NWL
		2013/12/19	863	NWL
		2013/11/01	839	NWL
		2013/10/15	819	NWL
		2013/09/24	798	NWL
		2013/02/14	573	NWL
		2012/12/11	536	NWL
		2012/12/11	535	NWL
		2012/10/12	466	NWL
		2012/10/24	475	NWL
		2012/05/28	281	NWL
		2012/03/29	250	NWL
	2011/11/02	Baseline	NWL	
HZMB 001	WL46	2016/07/18	1276	NWL
		2016/05/23	1251	NWL
		2014/08/25	997	NWL
		2013/08/21	771	NWL
		2013/06/13	681	NWL
		2013/04/01	617	NWL
		2013/02/14	573	NWL
		2012/03/29	250	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
	CH98	2011/11/02	Baseline	NWL
	NL11	2011/11/02	Baseline	NWL
		2011/11/07	Baseline	NWL
	NL12	2011/11/02	Baseline	NWL
	NL33	2011/09/23	Baseline	NWL
		2011/11/01	Baseline	NEL
		2011/11/05	Baseline	NWL
		2011/11/07	Baseline	NWL
	NL46	2011/10/28	Baseline	NWL
	CH153	2011/10/11	Baseline	NWL
	NL48	2001/11/07	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/09/16	Baseline	NWL
	NL75	2011/09/16	Baseline	NWL
		2011/09/16	Baseline	NWL
		2011/11/01	Baseline	NEL
	NL80	2011/11/02	Baseline	NWL
	NL118	2011/09/06	Baseline	NWL
	NL120	2011/11/06	Baseline	NEL
		2011/10/10	Baseline	NWL
	NL123	2011/11/06	Baseline	NEL
		2011/10/10	Baseline	NWL
		2011/10/06	Baseline	NWL
	NL139	2011/11/01	Baseline	NEL
		2011/10/10	Baseline	NEL
		2011/09/16	Baseline	NWL
	NL165	2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
	NL170	2011/10/06	Baseline	NEL
	NL188	2011/11/07	Baseline	NWL
		2011/11/01	Baseline	NWL
		2011/10/28	Baseline	NWL
	NL191	2011/09/07	Baseline	NWL
	NL202	2011/11/07	Baseline	NWL
		2011/10/28	Baseline	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
	NL210	2011/11/07	Baseline	NWL
		2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/09/07	Baseline	NWL
	NL214	2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/10/28	Baseline	NWL
	NL220	2011/10/10	Baseline	NEL
	NL224	2011/10/28	Baseline	NWL
	NL226	2011/11/05	Baseline	NWL
		2011/10/17	Baseline	WL
	NL230	2011/11/02	Baseline	NWL
		2011/10/17	Baseline	WL
	NL233	2011/10/28	Baseline	NWL
		2011/10/06	Baseline	NWL
		2011/09/16	Baseline	NWL
	NL241	2011/11/07	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/09/16	Baseline	NWL
	NL244	2011/11/01	Baseline	NEL
		2011/11/01	Baseline	NWL
		2011/09/05	Baseline	WL
	NL256	2011/11/02	Baseline	NWL
	NL258	2011/09/16	Baseline	NWL
		2011/09/05	Baseline	WL
	NL259	2011/11/07	Baseline	NWL
	NL261	2011/11/01	Baseline	NEL
