

China Harbour Engineering Company Limited

Contract No. HY/2010/02

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

Quarterly EM&A Summary Report for September 2015 – November 2015

[05/2016]

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

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AECOM Asia Co. Ltd.
15/F, Grand Central Plaza, Tower 1, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 3922 9000 Fax: (852) 2317 7609 www.aecom.com

30 May 2016

By Fax (3698 5999) and By Post

Ove Arup & Partners
Chief Resident Engineer's Office
5 Ying Hei Road, Tung Chung, Lantau
Hong Kong

Attention: Mr. Paul Appleton

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
Quarterly EM&A Report for September 2015 to November 2015**

Reference is made to the Environmental Team's submission of the Quarterly Environmental Monitoring & Audit Report for September 2015 to November 2015 certified by the ET Leader (ET's ref.: "60249820/C/RMKY16053001" dated 30 May 2016) and provided to us via e-mail on 30 May 2016.

We are pleased to inform you that we have no adverse comment on the captioned Quarterly Environmental Monitoring & Audit Report for September 2015 to November 2015.

Please be reminded that our verification to your report does not release any of your obligations in the EM&A Manual 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 Environ Hong Kong Limited



Raymond Dai
Independent Environmental Checker

c.c.	HyD	Mr. Matthew Fung	(By Fax: 3188 6614)
	HyD	Mr. Wai-Ping Lee	(By Fax: 3188 6614)
	AECOM	Ms. Echo Leong	(By Fax: 2317 7609)
	CHEC	Mr. Lim Kim Chuan	(By Fax: 2578 0413)

Internal: DY, YH, CL, 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 Environ Hong Kong Limited. 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 Project under the EPs was commenced on 12 March 2012 and will be tentatively completed by early Year 2017. The EM&A programme, including air quality, noise, water quality and dolphin monitoring and environmental site inspections, was commenced on 12 March 2012.

This report documents the findings of EM&A works conducted in the period between 1 September 2015 and 30 November 2015. As informed by the Contractor, major activities in the reporting quarter were:-

Marine-base

- Rock fill
- Marine fill
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Rubble Mound Seawall

Land-base

- Earthwork fill
- Surcharge removal & laying
- Deep Cement Mixing
- Removal of Temporary Seawall
- Vertical Band Drains
- Installations of Precast Culverts except sloping outfalls
- Geotechnical Instrumentation Works
- 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

A summary of monitoring and audit activities conducted in the reporting quarter is listed below:

24-hour Total Suspended Particulates (TSP) monitoring	16 sessions
1-hour TSP monitoring	16 sessions
Noise monitoring	13 sessions
Impact water quality monitoring	39 sessions
Impact dolphin monitoring	6 surveys
Joint Environmental site inspection	13 sessions

Breaches of Action and Limit Levels for Air Quality

All 1-Hour TSP and 24-Hour TSP results were below the Action and Limit Level in the reporting quarter.

Breaches of Action and Limit Levels for Noise

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

Breaches of Action and Limit Levels for Water Quality

For water quality, one (1) Action Level Exceedance of SS at SR7 during flood tide was recorded on 30 September 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month September 2015; one (1) Action Level Exceedance of SS at SR6 during flood tide was recorded on 2 October 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month October 2015; one (1) Action Level Exceedance of SS at IS(Mf)9 during flood tide was recorded on 6 Nov 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month November 2015.

Breaches of Action and Limit Levels for Impact Dolphin Monitoring

One (1) Limit Level exceedance of dolphin monitoring was recorded in the reporting quarter. 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 detail of investigation, please refer to appendix L.

Implementation Status and Review of Environmental Mitigation Measures

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

The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Project. 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

A complainant who lives at 1 Sky City Road East, Hong Kong SkyCity Marriott Hotel, Hong Kong International Airport, Lantau, Hong Kong complained to EPD's hotline on 23 October 2015 that loud noise were generated by HZMB artificial island construction site of China Harbour Engineering Company Ltd adjacent to the premises approximately between 10pm to 12am, during recent weekdays and Saturday. In addition, loud noise and dark smoke were noted on the construction site of HZMB artificial island during Sunday and public holiday. The complainant questioned whether the Contractor was allowed to conduct construction work during Sunday and public holiday. The complaint was referred by EPD to the project team of Contract No. HY/2010/02 to follow up on 23 October 2015. After investigation, with referred to the available information, it is unable to determine whether the night time noise complaint and the concerned dark smoke are related to this Contract.

No notification of summons or prosecution was received in the reporting period

1 INTRODUCTION

1.1 Background

- 1.1.1 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).
- 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 Environ Hong Kong Limited. 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 Project under the EPs was commenced on 12 March 2012 and will be tentatively completed by early Year 2017.
- 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 Contract commenced on 12 March 2012.

1.2 Scope of Report

- 1.2.1 This is the fifteen quarterly EM&A 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 September 2015 to 30 November 2015.

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
Engineer's Representative (ER) (Ove Arup & Partners Hong Kong Limited)	Chief Resident Engineer	Roger Marechal (Effective between 1 – 15 September 2015)	3698 5700	2698 5999
Engineer's Representative (ER) (Ove Arup & Partners Hong Kong Limited)	Chief Resident Engineer	Paul Appleton (Effective 16 September 2015 onward)	3698 5889	2698 5999
IEC / ENPO (Ramboll Environ Hong Kong Limited)	Independent Environmental Checker	Raymond Dai	3465 2888	3465 2899
	Environmental Project Office Leader	Y. H. Hui	3547 2133	3465 2899
Contractor (China Harbour Engineering Company Limited)	Environmental Officer	Louie Chan	36932254	2578 0413
	24-hour Hotline	Alan C.C. Yeung	9448 0325	--
ET (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 Project 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 quarter are listed below:-

Marine-base

- Rock fill
- Marine fill
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Rubble Mound Seawall

Land-base

- Earthwork fill
 - Surcharge removal & laying
 - Deep Cement Mixing
 - Removal of Temporary Seawall
 - Vertical Band Drains
 - Installations of Precast Culverts except sloping outfalls
 - Geotechnical Instrumentation Works
 - 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
- 1.4.3 The 3-month rolling construction programme of the Project 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 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.
- 2.1.5 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.
- 2.1.6 The monitoring locations used during the reporting quarter are depicted in Figures 2, 3 and 4 respectively.
- 2.1.7 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 and water quality monitoring were derived from the baseline air and water quality monitoring results at the respective monitoring stations, 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 and water 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 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 AMS7A).
- 3.1.2 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.
- 3.1.3 Reference is made to ET's proposal of relocation of air quality monitoring station (AMS7A) 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.
- 3.1.4 The weather was mostly fine and sunny, with occasional cloudy in the reporting quarter. The major dust source in the reporting quarter included construction activities from the Contract, as well as nearby traffic emissions.
- 3.1.5 The number of monitoring events and exceedances recorded in each month of the reporting quarter are presented in Table 3.1 and Table 3.2 respectively.

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

Monitoring Parameter	Location	No. of monitoring events		
		September 15	October 15	November 15
1-hr TSP	AMS2	18	15	15
	AMS3B	18	15	15
	AMS7A	18	15	15
24-hr TSP	AMS2	6	5	5
	AMS3B	6	5	5
	AMS7A	6	5	5

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

Monitoring Parameter	Location	Level of Exceedance	Numbers of Exceedance		
			September 15	October 15	November 15
1-hr TSP	AMS2	Action	0	0	0
		Limit	0	0	0
	AMS3B	Action	0	0	0
		Limit	0	0	0
	AMS7A	Action	0	0	0
		Limit	0	0	0
		Total	0	0	0
24-hr TSP	AMS2	Action	0	0	0
		Limit	0	0	0
	AMS3B	Action	0	0	0
		Limit	0	0	0
	AMS7A	Action	0	0	0
		Limit	0	0	0
		Total	0	0	0

- 3.1.6 All 24-Hour TSP and 1-Hour TSP results were below the Action and Limit Level in the reporting quarter.

3.1.7 The event action plan is annexed in Appendix K.

3.1.8 Meteorological information collected from the wind station during the monitoring periods on the monitoring dates, as shown in Figure 2, including wind speed and wind direction, is annexed in Appendix H of monthly EM&A report September 2015, October 2015 and November 2015 respectively.

3.2 Noise Monitoring

- 3.2.1 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 quarter.
- 3.2.2 The monitoring locations used during the reporting quarter are depicted in Figure 2.
- 3.2.3 No Action or Limit Level Exceedance of construction noise was recorded in the reporting quarter.
- 3.2.4 Major noise sources during the noise monitoring included construction activities of the Project and nearby traffic noise.
- 3.2.5 The number of impact noise monitoring events and exceedances are summarized in Table 3.3 and Table 3.4 respectively.

Table 3.3 Summary of Number of Monitoring Events for Impact Noise

Monitoring Parameter	Location	No. of monitoring events		
		September 15	October 15	November 15
	NMS2	5	4	4
	NMS3B	5	4	4

Table 3.4 Summary of Number of Monitoring Exceedances for Impact Noise

Monitoring Parameter	Location	Level of Exceedance	Level of Exceedance		
			September 15	October 15	November 15
	NMS2	Action	0	0	0
		Limit	0	0	0
	NMS3B	Action	0	0	0
		Limit	0	0	0
		Total	0	0	0

- 3.2.6 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.
- 3.2.7 The event action plan is annexed in Appendix K.

3.3 Water Quality Monitoring

3.3.1 The monitoring locations used during the reporting quarter are depicted in Figure 3.

Table 3.5 Summary of Water Quality Exceedances in September 2015 – November 2015

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	0	0	0	0	0	0	0	0
	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	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)9	Action	0	0	0	0	0	0	0	(1) 6 Nov 15	0	(1) 6 Nov 15
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)11	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)16	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS17	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR3	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR4(N)	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR5	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR6	Action	0	0	0	0	0	0	0	(1) 2 Oct 2015	0	(1) 2 Oct 2015
	Limit	0	0	0	0	0	0	0	0	0	0
SR7	Action	0	0	0	0	0	0	0	(1) 30 Sept 2015	0	(1) 30 Sept 2015
	Limit	0	0	0	0	0	0	0	0	0	0
SR10A	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR10B (N)	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
Total	Action	0	0	0	0	0	0	0	3		3
	Limit	0	0	0	0	0	0	0	0		0

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

- 3.3.2.2 Exceedance recorded at SR7 during mid-flood tide is unlikely due to marine based construction activities of the Project:
- 3.3.2.3 With reference to the silt curtain checking record of 30 September 2015, defects such as missing segment or disconnection of the perimeter silt curtain were not observed at north part of the perimeter silt curtain.
- 3.3.2.4 With referred to the attached layout map, no marine based construction work was conducted at north part of the HKBCF reclamation works on 30 September 2015 and no silt plume was observed to flow from the inside of the perimeter silt curtain to the outside of the perimeter silt curtain when monitoring was conducted during flood tide.
- 3.3.2.5 Photo record which shows the sea condition at north part of the HKBCF reclamation works during flood tide on 30 September 2015.