	NL264	2011/11/06	Baseline	NEL
		2011/10/06	Baseline	NEL
		2011/09/23	Baseline	NWL
	NL269	2011/11/02	Baseline	NWL
	NL272	2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/10/28	Baseline	NWL
		2011/09/16	Baseline	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
	NL278	2011/11/02	Baseline	NWL
	NL279	2011/11/02	Baseline	NWL
	SL42	2011/11/02	Baseline	NWL
	SL43	2011/10/28	Baseline	NWL
	WL04	2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/10/17	Baseline	WL
		2011/10/10	Baseline	NWL
		2011/09/16	Baseline	NWL
	WL05	2011/11/01	Baseline	NEL
		2011/11/01	Baseline	NEL
	WL11	2011/11/07	Baseline	NWL
	WL25	2011/10/17	Baseline	WL
		2011/09/23	Baseline	WL
		2011/09/16	Baseline	NWL
	WL88	2011/11/02	Baseline	WL
		2011/09/16	Baseline	NWL
	WL116	2011/09/16	Baseline	NWL
	WL124	2011/11/02	Baseline	NWL
	WL156	2011/10/28	Baseline	NWL
		2011/09/23	Baseline	WL
	WL162	2011/09/16	Baseline	NWL
	NL275	2011/09/23	Baseline	WL
	SL48	2011/11/02	Baseline	WL
		2011/10/17	Baseline	WL
		2011/09/23	Baseline	WL
	CH108	2011/11/02	Baseline	WL
		2011/11/02	Baseline	WL
	CH157	2011/11/02	Baseline	WL
	NL206	2011/10/07	Baseline	WL
	WL28	2011/09/23	Baseline	WL
	WL42	2011/11/02	Baseline	WL
		2011/09/05	Baseline	WL
	WL47	2011/10/17	Baseline	WL
	WL61	2011/10/17	Baseline	WL
		2011/09/23	Baseline	WL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
	WL66	2011/11/07	Baseline	WL
	WL68	2011/09/05	Baseline	WL
		2011/09/05	Baseline	WL
	WL72	2011/11/02	Baseline	WL
		2011/11/02	Baseline	WL
		2011/09/23	Baseline	WL
	WL87	2011/09/23	Baseline	WL
	WL88	2011/11/02	Baseline	WL
		2011/09/16	Baseline	WL
	WL116	2011/09/16	Baseline	WL
	WL118	2011/11/02	Baseline	WL
		2011/11/02	Baseline	WL
	WL123	2011/11/02	Baseline	WL
	WL124	2011/11/02	Baseline	WL
	WL128	2011/11/07	Baseline	WL
		2011/11/02	Baseline	WL
	WL131	2011/11/02	Baseline	WL
		2011/11/02	Baseline	WL
		2011/09/23	Baseline	WL
	WL132	2011/09/23	Baseline	WL
	WL137	2011/11/02	Baseline	WL
	WL138	2011/11/02	Baseline	WL
	WL144	2011/11/02	Baseline	WL
	WL145	2011/09/05	Baseline	WL
	WL146	2011/10/17	Baseline	WL
	WL153	2011/11/07	Baseline	WL
	WL157	2011/09/23	Baseline	WL
	WL158	2011/09/23	Baseline	WL
	WL163	2011/11/07	Baseline	WL
		2011/11/02	Baseline	WL
	WL165	2011/10/17	Baseline	WL
	WL167	2011/10/17	Baseline	WL
	WL170	2011/11/07	Baseline	WL
	WL171	2011/10/28	Baseline	WL



# China Harbour Engineering Company Limited

## Monthly Summary Waste Flow Table for December / 2017 (year)

Project : Hong Kong – Zhuhai – Macao Bridge, Hong Kong Boundary Crossing Facilities – Reclamation Works

Contract No.: HY/2010/02

Month	Actual Quantities of Inert C&D Materials Generated Monthly							Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete (see Note 1)	Reused in the Contract	Reused in other Projects	Surplus Surcharge exported to Macau	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (see Note 2)	Chemical Waste (see Note 4)	Others, e.g. general refuse (see Note 3)
	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000 kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000 m <sup>3</sup> )
Jan-17	0.0000	0.0000	0.0000	15.6100	73.2375	0.0000	18.8927	0.0000	0.3640	0.0000	0.0000	0.0455
Feb-17	0.0000	0.0000	0.0000	39.0950	182.3675	0.0000	17.5747	0.0000	0.3920	0.0000	0.0000	0.0260
Mar-17	0.0000	0.0000	0.0000	60.6496	171.6925	0.0000	20.6013	0.0000	0.0000	0.0000	0.0000	0.0585
Apr-17	0.0000	0.0000	0.0000	2.4750	55.3140	0.0000	39.9607	0.0000	0.4480	0.0000	0.0000	0.0325
May-17	0.0000	0.0000	0.0000	0.0000	4.5540	0.0000	22.4307	0.0000	0.0000	0.0000	0.0000	0.0455
Jun-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3920	0.0000	0.0000	0.0390
Sub-total	0.0000	0.0000	0.0000	117.8296	487.1655	0.0000	119.4601	0.0000	1.5960	0.0000	0.0000	0.2470
Jul-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3360	0.0000	0.0000	0.0195
Aug-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3360	0.0000	0.0000	0.0130
Sep-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0130
Oct-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0130
Nov-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2520	0.0000	0.0000	0.0065
Dec-17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0065
Total	0.0000	0.0000	0.0000	117.8296	487.1655	0.0000	119.4601	0.0000	2.5200	0.0000	0.0000	0.3185

- Notes:
- (1) Broken concrete for recycling into aggregates.
  - (2) Plastics refer to plastic bottles / containers / sheets / foam / barrier from packaging materials.
  - (3) Use the conversion factor : 1 full load of dumping truck being equivalent to 6.5m<sup>3</sup> by volume.
  - (4) Chemical waste refer to spent “battery” and “oil with water”.



# China Harbour Engineering Company Limited

## Monthly Summary Waste Flow Table for April / 2018 (year)

Project : Hong Kong – Zhuhai – Macao Bridge, Hong Kong Boundary Crossing Facilities – Reclamation Works

Contract No.: HY/2010/02

Month	Actual Quantities of Inert C&D Materials Generated Monthly							Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete (see Note 1)	Reused in the Contract	Reused in other Projects	Surplus Surcharge exported to Macau	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (see Note 2)	Chemical Waste (see Note 4)	Others, e.g. general refuse (see Note 3)
	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000 kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000 m <sup>3</sup> )
Jan-18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0065
Feb-18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1680	0.0000	0.0000	0.0000
Mar-18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0065
Apr-18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.9200	0.0000	0.0000	0.0325
May-18												
Jun-18												
Sub-total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.0880	0.0000	0.0000	0.0455
Jul-18												
Aug-18												
Sep-18												
Oct-18												
Nov-18												
Dec-18												
Total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.0880	0.0000	0.0000	0.0455

- Notes:
- (1) Broken concrete for recycling into aggregates.
  - (2) Plastics refer to plastic bottles / containers / sheets / foam / barrier from packaging materials.
  - (3) Use the conversion factor : 1 full load of dumping truck being equivalent to 6.5m<sup>3</sup> by volume.
  - (4) Chemical waste refer to spent “battery” and “oil with water”.

## Appendix J

### Cumulative Statistics on Exceedances, Complaints, Notifications of Summons and Successful Prosecutions

#### Cumulative statistics on Exceedances

		Total no. recorded in this month	Total no. recorded since project commencement
<b>1-Hour TSP</b>	Action	-	-
	Limit	-	-
<b>24-Hour TSP</b>	Action	-	-
	Limit	-	-
<b>Noise</b>	Action	-	-
	Limit	-	-
<b>Water Quality</b>	Action	-	2
	Limit	-	3
<b>Dolphin Monitoring</b>	Action	-	-
	Limit	-	-

Remarks: Exceedances which are not project-related are not presented in this table.