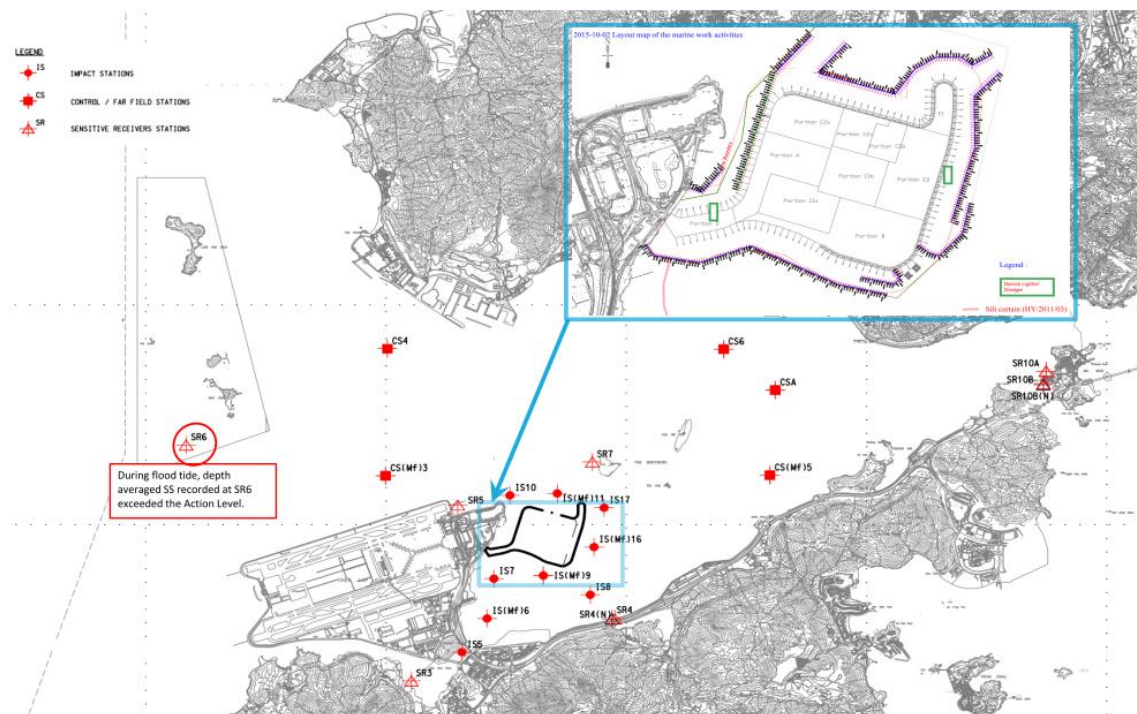


- 3.3.2.6 Also, turbidity level recorded at IS(Mf)11, IS10, IS17 and SR7 were 10.6(NTU), 14.5(NTU), 15.8(NTU) and 9.9(NTU) respectively; Suspended solids level recorded at IS(Mf)11, IS10 and IS17 were 14.2 mg/L, 16 mg/L and 8.3 mg/L respectively, which were all below the action and limit level. This indicates the turbidity level at or near SR7 and Suspended Solids level near SR7 was not adversely affected.
- 3.3.2.7 Impact water quality monitoring stations IS(Mf)11, IS10 and IS17 are located relatively closer to the construction site of HKBCF reclamation works but no IWQM exceedance was recorded on 30 September 2015 during flood tide. This indicates that the SS exceedance recorded at SR7 on 30 September 2015 during flood tide was unlikely due to activities of HKBCF reclamation works.
- 3.3.2.8 The exceedance was likely due to local effects in the vicinity of SR7.
- 3.3.2.9 After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract.
- 3.3.2.10 Action taken under the action plan:
1. Not applicable as SS was not measured *in situ*;
 2. After considering the above mentioned investigation results, it appears that it was unlikely that the SS exceedances were attributed to active construction activities of this Contract;
 3. IEC, contractor and ER were informed via email;
 4. Monitoring data, all plant, equipment and Contractor's working methods were checked;
 5. Since it is considered that the SS exceedance is unlikely to be project related, as such, actions 5-7 under the EAP are not considered applicable.

- 3.3.2.11 The exceedences noted were of a localised nature and in the north of HKBCF (on 30 September 2015), the north of the Brothers Island, at NEL. Short duration local increased sedimentation is not anticipated to affect the dolphins which may have occurred in the western reached of NWL.
- 3.3.2.12 Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains and to carry out maintenance work once defects were found.
- 3.3.2.13 Maintenance work of the silt curtain was carried out by the Contractor on a daily basis except Sunday and public holiday

3.3.3 For water quality, one (1) Action Level Exceedance of SS at SR6 during flood tide was recorded on 02 October 2015.

3.3.3.1 Layout map below shows that vessel activities were carried out out on 2 October 2015. One derrick/dredger was at Portion D and one derrick/dredger was outside Portion E2 during flood tide on 2 October 2015.



3.3.3.2 Exceedance recorded at SR6 during mid-flood tide is unlikely due to marine based construction activities of the Project:

3.3.3.3 With reference to the silt curtain checking record of 02 October 2015, defects such as missing segment or disconnection of the perimeter silt curtain were not observed at north part of the perimeter silt curtain.

3.3.3.4 With referred to the above layout map, no marine based construction work was conducted at north part of the HKBCF reclamation works on 02 October 2015 and no silt plume was observed to flow from the inside of the perimeter silt curtain to the outside of the perimeter silt curtain when monitoring was conducted during flood tide.

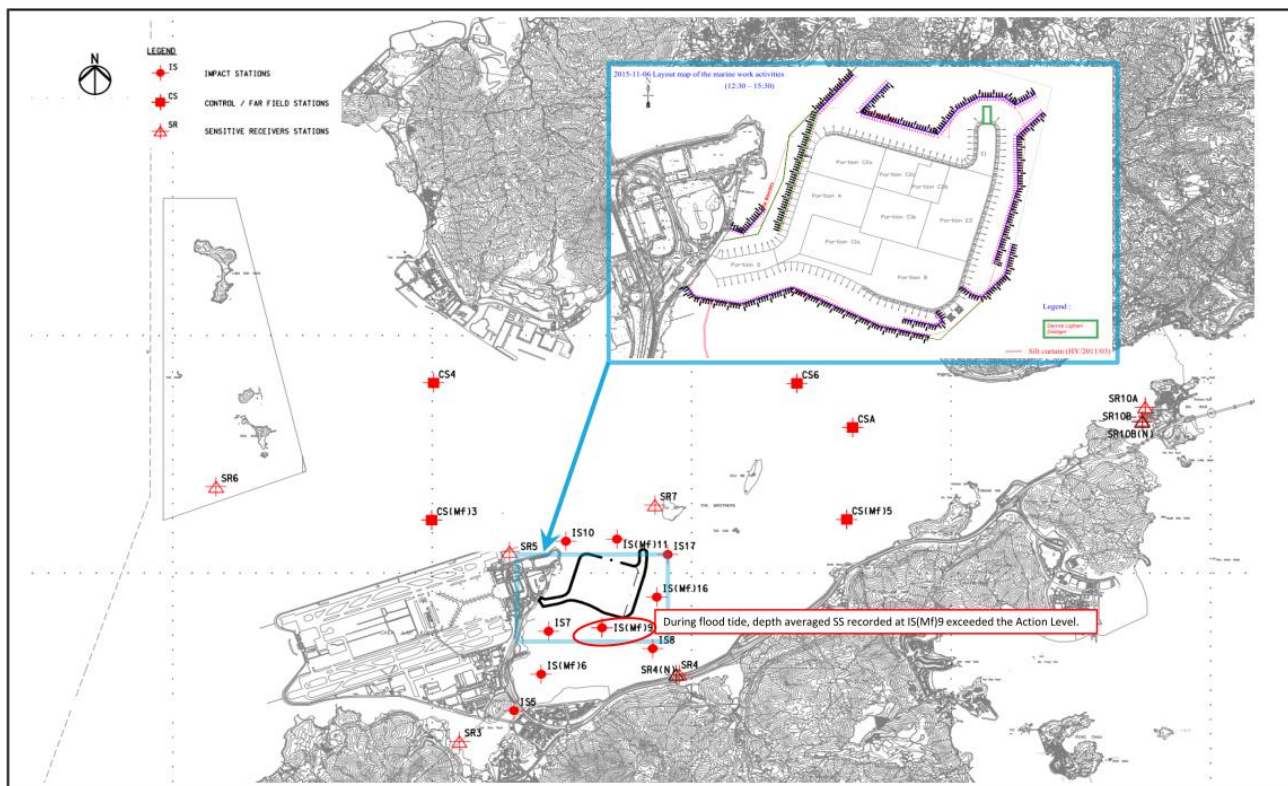
3.3.3.5 Photo record which shows the sea condition at north part of the HKBCF reclamation works during flood tide on 02 October 2015



- 3.3.3.6 Monitoring Stations IS10, IS(Mf)16, IS(Mf)11, IS17 & SR5 and control station CS(Mf)3 which are considered downstream and/or closer to active works than Monitoring Station SR6. Since the Suspended Solids values recorded at IS10, IS(Mf)11, SR5 and CS(Mf)3 are all below the Action and Limit Level during same tide on the same day. This indicates that the water quality at downstream of and/or closer to active works were not adversely affected by active works. As such, it is considered that the exceedance recorded at SR6 is not related to the Project.
- 3.3.3.7 The monitoring site SR6 is relatively far away from Portion D and E2 where works were carried out.
- 3.3.3.8 Turbidity level and suspended solids level recorded at CS(Mf)3 were 20.1 (NTU) and 29.4 mg/L respectively which were slightly higher than the turbidity level (19.2 NTU) and suspended solids (24mg/L) level recorded at SR6. However, turbidity level recorded at IS(Mf)11, IS10, IS17, SR5 and IS(Mf)16 were 15.8(NTU), 16.2(NTU), 11.4(NTU), 19.5(NTU) and 15.7(NTU) respectively; Suspended solids level recorded at IS(Mf)11, IS10, IS17, SR5 and IS(Mf)16 were 8.7 mg/L, 23.1 mg/L, 5.9 mg/L, 12.2 mg/L and 5.5 mg/L respectively, which were all below the action and limit level. This indicates the turbidity and suspended solids level at monitoring stations relatively closer to active works than sensitive receiver station SR6 and control station CS(Mf)3 were not adversely affected.
- 3.3.3.9 The exceedance was likely due to local effects in the vicinity of SR6.
- 3.3.3.10 Action taken under the action plan:
1. Not applicable as SS was not measured *in situ*;
 2. After considering the above mentioned investigation results, it appears that it was unlikely that the SS exceedances were attributed to active construction activities of this Contract;
 3. IEC, contractor and ER were informed via email;
 4. Monitoring data, all plant, equipment and Contractor's working methods were checked;
 5. Since it is considered that the SS exceedance is unlikely to be project related, as such, actions 5-7 under the EAP are not considered applicable.
- 3.3.3.11 Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains and to carry out maintenance work once defects were found.
- 3.3.3.12 Maintenance work of the silt curtain was carried out by the Contractor on a daily basis except Sunday and public holiday.

3.3.4 For water quality, one (1) Action Level Exceedance of SS at IS(Mf)9 during flood tide was recorded on 6 November 2015.

3.3.4.1 Layout map below shows that the construction activities conducted during flood tide on 6 November 2015, derrick lighter or dredger was working at north of HKBCF reclamation works which was far away from where IS(Mf)9 is located, therefore the construction activities was considered unlikely to cause the SS exceedances recorded at IS(Mf)9 during mid-flood tide.



3.3.4.2 Exceedance recorded at IS(Mf)9 during mid-flood tide is unlikely due to marine based construction activities of the Project:

3.3.4.3 With reference to the silt curtain checking record, defects such as disconnection of the silt curtain was not observed at south part of the perimeter silt curtain which are close to the IS(Mf)9.

3.3.4.4 Furthermore, no filling activities was observed in progress at the sea area south to HKBCF reclamation works and no silt plume was observed to flow from the inside of the perimeter silt curtain to the outside of the perimeter silt curtain when monitoring was conducted at IS(Mf)9. Also refer to the attached photo record taken at sea area located south of HKBCF reclamation works on 6 November 2015 for reference of sea condition on 6 November 2015, which shows that no silt plume was observed.

3.3.4.5 Photo record which shows the sea condition at southern part of the HKBCF reclamation works on 06 November 2015. No silt plume was observed.



3.3.4.6 The turbidity data obtained from monitoring station IS7 and IS(Mf)9, IS8 and IS(Mf)6 which located at/near the vicinity of sea area at south of HKBCF reclamation works, did not exceed the action and limit level. This indicates the turbidity level at/near IS(Mf)9 was not adversely affected.

3.3.4.7 As such, the exceedance was likely due to local effects in the vicinity of IS(Mf)9.

3.3.4.8 Action taken under the action plan:

1. Not applicable as SS was not measured *in situ*;
2. After considering the above mentioned investigation results, it appears that it was unlikely that the SS exceedances were attributed to active construction activities of this Contract;
3. IEC, contractor and ER were informed via email;
4. Monitoring data, all plant, equipment and Contractor's working methods were checked;
5. Since it is considered that the SS exceedance is unlikely to be project related, as such, actions 5-7 under the EAP are not considered applicable.

3.3.4.9 Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains and to carry out maintenance work once defects were found.

3.3.4.10 Maintenance work of the silt curtain was carried out by the Contractor on a daily basis except Sunday and public holiday.

3.3.5 The event action plan is annexed in Appendix K.

3.4 Dolphin Monitoring

- 3.4.1 In accordance with the Contract Specific EM&A Manual, pre-set and fixed transect line vessel based dolphin survey was required in two AFCD designated areas (Northeast Lantau (NEL) and Northwest Lantau (NWL) survey areas). The impact dolphin monitoring at each survey area should be conducted twice per month.
- 3.4.2 The impact dolphin monitoring conducted is vessel-based and combines line-transect and photo-ID methodology, which have adopted similar survey methodologies as that adopted during baseline monitoring to facilitate comparisons between datasets.
- 3.4.3 The layout map of impact dolphin monitoring have been provided by AFCD and is shown in Figure 4.
- 3.4.4 The effort summary and sighting details during the reporting quarter are shown in the Appendix H. A summary of key findings of the dolphin surveys completed during the reporting quarter is shown below:

Table 3.6 Summary of Key Dolphin Survey Findings in September 2015 – November 2015

Number of Impact Surveys Completed^	6
Survey Distance Travelled under Favourable On- Effort Condition	650.7km
Number of Sightings	13 sightings (7 sightings are "on effort" (which are all under favourable condition), 6 sightings are "opportunistic")
Number of dolphin individual sighted	36 individuals (the best estimated group size)
Dolphin Encounter Rate#	NEL: 0 NWL: 1.7
Dolphin Group Size	Average of NEL: 0 Average of NWL: 2.8 Varied from 1-6 individuals
Most Often frequent dolphin sighting area	Northern Sha Chau and Lung Kwu Chau Marine Park, the western limit of NWL and Tai O area.

Remarks:

^ Completion of line transect survey of NEL and NWL survey area once was counted as one complete survey.
 # Dolphin Encounter Rate = (Sum of 1st 2nd, 3rd month's total sighting/ Sum of 1st, 2nd, 3rd month's total effort)*100km (encounter rates are calculated using on effort sightings made under favourable conditions only.)

- 3.4.5 One (1) Limit Level exceedance of dolphin monitoring was recorded in the reporting quarter. 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 detail of investigation, please refer to appendix L.

Table 3.7 Summary of STG and ANI encounter rates in September 2015 – November 2015

	NEL	NWL	Level Exceeded
STG*	0	1.9	Limit
ANI**	0	3.8	

*Quarterly Average Encounter Rate of Number of Dolphin Sightings (STG) presents averaged encounter rates of the three monitored months in terms of groups per 100km per survey event.

STG Encounter rate = (Average of (total number sighting/total effort) of 1st and 2nd completed survey# of 1st month+ Average of (total number sighting/total effort) of 1st and 2nd completed survey# of 2nd month + Average of (total number sighting/total effort) of 1st and 2nd completed survey# of 3rd month)/3*100km

**Quarterly Average Encounter Rate of Total Number of Dolphins (ANI) presents averaged encounter rates of the three monitored months in terms of individuals per 100km per survey event.

ANI Encounter rate = (Average of (total number of Individual/total effort) of 1st and 2nd completed survey# of 1st month+ Average of (total number of Individual/total effort) of 1st and 2nd completed survey# of 2nd month + Average of (total number of Individual/total effort) of 1st and 2nd completed survey# of 3rd month +)/3*100km

- 3.4.6 Details of the comparison and analysis methodology and their findings and discussions are annexed in Appendix H.

3.5 Environmental Site Inspection and Audit

3.5.1 Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Project. In the reporting quarter, 13 site inspections were carried out. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.

3.5.2 Particular observations during the site inspections are described below:

Air Quality

3.5.3 The Contractor was reminded to continue to provide sufficient dust control to prevent generation of fugitive dust. (Reminder)

3.5.4 Fugitive dust was observed when vehicle was drove pass the road, during grout production process and during rock filling process. The Contractor was reminded to provide sufficient dust control to prevent generation of fugitive dust. The Contractor subsequently provided dust control measures to the area. (Closed)

3.5.5 Dark smoke emission was observed from plant/equipment of derrick barge and pelican barge and on at Portion E1, the Contractor was advised to provide measures to avoid emission of dark smoke. The Contractor subsequently provided measures to avoid emission of dark smoke. (Closed)

Noise

3.5.6 No relevant adverse impact was observed in the reporting quarter.

Water Quality

3.5.7 A deformed drip tray was observed on site. The Contractor was reminded to provide drip tray which can effectively contain potential leakage of oil. The Contractor subsequently provided drip tray without defect. (Closed)

3.5.8 Gaps between vehicle accesses were observed on the landing barge near Portion E1. The Contractor was reminded to provide measure to prevent potential runoff on the landing barge. (Reminder)

3.5.9 Material was observed stockpiled on cells at Portion E1 and near Portion C2a. The Contractor was reminded to provide preventative measures to the works process to prevent runoff. The Contractor subsequently removed the material from Portion E1. (Closed)

3.5.10 Delivery pipe of floating grout production facilities was observed not fully enclosed. The Contractor was reminded to ensure full enclosure and prevent any potential runoff. The Contractor subsequently provided full enclosure to delivery pipes of the grout production facilities. (Closed)

3.5.11 Disconnection of secondary protective pipe was observed, the Contractor was reminded provide effective measures to avoid any wastewater discharged from the grouting production process or domestic sewage to the sea. The Contractor subsequently provided maintenance to the disconnected pipes. (Closed)

3.5.12 Pipes were observed at Portion E1, the Contractor was reminded to provide preventive measures and avoid potential release of turbid water. (Reminder)

3.5.13 The Contractor was reminded to provide preventive measures, such as liner and bunding, for the stockpile of excavated materials at Portion C2a and C2b. (Reminder)

3.5.14 Runoff was observed onsite and silt plume was observed by at the sea area by the seawall near Portion C2a. The Contractor was advised to provide control measures to prevent runoff. The Contractor subsequently provided measures to prevent runoff. (Closed)

- 3.5.15 Turbid water was observed at Portion E1, the Contractor was reminded to prevent runoff of turbid water. The Contractor subsequently provided measures to prevent runoff of turbid water. (Closed)
- 3.5.16 Silt curtain was observed temporarily disconnected during maintenance. The Contractor was reminded the silt curtain should be reinstated after maintenance is completed. The Contractor subsequently collect the silt curtain. (Reminder)

Chemical and Waste Management

- 3.5.17 The Contractor was reminded to remove the water mixture which accumulated inside the drip trays at Portion C2a and dispose of as chemical waste properly. The Contractor subsequently removed the water mixture inside drip tray. (Closed)
- 3.5.18 It was observed that sand was loaded inside drip trays. The Contractor was reminded to clear the sand inside drip tray. The Contractor subsequently cleared the sand inside drip tray. (Closed)
- 3.5.19 It was observed that water and oil mixture accumulated inside drip tray at Portion E2. The Contractor was reminded to clear the sand inside drip tray. The Contractor subsequently cleared the water and oil mixture accumulated inside drip tray. (Closed)
- 3.5.20 Bags of inert waste were observed on site, the Contractor was reminded to collect and dispose them of properly and regularly. (Reminder)
- 3.5.21 General refuses were observed at Portion D and Portion E. The Contractor was reminded to regular collect and dispose of the general refuses on site to keep the site clean and tidy. The Contractor subsequently collected and removed the general refuses at Portion D. (Closed)
- 3.5.22 Oil drum were observed without drip tray on barge GD852, the Contractor was reminded to provide drip tray to oil drums. The oil drums were subsequently removed by the Contractor. (Closed)
- 3.5.23 A generator was observed without drip tray, the Contractor was reminded to provide drip tray to generator. The Contractor subsequently provided drip tray to generator. (Closed)

Landscape and Visual Impact

- 3.5.24 No relevant adverse impact was observed in the reporting quarter.

Others

- 3.5.25 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 project. Sufficient numbers of receptacles were available for general refuse collection and sorting.
- 4.1.2 As advised by the Contractor, 142,892m³ of fill were imported for the Project use in the reporting period. 672kg of paper/cardboard packaging and 221m³ of general refuse were generated and disposed of in the reporting period. Monthly 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.