#### Cumulative statistics on Complaints, Notifications of Summons and Successful Prosecutions

	Date Received	Subject	Status	Total no. received in this quarter	Total no. received since project commencement
<b>Environmental complaints</b>	27 March 2017	An environmental complaint was received by EPD on 27 March 2017, and the complainant complained that a very loud sound was intermittently heard by the Complainant since 10pm on 26 March and such loud sound was heard by the complainant until midnight. It was suspected that the sound came from the Hong Kong-Zhuhai-Macao Bridge (HZMB) construction works near the artificial	Closed	1	45

		island. In addition, a large area of pollution was observed on sea in the morning of the day the complainant made the complaint. It was suspected that was caused by the HZMB construction works. After investigation, there is no adequate information to conclude the complaint is related to this Contract.			
	17 April 2017	One environmental complaint was received on 17 April 2017, the organization which made the complaint, Green Sense, complained that “muddy water was observed at area surrounding the Hong Kong-Zhuhai-Macao Bridge (HZMB) artificial island, it is suspected that there were overflow muddy water from the artificial island. Tam Hoi-pong of Green Sense stated that there should not be too much muddy water if reclamation was conducted according to the EIA report. He suspected that there are problems of reclamation works, silt curtain have not effectively screen out the mud and sand, the construction works is not ideal and unable to ensure water quality. After investigation, there is no adequate information to conclude the complaint is related to this Contract.	Closed	2	46
	27 October 2017	A complaint forwarded to us by ENPO on 27 October 2017; the complainant complained that yellowish muddy water was discharged into the sea from construction site location C3 of the artificial island of the Hong	Closed	3	47

		Kong-Zhuhai-Macao Bridge and this has been persist for one week. After investigation, there is no adequate information to conclude the complaint is related to this Contract.			
	23 November 2017	IEC/ENPO received a complaint on 23 November 2017 which was referred by EPD, and subsequently referred to ET for investigation. The complainant complained that, on Hong Kong- Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Artificial Island, due to watering was not provided to all areas, large amount of fugitive dust was generated, especially at the toll kiosks. After investigation, there is no adequate information to conclude the complaint is related to this Contract.	Closed	4	48
<b>Notification of summons</b>	-	-	-	-	2
<b>Successful Prosecutions</b>	-	-	-	-	2

## Appendix K – Event Action Plan

### Event / Action Plan for Air Quality

Event	Action			
	ET Leader	IEC	ER	Contractor
<b>Action Level</b>				
Exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>2. Inform IEC and ER;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase monitoring frequency to daily.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify Contractor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rectify any unacceptable practice;</li> <li>2. Amend working methods if appropriate.</li> </ol>
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Identify source;</li> <li>2. Inform IEC and ER;</li> <li>3. Advise the ER on the effectiveness of the proposed remedial measures;</li> <li>4. Repeat measurements to confirm findings;</li> <li>5. Increase monitoring frequency to daily;</li> <li>6. Discuss with IEC and Contractor on remedial actions required;</li> <li>7. If exceedance continues, arrange meeting with IEC and ER;</li> <li>8. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor on possible remedial measures;</li> <li>4. Advise the ER on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise Implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Ensure remedial measures properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit proposals for remedial to ER within 3 working days of notification;</li> <li>2. Implement the agreed proposals;</li> <li>3. Amend proposal if appropriate.</li> </ol>

Event	Action			
	ET Leader	IEC	ER	Contractor
<b>Limit Level</b>				
Exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>2. Inform ER, Contractor and EPD;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase monitoring frequency to daily;</li> <li>5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor on possible remedial measures;</li> <li>4. Advise the ER on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Ensure remedial measures properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Amend proposal if appropriate.</li> </ol>

Event	Action			
	ET Leader	IEC	ER	Contractor
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Notify IEC, ER, Contractor and EPD;</li> <li>2. Identify source;</li> <li>3. Repeat measurement to confirm findings;</li> <li>4. Increase monitoring frequency to daily;</li> <li>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented;</li> <li>6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken;</li> <li>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results;</li> <li>8. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst ER, ET, and Contractor on the potential remedial actions;</li> <li>2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly;</li> <li>3. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented;</li> <li>4. Ensure remedial measures properly implemented;</li> <li>5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Resubmit proposals if problem still not under control;</li> <li>5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.</li> </ol>

Event / Action Plan for Construction Noise

Event	Action			
	ET Leader	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> <li>1. Notify IEC and Contractor;</li> <li>2. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>3. Report the results of investigation to the IEC, ER and Contractor;</li> <li>4. Discuss with the Contractor and formulate remedial measures;</li> <li>5. Increase monitoring frequency to check mitigation effectiveness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review the analysed results submitted by the ET;</li> <li>2. Review the proposed remedial measures by the Contractor and advise the ER accordingly;</li> <li>3. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Require Contractor to propose remedial measures for the analysed noise problem;</li> <li>4. Ensure remedial measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit noise mitigation proposals to IEC;</li> <li>2. Implement noise mitigation proposals.</li> </ol>
Limit Level	<ol style="list-style-type: none"> <li>1. Inform IEC, ER, EPD and Contractor;</li> <li>2. Identify source;</li> <li>3. Repeat measurements to confirm findings;</li> <li>4. Increase monitoring frequency;</li> <li>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented;</li> <li>6. Inform IEC, ER and EPD the causes and actions taken for the exceedances;</li> <li>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results;</li> <li>8. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst ER, ET, and Contractor on the potential remedial actions;</li> <li>2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly;</li> <li>3. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Require Contractor to propose remedial measures for the analysed noise problem;</li> <li>4. Ensure remedial measures properly implemented;</li> <li>5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Resubmit proposals if problem still not under control;</li> <li>5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.</li> </ol>

Event / Action Plan for Water Quality

Event	Action			
	ET Leader	IEC	ER	Contractor
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat <i>in situ</i> measurement to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IEC, contractor and ER;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, ER and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Repeat measurement on next day of exceedance to confirm findings.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor's working methods;</li> <li>2. Discuss with ET and Contractor on possible remedial actions;</li> <li>3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly;</li> <li>4. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of non-compliance in writing;</li> <li>2. Discuss with IEC on the proposed mitigation measures;</li> <li>3. Make agreement on mitigation measures to be implemented;</li> <li>4. Ensure mitigation measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment and consider changes of working methods;</li> <li>4. Discuss with ET and IEC on possible remedial actions and propose mitigation measures to IEC and ER;</li> <li>5. Implement the agreed mitigation measures.</li> <li>6. Amend working methods if appropriate.</li> </ol>

Event	Action			
	ET Leader	IEC	ER	Contractor
Action level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat <i>in situ</i> measurement to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IEC, Contractor and ER;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, ER and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Action level;</li> <li>8. Repeat measurement on next day of exceedance to confirm findings.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor's working method;</li> <li>2. Discuss with ET and Contractor on possible remedial actions;</li> <li>3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly;</li> <li>4. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of non-compliance in writing;</li> <li>2. Discuss with IEC on the proposed mitigation measures;</li> <li>3. Make agreement on mitigation measures to be implemented;</li> <li>4. Ensure mitigation measures are properly implemented;</li> <li>5. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the Engineer and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment and consider changes of working methods;</li> <li>4. Discuss with ET and IEC on possible remedial actions and propose mitigation measures to IEC and ER within 3 working days of notification;</li> <li>5. Implement the agreed mitigation measures;</li> <li>6. Amend working methods if appropriate.</li> </ol>

Event	Action			
	ET Leader	IEC	ER	Contractor
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat <i>in-situ</i> measurement to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IEC, Contractor, ER and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, ER and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor's working method;</li> <li>2. Discuss with ET and Contractor on possible remedial actions;</li> <li>3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly;</li> <li>4. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>3. Request Contractor to critically review the working methods;</li> <li>4. Ensure mitigation measures are properly implemented;</li> <li>5. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment and consider changes of working methods;</li> <li>4. Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER;</li> <li>5. Implement the agreed mitigation measures;</li> <li>6. Amend working methods if appropriate.</li> </ol>