5 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

5.1 Implementation Status of Environmental Mitigation Measures

- 5.1.1 In response to the site audit findings, the Contractors carried out corrective actions.
- 5.1.2 A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in Appendix C. Most of the recommended mitigation measures are being upheld. 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.
- 5.1.3 Training of marine travel route for marine vessels operator was given to relevant staff and relevant records were kept properly.
- 5.1.4 Regarding the implementation of dolphin monitoring and protection measures (i.e. implementation of Dolphin Watching Plan, Dolphin Exclusion Zone and Silt Curtain integrity Check), regular checks were conducted by experienced MMOs within the works area to ensure that no dolphins were trapped by the silt curtain area. There were no dolphins spotted within the silt curtain during this quarter. The relevant procedures were followed and all measures were well implemented. The silt curtains were also inspected in accordance to the submitted plan.
- 5.1.5 Acoustic decoupling measures on noisy plants on construction vessels were checked regularly and the Contractor was reminded to ensure provision of ongoing maintenance to noisy plants and to carry out improvement work once insufficient acoustic decoupling measures were found.
- 5.1.6 As informed by the Contractor, an area of Portion B has been handed over to other Contract and the perimeter silt curtain near this area of Portion B has been rearranged on 31 July 2015 for berthing another Contractor's vessels (which do not belong to this Contract). IEC/ENPO was informed on 5 Aug 2015 immediately after ET's review. IEC/ENPO provided further comments on 1 September 2015, ET responded 2 September 2015 with notification letter ref.:60249820/rmky15090201. IEC/ENPO expressed no further comment via letter ref.: HYDZMBEEM00_0_03351L.15 on 8 September 2015 for the removal of section of perimeter silt curtain near Portion B of HKBCF. EPD replied on 24 September 2015 via memo (39) in Ax(1) to EP2/G/A/146 pt.8 and reminded HyD that if grouting trial is undertaken, to adhere to the VEP requirement and undertake the necessary.
- 5.1.7 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 within the

6 SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

6.1 Summary of Exceedances of the Environmental Quality Performance Limit

- 6.1.1 All 1-Hour TSP and 24-Hour TSP results were below the Action and Limit Level in the reporting quarter.
- 6.1.2 For construction noise, no exceedance was recorded at all monitoring stations in the reporting quarter.
- 6.1.3 For water quality, one (1) Action Level Exceedance of SS at SR7 during flood tide was recorded on 30 September 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month September 2015; one (1) Action Level Exceedance of SS at SR6 during flood tide was recorded on 2 October 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month October 2015; one (1) Action Level Exceedance of SS at IS(Mf)9 during flood tide was recorded on 6 Nov 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month November 2015.
- 6.1.4 One (1) Limit Level exceedance of dolphin monitoring was recorded in the reporting quarter. 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 detail of investigation, please refer to appendix L.
- 6.1.5 A complainant who lives at 1 Sky City Road East, Hong Kong SkyCity Marriott Hotel, Hong Kong International Airport, Lantau, Hong Kong complained to EPD's hotline on 23 October 2015 that loud noise were generated by HZMB artificial island construction site of China Harbour Engineering Company Ltd adjacent to the premises approximately between 10pm to 12am, during recent weekdays and Saturday. In addition, loud noise and dark smoke were noted on the construction site of HZMB artificial island during Sunday and public holiday. The complainant questioned whether the Contractor was allowed to conduct construction work during Sunday and public holiday. The complaint was referred by EPD to the project team of Contract No. HY/2010/02 to follow up on 23 October 2015. After investigation, with referred to the available information, it is unable to determine whether the night time noise complaint and the concerned dark smoke are related to this Contract.
- 6.1.6 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 The Environmental Complaint Handling Procedure is annexed in Figure 5.

7.1.2 A complainant who lives at 1 Sky City Road East, Hong Kong SkyCity Marriott Hotel, Hong Kong International Airport, Lantau, Hong Kong complained to EPD's hotline on 23 October 2015 that loud noise were generated by HZMB artificial island construction site of China Harbour Engineering Company Ltd adjacent to the premises approximately between 10pm to 12am, during recent weekdays and Saturday. In addition, loud noise and dark smoke were noted on the construction site of HZMB artificial island during Sunday and public holiday. The complainant questioned whether the Contractor was allowed to conduct construction work during Sunday and public holiday. The complaint was referred by EPD to the project team of Contract No. HY/2010/02 to follow up on 23 October 2015.

7.1.2.1 Investigation Actions for part of the complaint which is related to noise:

- Relevant CNPs applicable and valid for this Contract were reviewed.
- CNP compliance checking record from 1 to 23 October 2015 provided by the Contractor has been reviewed; please see the following for details of investigation results.
- Although sufficient details of the noise problem (such as exact date and location) were not provided by the complainant, the construction activities conducted from 1- 23 October 2015 were checked.

7.1.2.2 Investigation and Findings for part of the complaint which is related to noise:

- For information such as i) CNP No.; ii) works location specified under the CNP; iii) the numbers and types of PME allowed to use under the CNP; iv) the working hours stated in the CNP, please refer to copy of CNP#GW-RS1046-15 and CNP# GW-RS0536-15 which could be accessed online: <https://epic.epd.gov.hk/eForm/cnp/download.jsp?lang=eng>
- Construction activities conducted between 1 – 23 October 2015 were reviewed. It is noted that deep cement mixing, box culvert works, removal of surcharge or installation of Hydraulic Band drain were all/partially in operation during restricted hours.
- However, compliance checking record from 1 to 23 October 2015 provided by the Contractor was reviewed and it shows that construction works were carried out in compliance with the CNP in force.

7.1.2.3 As such, with referred to the available information, it is unable to determine whether the night time noise complaint is related to this Contract.

7.1.2.4 Investigation Actions for part of the complaint which is related to air quality:

- Reviewed 1-hour TSP and 24-hours TSP monitoring data within the construction period 1 - 23 October 2015.
- Weekly site inspections jointly conducted by ET, RSS, the Contractor or IEC between 1 - 23 October 2015 and the observations made during this weekly site inspection were reviewed. Please see the following for details of investigation results.

7.1.2.5 Investigation and Findings for part of the complaint which is related to air quality:

- No impact air quality monitoring exceedance was recorded in October 2015 (also refer to attached Appendix G impact air quality monitoring data for reference.)
- Weekly site inspection was jointly conducted by ET, RSS and the Contractor on 2, 8, 22 October 2015 and by ET, RSS, the Contractor; and with ET, RSS, Contractor and IEC on 15 October 2015. During the weekly site inspections on 8 and 15 October 2015, dark smoke emission from barge was observed at North-eastern part of the HKBCF reclamation site which relatively far away from where the complainant resided. The duration of the dark smoke emissions were not more than the regulatory limit of emission for more than 6 minutes in any period of 4 hours or for more than 3 minutes continuously at

any one time. Nonetheless, the Contractor was reminded to prevent the emission of dark smoke and the Contractor subsequently provided measures to avoid emission of it.

- In addition, there is no sufficient information, such as photos provided by the complainant to make sure that the concerned dark smoke are related to this Contract.

7.1.2.6 With referred to the available information, it is unable to determine whether concerned dark smoke are related to this Contract.

7.1.2.7 Recommendations for the part of the complaint which is related to noise:

- The Contractor was reminded to continue to strictly follow with all terms and conditions of a valid CNP.

7.1.2.8 Recommendation for the part of the complaint which is related to air quality:

- The Contractor was reminded that all plant and equipment should be well maintained and in good condition and ensure dark smoke emission from plant/equipment is effectively avoided.

7.1.3 No notification of summons or prosecution was received in the reporting quarter.

7.1.4 Statistics on complaints, notifications of summons and successful prosecutions are summarized in Appendix N.

8 COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

8.1 Comments on mitigation measures

8.1.1 According to the environmental site inspections performed in the reporting quarter, the following recommendations were provided:

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.
- Regular review and provide maintenance to dust control measures such as sprinkler system.

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.
- Acoustic decoupling measures should be properly implemented for all existing and incoming construction vessels with continuous and regularly checking to ensure effective implementation of acoustic decoupling measures.

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.

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.

Landscape and Visual Impact

- All existing, retained/transplanted trees at the works areas should be properly fenced off and regularly inspected.
- Control night-time lighting and glare by hooding all lights.

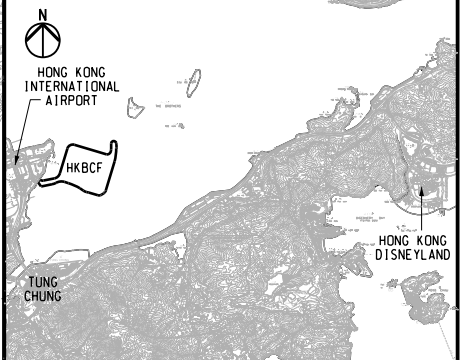
8.2 Recommendations on EM&A Programme

- 8.2.1 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 Project. With implementation of recommended effective environmental mitigation measures, the Project's environmental impacts were considered as environmentally acceptable. The weekly environmental site inspections ensured that all the environmental mitigation measures recommended were effectively implemented.
- 8.2.2 The recommended environmental mitigation measures, as included in the EM&A programme, effectively minimize the potential environmental impacts from the Project. 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.

8.3 Conclusions

- 8.3.1 The construction phase and EM&A programme of the Project commenced on 12 March 2012.
- 8.3.2 All 1-Hour TSP and 24-Hour TSP results were below the Action and Limit Level in the reporting quarter.
- 8.3.3 For construction noise, no exceedance was recorded at all monitoring stations in the reporting quarter.
- 8.3.4 For water quality, one (1) Action Level Exceedance of SS at SR7 during flood tide was recorded on 30 September 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month September 2015; one (1) Action Level Exceedance of SS at SR6 during flood tide was recorded on 2 October 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month October 2015; one (1) Action Level Exceedance of SS at IS(Mf)9 during flood tide was recorded on 6 Nov 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in the reporting month November 2015.
- 8.3.5 One (1) Limit Level exceedance of dolphin monitoring was recorded in the reporting quarter. 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 detail of investigation, please refer to appendix L.
- 8.3.6 Environmental site inspection was carried out 13 times in the reporting quarter. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.
- 8.3.7 A complainant who lives at 1 Sky City Road East, Hong Kong SkyCity Marriott Hotel, Hong Kong International Airport, Lantau, Hong Kong complained to EPD's hotline on 23 October 2015 that loud noise were generated by HZMB artificial island construction site of China Harbour Engineering Company Ltd adjacent to the premises approximately between 10pm to 12am, during recent weekdays and Saturday. In addition, loud noise and dark smoke were noted on the construction site of HZMB artificial island during Sunday and public holiday. The complainant questioned whether the Contractor was allowed to conduct construction work during Sunday and public holiday. The complaint was referred by EPD to the project team of Contract No. HY/2010/02 to follow up on 23 October 2015. After investigation, with referred to the available information, it is unable to determine whether the night time noise complaint and the concerned dark smoke are related to this Contract.
- 8.3.8 No notification of summons or prosecution was received in the reporting quarter.
- 8.3.9 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 quarter.
- 8.3.10 The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Project. 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.
- 8.3.11 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.

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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

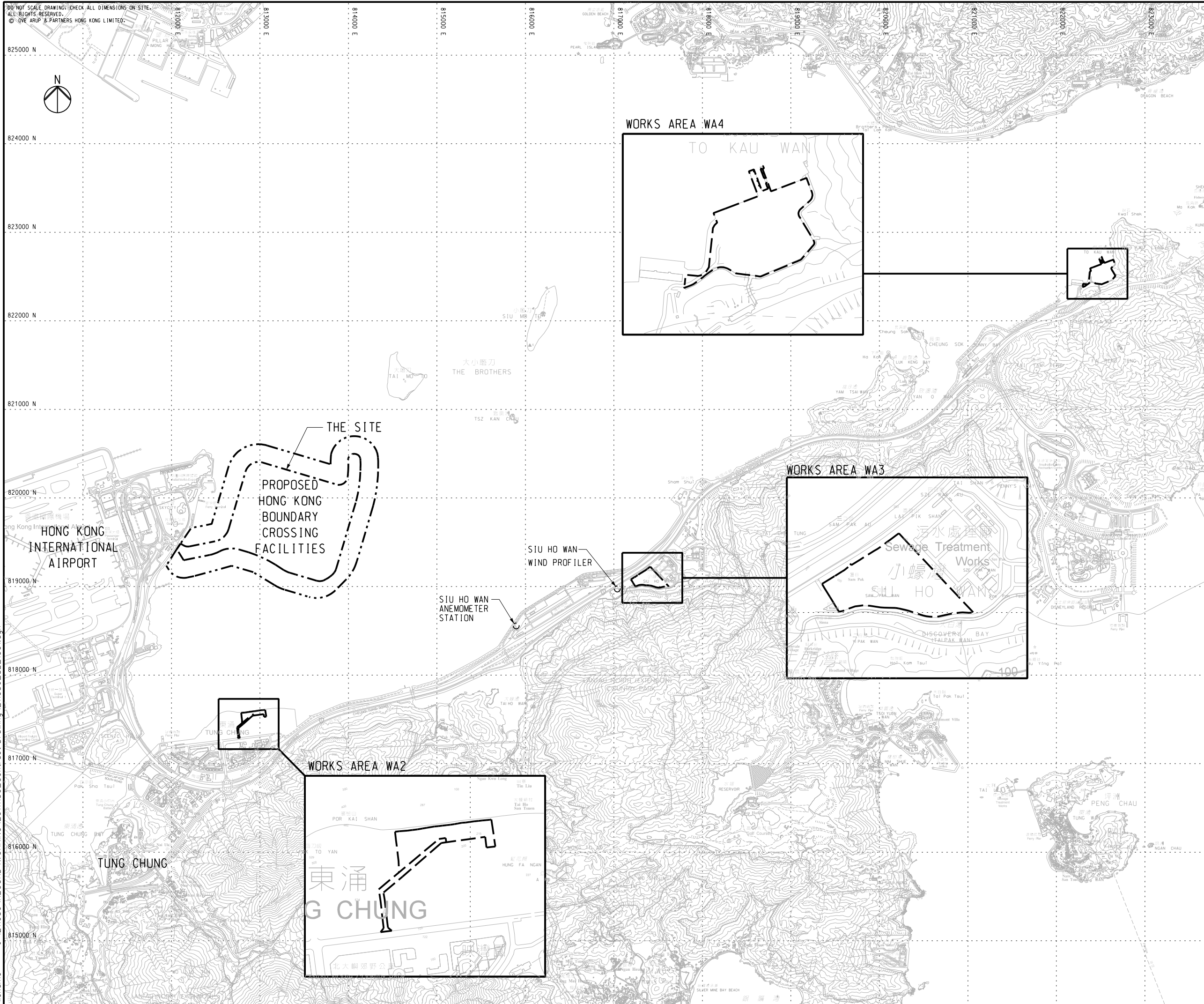
Drawing title
KEY PLAN

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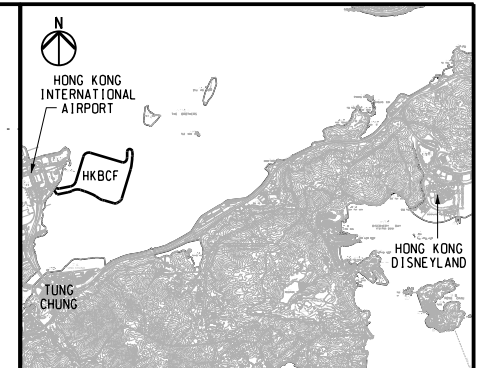
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KEY PLAN

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

ARUP	奧雅納工程顧問	•
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	Hong Kong Cetacean Research Project	○
	Intel:Build Technyx Asia Limited	○
	Tony Gee and Partners LLP	○

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

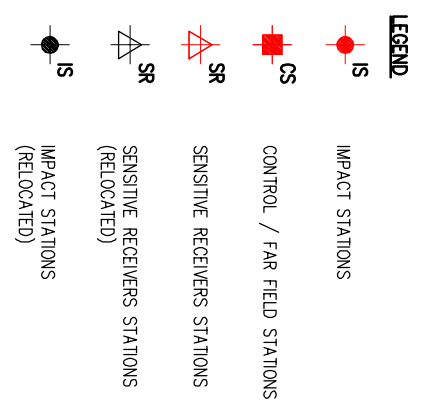
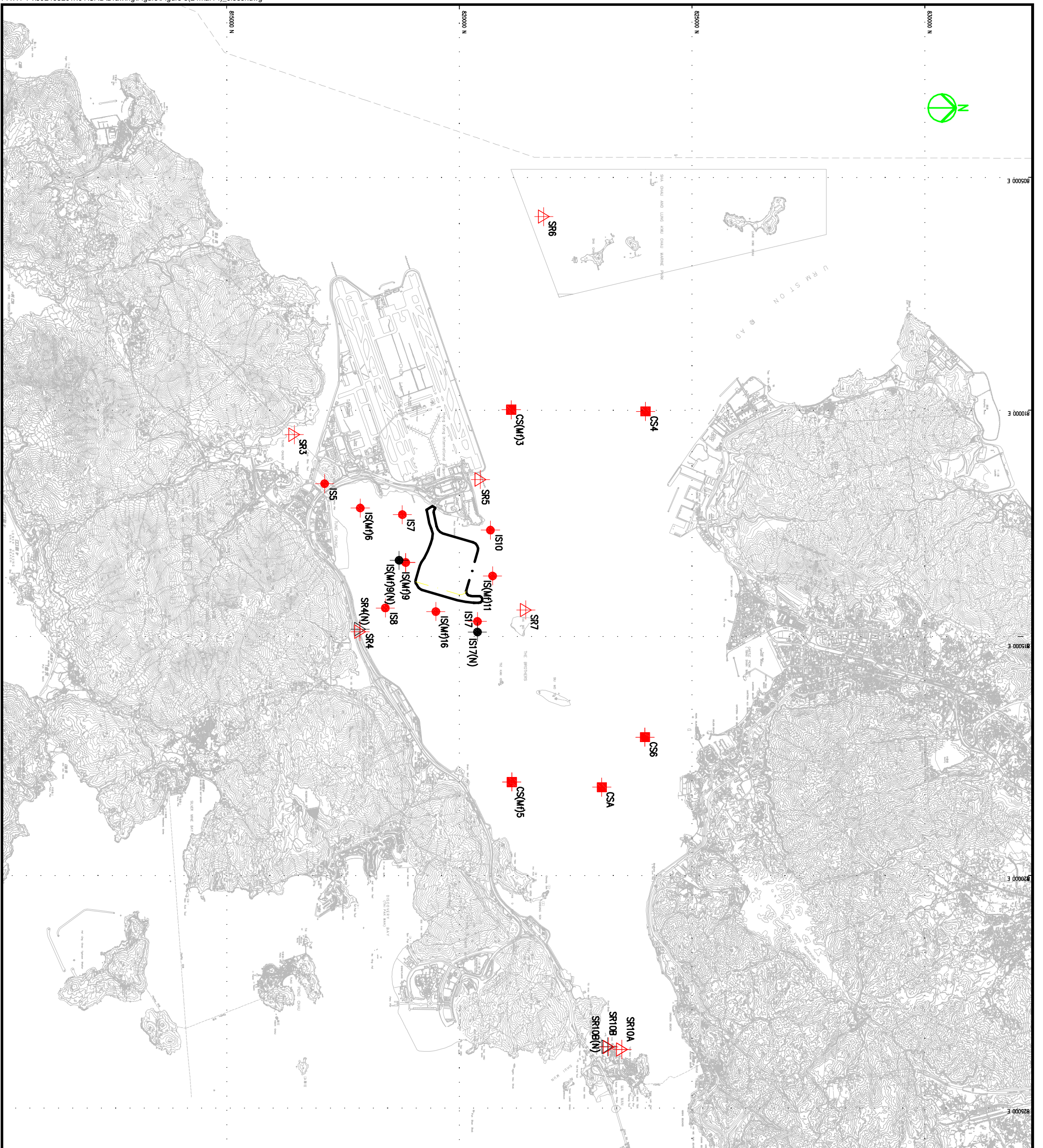
Drawing title
WORKS AREA LAYOUT
AND HOARDING PLAN
(SHEET 2 OF 3)