Event	Action			
	ET Leader	IEC	ER	Contractor
Limit level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat <i>in-situ</i> measurement to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IEC, contractor, ER and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, ER and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor's working method;</li> <li>2. Discuss with ET and Contractor on possible remedial actions;</li> <li>3. Review the Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the ER accordingly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>3. Request Contractor to critically review the working methods;</li> <li>4. Make agreement on the mitigation measures to be implemented;</li> <li>5. Ensure mitigation measures are properly implemented;</li> <li>6. Assess the effectiveness of the implemented mitigation measures;</li> <li>7. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Take immediate action to avoid further exceedance;</li> <li>3. Rectify unacceptable practice;</li> <li>4. Check all plant and equipment and consider changes of working methods;</li> <li>5. Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER;</li> <li>6. Implement the agreed mitigation measures;</li> <li>7. Resubmit proposals of mitigation measures if problem still not under control;</li> <li>8. As directed by the Engineer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.</li> </ol>

Event / Action Plan for Dolphin Monitoring

Event	ET Leader	IEC	ER / SOR	Contractor
Action Level	<ol style="list-style-type: none"> <li>1. Repeat statistical data analysis to confirm findings;</li> <li>2. Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&amp;A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences;</li> <li>3. Identify source(s) of impact;</li> <li>4. Inform the IEC, ER/SOR and Contractor;</li> <li>5. Check monitoring data.</li> <li>6. Review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor;</li> <li>2. Discuss monitoring results and finding with the ET and the Contractor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss monitoring with the IEC and any other measures proposed by the ET;</li> <li>2. If ER/SOR is satisfied with the proposal of any other measures, ER/SOR to signify the agreement in writing on the measures to be implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER/SOR and confirm notification of the non-compliance in writing;</li> <li>2. Discuss with the ET and the IEC and propose measures to the IEC and the ER/SOR;</li> <li>3. Implement the agreed measures.</li> </ol>
Limit Level	<ol style="list-style-type: none"> <li>1. Repeat statistical data analysis to confirm findings;</li> <li>2. Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&amp;A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences;</li> <li>3. Identify source(s) of impact;</li> <li>4. Inform the IEC, ER/SOR and Contractor of findings;</li> <li>5. Check monitoring data;</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor;</li> <li>2. Discuss monitoring results and findings with the ET and the Contractor;</li> <li>3. Attend the meeting to discuss with ET, ER/SOR and Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures.</li> <li>4. Review proposals for additional monitoring and any other mitigation measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Attend the meeting to discuss with ET, IEC and Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures.</li> <li>2. If ER/SOR is satisfied with the proposals for additional dolphin monitoring and/or any other mitigation measures submitted by ET and Contractor and verified by IEC, ER/SOR to signify the agreement in writing on such</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER/SOR and confirm notification of the non-compliance in writing;</li> <li>2. Attend the meeting to discuss with ET, IEC and ER/SOR the necessity of additional dolphin monitoring and any other potential mitigation measures.</li> <li>3. Jointly submit with ET to IEC a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary.</li> <li>4. Implement the agreed additional dolphin monitoring</li> </ol>

	<p>6. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary.</p> <p>7. If ET proves that the source of impact is caused by any of the construction activity by the works contract, ET to arrange a meeting to discuss with IEC, ER/SOR and Contractor the necessity of additional dolphin monitoring and/or any other potential mitigation measures (e.g., consider to modify the perimeter silt curtain or consider to control/temporarily stop relevant construction activity etc.) and submit to IEC a proposal of additional dolphin monitoring and/or mitigation measures where necessary.</p>	<p>submitted by ET and Contractor and advise ER/SOR of the results and findings accordingly.</p> <p>5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise ER/SOR the results and findings accordingly.</p>	<p>proposals and any other mitigation measures.</p> <p>3. Supervise the implementation of additional monitoring and/or any other mitigation measures.</p>	<p>and/or any other mitigation measures.</p>
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