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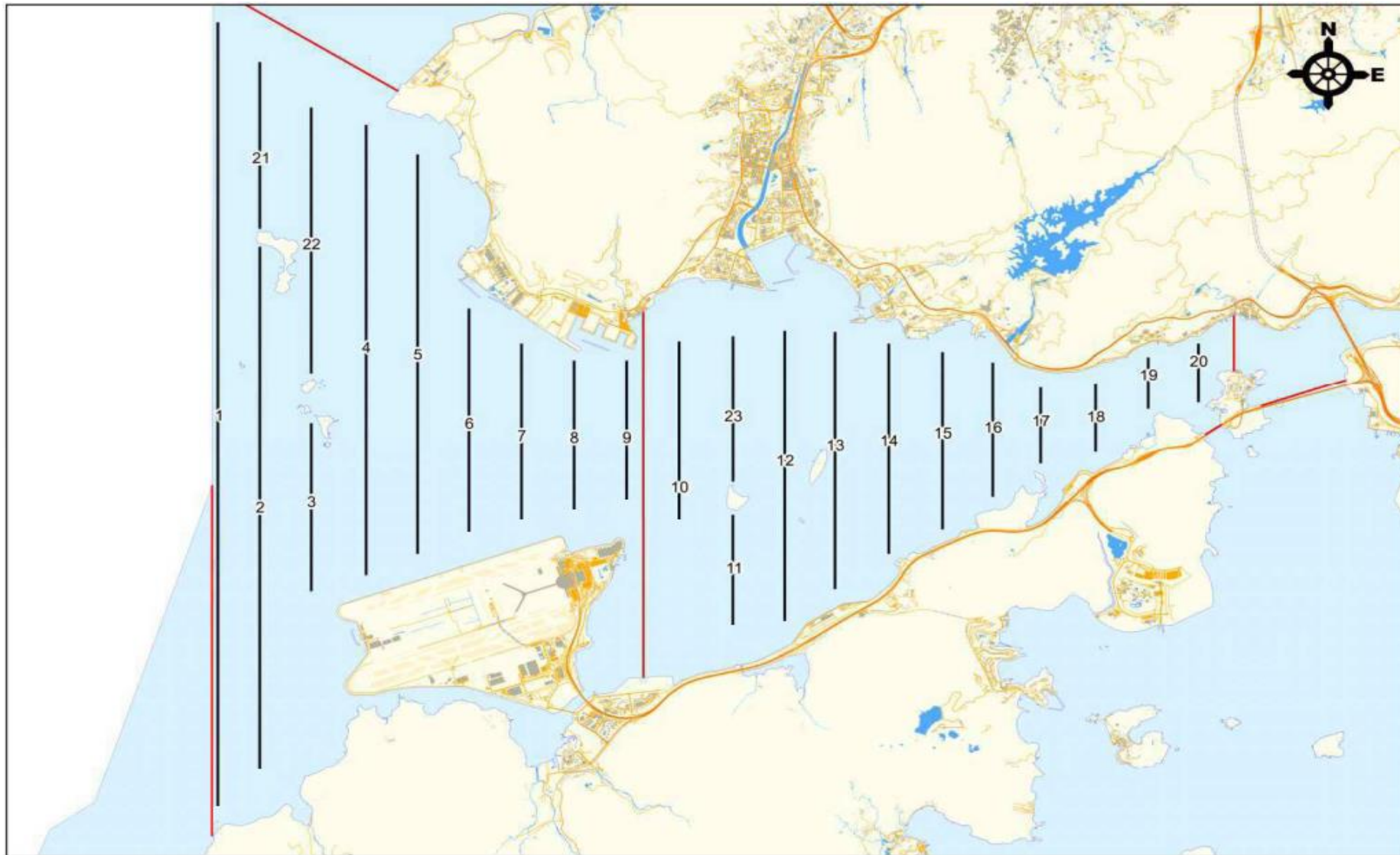
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SETTING OUT SCHEDULE

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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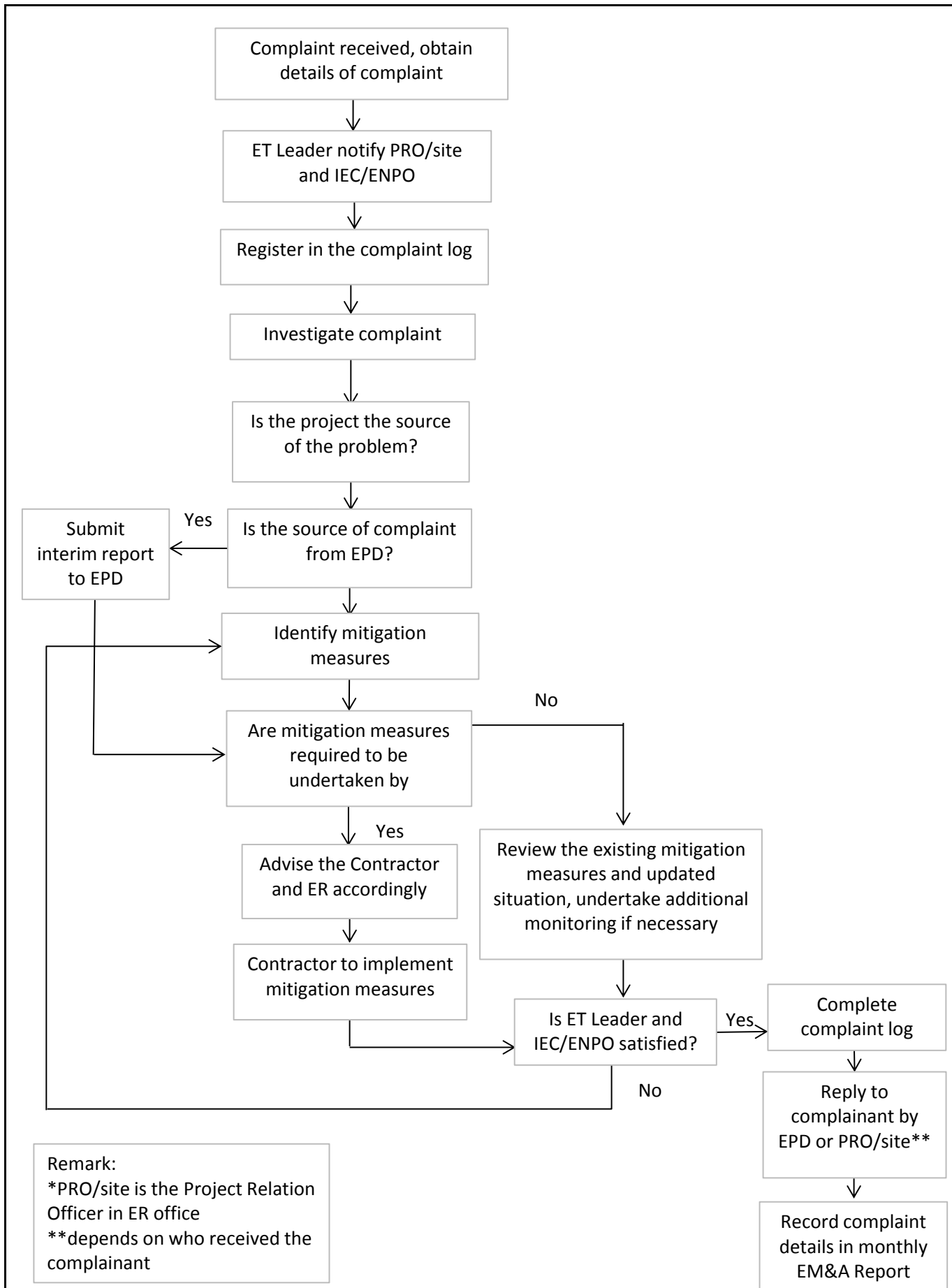


Remarks:

*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.

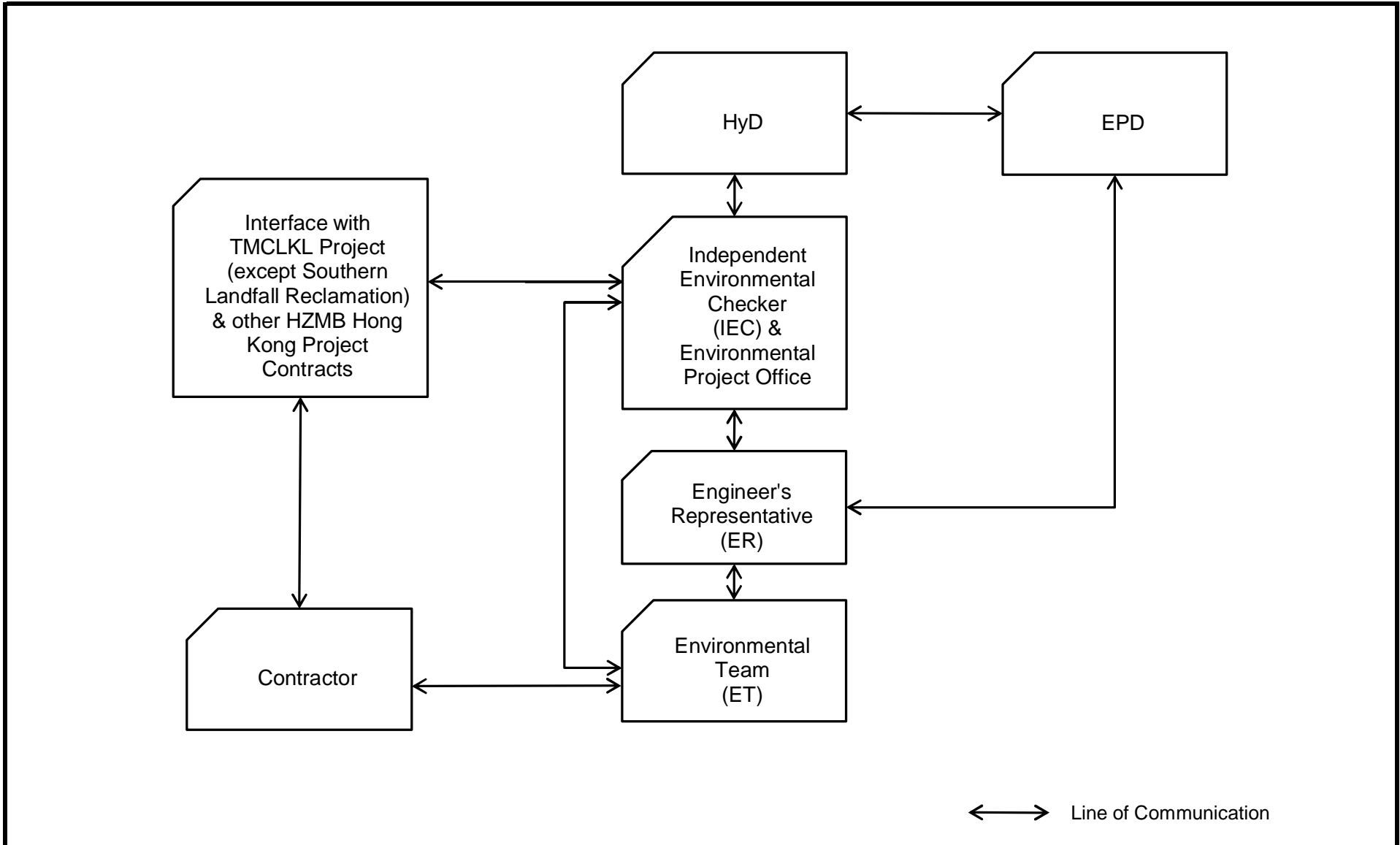
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Remark:
 *PRO/site is the Project Relation Officer in ER office
 **depends on who received the complainant

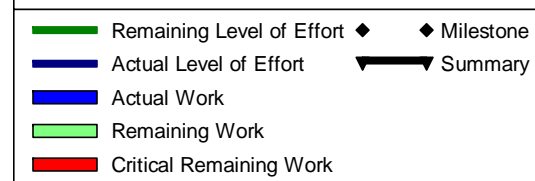
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Activity ID	Activity Name	Original	Start	Finish	Total Float	2015			
						Sep	Oct	Nov	Dec
50th_7 Monthly Progress Report Status as on 21Jan2016		1774	21-May-12 A	28-Feb-17	316				
Contract Key Dates		44	21-Sep-15 A	05-Nov-15 A					
Key Dates for achievement of Stages and completion of Sections		44	21-Sep-15 A	05-Nov-15 A					
G1064	KD-04C1 Completion of Section A Main Area North AC1 A2 15Jul2014 SA3	0		21-Sep-15 A					
G1116	KD-09C1C1, Completion of Section C2aC1C1 Edge Area C101 - C103 30Sep2014 SA4 0-43M	0		04-Nov-15 A					
G1067	KD-04C2 Completion of Section A Main Area South AC2 02Aug2015 SA3	0		05-Nov-15 A					
Supplementary Agreement		44	21-Sep-15 A	05-Nov-15 A					
SA3		44	21-Sep-15 A	05-Nov-15 A					
SA3-KD04-010	KD-04C1 Completion of Section AC1 15Jul2014	0		21-Sep-15 A					
SA3-KD04-020	KD-04C2 Completion of Section AC2 2Aug2015	0		05-Nov-15 A					
Summary Programme		0	21-Sep-15 A	21-Sep-15 A					
Portion Summary		0	21-Sep-15 A	21-Sep-15 A					
Portion A		0	21-Sep-15 A	21-Sep-15 A					
ZG1064	KD-04C1 Completion of Section A Main Area North AC1 A2 15Jul2014 SA3	0		21-Sep-15 A					
ZGA3-KD04-010	KD-04C1 Completion of Section AC1 15Jul2014	0		21-Sep-15 A					
Work Zone, as defined in PS Clause 1.03(6)		596	31-Dec-14 A	10-Jul-16	549				
Portion A, B, C & E		596	31-Dec-14 A	10-Jul-16	549				
Portion A, B, C & E		596	31-Dec-14 A	10-Jul-16	549				
Seawall		367	16-Aug-15 A	30-Jun-16	559				
Optimizing Rubble Mound Seawalls		144	09-Nov-15 A	15-May-16	591				
Seawall Portion A at C121 - C134		144	09-Nov-15 A	15-May-16	591				
RFA0-010	PA at C121 - C134 Removal of Temporary Rockfill (170,000m3, 1,500m3/day)	144	09-Nov-15 A	31-Mar-16	622				
RFA0-020	PA at C121 - C134 Underlayer (21,600m3 1,000m3/day)	98	15-Nov-15 A	15-May-16	591				
Conforming Sloping Seawalls		367	16-Aug-15 A	30-Jun-16	559				
Rockfill		65	16-Aug-15 A	20-Oct-15 A					
Seawall Portion E1 at C068 - C090 23cells		65	16-Aug-15 A	20-Oct-15 A					
RFE1-070	PE1 Type2 Rockfill upto -6mPD 8,849m3	16	16-Aug-15 A	03-Sep-15 A					
RFE1-080	PE1 Type1 Rockfill upto -6mPD 6,632m3	16	17-Aug-15 A	03-Sep-15 A					
RFE1-090	PE1 Type2 Rockfill upto -1.35mPD 3,366m3	4	04-Sep-15 A	08-Sep-15 A					
RFE1-100	PE1 Type1 Rockfill upto -1.35mPD 3,740m3	4	04-Sep-15 A	08-Sep-15 A					
RFE1-120	PE1 60-300ton Underlayer	42	09-Sep-15 A	20-Oct-15 A					
RFE1-110	PE1 Type1 & Type2 Rockfill Trimming and Acceptance	3	09-Sep-15 A	11-Sep-15 A					
Rock Armour		180	02-Sep-15 A	29-Feb-16	681				
Portion B At K028 - K039 (Ch1102 - Ch1600)		180	02-Sep-15 A	29-Feb-16	681				
RFB1-040	PB at K028 - K039 in front of cells Removal of temporary rockfill 10205m3 190m3/day	116	02-Sep-15 A	20-Jan-16 A					
RFB1-010	PB at K028 - K039 on cells Removal of temporary rockfill	34	08-Sep-15 A	11-Oct-15 A					
RFB1-020	PB at K028 - K039 on cells Geotextile & Underlayer 10-60kg 6,506m3 200m3/day	34	13-Sep-15 A	16-Oct-15 A					
RFB1-030	PB at K028 - K039 on cells Rock Armour 0.3-1ton 13,505m3 237m3/day	119	18-Sep-15 A	29-Feb-16	681				
RFB1-050	PB at K028 - K039 in front of cells Geotextile & Underlayer 10-60kg 15m/day	33	02-Nov-15 A	05-Feb-16	705				
Portion E2 At K049 - C067 (Ch1990 - Ch2800)		89	12-Oct-15 A	08-Feb-16	410				
RFE2-012	PE2 at K049 - K067 on cells Removal of temporary rockfill	84	12-Oct-15 A	03-Feb-16	415				
RFE2-014	PE2 at K049 - K067 on cells Geotextile & Underlayer 10-60kg 11,733m3 200m3/day	84	17-Oct-15 A	08-Feb-16	410				
Option 1 : Accropode		352	01-Sep-15 A	30-Jun-16	559				
Accropode Production		352	01-Sep-15 A	30-Jun-16	559				
OP1-00010	Trial Mix and Casting Yard Establish	137	01-Sep-15 A	15-Nov-15 A					
OP1-00020	Mould Fabrication	107	01-Oct-15 A	15-Nov-15 A					
OP1-00030	Precasting (22046nos), 120nos/day	184	16-Nov-15 A	30-Jun-16	559				
Reclamation		338	31-Dec-14 A	04-Dec-15 A					
Marine Fill		56	21-Sep-15 A	16-Nov-15 A					
Land Portion E1		56	21-Sep-15 A	16-Nov-15 A					
MFE1-010	PE1 Marine Sand Fill upto -6.0mPD 13,725m3 5,000m3/day Layer by Layer	3	21-Sep-15 A	23-Sep-15 A					
MFE1-020	PE1 Marine Sand Fill -6.0mPD to +0.0mPD 165,257m3 5,000m3/day Layer by Layer	33	24-Sep-15 A	31-Oct-15 A					
MFE1-012	PE1 Instruction to fill up to 0.0mPD by RE	0	24-Sep-15 A						
MFE1-030	PE1 Marine Sand Fill 0.0mPD to +2.5mPD 125,000m3 10,000m3/day	13	02-Nov-15 A	16-Nov-15 A					
Vertical Band Drains by Land Plant		11	17-Nov-15 A	30-Nov-15 A					
Land Portion E1 12,243nrs by Land		11	17-Nov-15 A	30-Nov-15 A					
VBDE1-10	PE1 Vertical Band Drains 3,478nrs by land plant (400nrs/day) (2HP)	12	17-Nov-15 A	30-Nov-15 A					
Earthwork Fill		338	31-Dec-14 A	04-Dec-15 A					
Land Portion C2a		2	01-Oct-15 A	02-Oct-15 A					
EFC2a-065	PC2a Edge Area NorthWest Earthwork Fill Type D Sand 100% stg3 9,668m3 5,000m/day by Dump T	2	01-Oct-15 A	02-Oct-15 A					
Land Portion E1		15	17-Nov-15 A	04-Dec-15 A					



Activity ID	Activity Name	Original	Start	Finish	Total Float	2015			
						Sep	Oct	Nov	Dec
EFE1-010	PE1 Type D Earthwork Sand Fill upto +5.5mPD 118,263m3 5,000m3/day	16	17-Nov-15 A	04-Dec-15 A					
Land Portion C2c									
EFC2c-010	PC2c Earthwork Fill Type B public w compaction upto +5.5mPD 276,853m3 5,000m3/day	241	31-Dec-14 A	20-Sep-15 A					
Surcharge									
Portion A Surcharge									
Edge Area From SOL offset within 180m to 50m									
CH5+110 to 5+440 Portion A North									
Area of 50m to 120m from Offset									
SUEA1-2098	PA North Area CH5+110 - CH5+440 Issue of Surcharge Removal	0		04-Sep-15 A					
SUEA1-2100	PA North 120m-73m from Offset Surcharge Removal 64,941m3 10,000m3/day	11	09-Sep-15 A	20-Sep-15 A					
CH5+440 to 5+650 Portion A South									
Area of 40m - 120m from Offset (other CLP area)									
Upto +11.5mPD Area									
SUEA3-0070	PA South Surcharge Period +11.5mPD 8mths (8 Nov2015)	240	14-Mar-15 A	08-Nov-15 A					
SUEA3-0078	PA South Area CH5+440 - CH5+650 Issue of Surcharge Removal	0		15-Oct-15 A					
SUEA3-0080	PA South Surcharge Removal 111,581m3 10,000m3/day	11	21-Oct-15 A	31-Oct-15 A					
SUEA3-0090	Completion of PA South	0		05-Nov-15 A					
Area of 10m - 40m from Offset (other CLP area)									
SUEA4-0072	PA South Area CH5+440 - CH5+650 Issue of Surcharge Removal	0		12-Oct-15 A					
SUEA4-0080	PA South 40m-10m Surcharge Sand Removal 40,000m3 10,000m3/day	4	02-Nov-15 A	05-Nov-15 A					
Land Portion B									
Edge Areas									
at K013 - K027									
SUEB0-016	PB Edge Area K013-K027 Sand Surcharge Checking at +7.5mPD	26	01-Sep-15 A	26-Sep-15 A					
SUEB0-018	PB Edge Area K013-K027 Sand Surcharge upto 8.5mPD 41,766m3 5,000m3/day by Dump Trucks	8	28-Sep-15 A	06-Oct-15 A					
SUEB0-020	PB Edge Area K013-K027 Sand Surcharge Checking at +8.5mPD	10	07-Oct-15 A	16-Oct-15 A					
SUEB0-030	PB Edge Area K013-K027 Sand Surcharge upto 9.5mPD 38,102m3 5,000m3/day	31	17-Oct-15 A	21-Nov-15 A					
SUEB0-032	PB Edge Area K013-K027 Sand Surcharge Checking at +9.5mPD	23	22-Nov-15 A	14-Dec-15 A					
at K028 - K035									
SUEB0-070	PB Edge Area K028-K035 Surcharge Period +8.5mPD 4.5mths	134	16-May-15 A	26-Sep-15 A					
SUEB0-072	PB Edge Area K028-K035 Surcharge Strength Test Achievement	96	27-Sep-15 A	26-Dec-15 A					
at K036 - K039									
SUEB0-125	PB Edge Area K036-K039 Surcharge Period +8.5mPD 4.5mths	134	26-Jun-15 A	06-Nov-15 A					
SUEB0-130	PB Edge Area K036-K039 Surcharge Strength Test Achievement	55	07-Nov-15 A	21-Jan-16					
at K047 - K052 (w Deep Cement Mixing)									
DCM-2060	PB Edge Area K047-K052 36-73m Filling up to +8.5mPD 34,864m3 5,000m3/day at DCM by Dump T	19	07-Sep-15 A	28-Sep-15 A					
DCM-2050	PB Edge Area K047-K052 Filling up to +5.5mPD 60,000m3 5,000m3/day	10	19-Sep-15 A	28-Sep-15 A					
DCM-2061	PB Edge Area K047-K052 36-73m CPT Test	10	29-Sep-15 A	08-Oct-15 A					
DCM-2062	PB Edge Area K047-K052 36-73m Filling up to +11.5mPD 33,470m3 5,000m3/day at DCM by Dump	7	09-Oct-15 A	16-Oct-15 A					
DCM-2070	PB Edge Area K047-K052 36-73m Surcharge Period 7mths (13May2016)	210	17-Oct-15 A	13-May-16					
Reclamation Areas									
at West of Main Area stq1									
SURB1-040	PB Main Area West-S Sand Surcharge Removal 291,223m3 10,000m3/day	125	19-Aug-15 A	31-Jan-16					
at West of Main Area stq2									
SURB2-040	PB Main Area West-N Sand Surcharge Removal 335,714m3 10,000m3/day	142	01-Aug-15 A	31-Jan-16					
at North- East of Main Area									
SURB3-030	PB Main Area East-N Sand Surcharge Period +11.5mPD 7mths (16Feb2016)	210	22-Jul-15 A	16-Feb-16					
Land Portion C2a									
Edge Areas									
Deep Cement Mixing Works at C101 - C103									
DCM-3035	PC2a Edge Area C101-C103 Instrumentation Installation	22	28-Sep-15 A	19-Oct-15 A					
DCM-3040	PC2a Edge Area C101-C103 Filling up to +5.5mPD Type D (73m width, 28,200m3) 5,000m3/day	6	29-Oct-15 A	04-Nov-15 A					
DCM-3045	PC2a Edge Area C101-C103 Completion of 0-43m	0		04-Nov-15 A					
DCM-3050	PC2a Edge Area C101-C103 Filling up to +8.5mPD Surcharge (30m width, 14,607m3 5,000m3/day)	14	05-Nov-15 A	20-Nov-15 A					
DCM-3052	PC2a Edge Area C101-C103 CPT Test	8	21-Nov-15 A	28-Nov-15 A					
Option - Deep Cement Mixing Works at C104 - C109									
DCM-4130	PC2a Edge Area C104-C109 43m width x 260m Installation 2,235nrs (Outstanding 1,175nrs, 22nrs/da	96	27-Aug-15 A	30-Nov-15 A					
at C110 - C112 Cellular Seawall									
SUEC2a-002	PC2a Edge Area C110-C112 Strength Test Result (CPT)	10	03-Oct-15 A	12-Oct-15 A					
CH4+710 - CH5+110 Rubble Mound Seawall									
10-73m									
SUEC2a-1038	PC2a C113-C117 10m-73m Checking Strength at +7.5mPD	51	01-Sep-15 A	21-Oct-15 A					
SUEC2a-1050	PC2a C113-C117 10m-73m Surcharge Sand upto 8.5mPD 15,210m3 5,000m3/day	3	22-Oct-15 A	24-Oct-15 A					
SUEC2a-1060	PC2a C113-C117 10m-73m Surcharge Strength Check as 8.5mPD	12	25-Oct-15 A	05-Nov-15 A					
SUEC2a-1070	PC2a C113-C117 10m-73m Surcharge Sand to 9.5mPD 15,210m3 5000m3/day	3	06-Nov-15 A	08-Nov-15 A					

█ Remaining Level of Effort ◆ Milestone
█ Actual Level of Effort ▼ Summary
█ Actual Work
█ Remaining Work
█ Critical Remaining Work

Activity ID	Activity Name	Original	Start	Finish	Total Float	2015			
						Sep	Oct	Nov	Dec
SUEC2a-1080	PC2a C113-C117 10m-73m Surcharge Strength check as 9.5mPD	8	09-Nov-15 A	16-Nov-15 A					
SUEC2a-1090	PC2a C113-C117 10m-73m Surcharge Sand to 10.5mPD 15,210m3 5000m3/day	3	17-Nov-15 A	19-Nov-15 A					
SUEC2a-1110	PC2a C113-C117 10m-73m Surcharge Sand upto +11.5mPD 15,210m3 5,000m3/day	20	27-Nov-15 A	20-Dec-15 A					
SUEC2a-1100	PC2a C113-C117 10m-73m Surcharge Strength Check as +11.5mPD	24	27-Nov-15 A	20-Dec-15 A					
73-120m		284	01-Oct-15 A	10-Jul-16	-230				
SUEC2a-2032	PC2a C113-C117 73m-120m Surcharge Sand upto 8.5mPD 11,347m3 5,000m3/day	3	01-Oct-15 A	03-Oct-15 A					
SUEC2a-2036	PC2a C113-C117 73m-120m Strength Test Result at 8.5mPD	18	04-Oct-15 A	21-Oct-15 A					
SUEC2a-2040	PC2a C113-C117 73m-120m Surcharge Sand upto 9.5mPD 11,347m3 5,000m3/day	3	22-Oct-15 A	24-Oct-15 A					
SUEC2a-2045	PC2a C113-C117 73m-120m Strength Test Result at 9.5mPD	7	25-Oct-15 A	31-Oct-15 A					
SUEC2a-2050	PC2a C113-C117 73m-120m Surcharge Sand upto 10.5mPD 11,347m3 5000m3/day	3	01-Nov-15 A	03-Nov-15 A					
SUEC2a-2055	PC2a C113-C117 73m-120m Strength Test Result at 10.5mPD	7	04-Nov-15 A	10-Nov-15 A					
SUEC2a-2080	PC2a C113-C117 73m-120m Surcharge Sand upto 11.5mPD 11,347m3 5,000m3/day	3	11-Nov-15 A	13-Nov-15 A					
SUEC2a-2090	PC2a C113-C117 73m-120m Surcharge Sand Period 8mths (10Jul2016)	240	14-Nov-15 A	10-Jul-16	-230				
Reclamation Areas		295	31-Aug-15 A	20-Jun-16	-630				
C2aC1		281	14-Sep-15 A	20-Jun-16	-630				
SURC2aC1-010	PC2a C2aC1 Sand Surcharge Laying 8.5mPD to 9.5mPD 46,412m3 5,000m3/day	6	14-Sep-15 A	19-Sep-15 A					
SURC2aC1-030	PC2a C2aC1 Sand Surcharge Laying 9.5mPD to 10.5mPD 46,412m3 5,000m3/day	9	20-Sep-15 A	30-Sep-15 A					
SURC2aC1-040	PC2a C2aC1 Strength Test Result	14	01-Oct-15 A	14-Oct-15 A					
SURC2aC1-050	PC2a C2aC1 Sand Surcharge Laying 10.5mPD to 11.5mPD 46,412m3 5,000m3/day	9	15-Oct-15 A	24-Oct-15 A					
SURC2aC1-070	PC2a C2aC1 Sand Surcharge Period 8mths (20Jun2016)	240	25-Oct-15 A	20-Jun-16	-630				
C2aC2		261	31-Aug-15 A	17-May-16	-606				
SURC2aC2-030	PC2a C2aC2 Sand Surcharge Laying 9.5mPD to 10.5mPD 30000m3 5,000m3/day	6	31-Aug-15 A	05-Sep-15 A					
SURC2aC2-040	PC2a C2aC2 Stability Checking at 10.5mPD	6	07-Sep-15 A	12-Sep-15 A					
SURC2aC2-050	PC2a C2aC2 Sand Surcharge Laying 10.5mPD to 11.5mPD 30000m3 5,000m3/day	6	14-Sep-15 A	19-Sep-15 A					
SURC2aC2-070	PC2a C2aC2 Sand Surcharge Period 8mths (17May2016)	241	20-Sep-15 A	17-May-16	-606				
Land Portion C1a		427	15-Jan-15 A	16-Mar-16	-546				
Reclamation Areas		427	15-Jan-15 A	16-Mar-16	-546				
C3		328	15-Jan-15 A	09-Dec-15 A					
SURC1a-022	PC1a Main Area West Sand Surcharge Period as +11.5mPD 8mths	244	15-Jan-15 A	15-Sep-15 A					
SURC1a-030	PC1a Main Area East Sand Surcharge Removal 280,000m3 10,000m3/day	80	15-Sep-15 A	09-Dec-15 A					
SURC1a-024	PC1a Main Area Instruction of Surcharge Removal stg1 from RE on 15Sep2015	0	15-Sep-15 A						
SURC1a-026	PC1a Main Area Instruction of Surcharge Removal stg2 from RE on 15Oct2015	0	15-Oct-15 A						
C4		240	21-Jul-15 A	16-Mar-16	-546				
SURC1a-140	PC1a South East Land Area Sand Surcharge Period at +11.5mPD 7mths (15Feb2016)	210	21-Jul-15 A	15-Feb-16	-516				
SURC1a-150	PC1a South West Land Area Sand Surcharge Period at +11.5mPD 8mths (16Mar2016)	240	21-Jul-15 A	16-Mar-16	-546				
Land Portion C1b		226	16-Aug-15 A	28-Mar-16	-187				
Reclamation Areas		226	16-Aug-15 A	28-Mar-16	-187				
West (1/4 Areas)		82	15-Sep-15 A	06-Dec-15 A					
SURC1b-030	PC1b West Sand Surcharge Removal 336,434m3 10,000m3/day	77	15-Sep-15 A	06-Dec-15 A					
SURC1b-022	PC1b Surcharge Removal instructed from RE 1stg (issued 9Sep2015) commenced 15Sep2015	0	15-Sep-15 A						
North Side close to Portion C2b		210	16-Aug-15 A	12-Mar-16	-244				
SURC1b-1030	PC1b Main Area Sand Surcharge Period as +11.5mPD 7mths (12Mar2016)	210	16-Aug-15 A	12-Mar-16	-244				
North Side close to Portion C2c		210	01-Sep-15 A	28-Mar-16	-187				
SURC1b-1080	PC1b Main Area Sand Surcharge Period as +11.5mPD 7mths (28Mar2016)	210	01-Sep-15 A	28-Mar-16	-187				
Land Portion E2		387	29-Mar-15 A	18-Apr-16	-108				
North Part		311	29-Mar-15 A	25-Jan-16	-306				
Edge Areas - North, Land Area & Edge Area C064-C067		276	03-May-15 A	25-Jan-16	-306				
SUEE2-110	PE2 North & East Edge C064-C067 Sand Surcharge Period at +5.5mPD Testing	138	03-May-15 A	17-Sep-15 A					
SUEE2-115	PE2 North & East Edge C064-C067 Remedial Works by Additional Band Drains	138	03-May-15 A	17-Sep-15 A					
SUEE2-117	PE2 North & East Edge C064-C067 Sand Surcharge Laying up to 5.5mPD	11	18-Sep-15 A	30-Sep-15 A					
SUEE2-120	PE2 North & East Edge C064-C067 Sand Surcharge Laying up to 8.5mPD 54,746m3 5,000m3/day	11	13-Nov-15 A	25-Jan-16	-262				
Land Areas - East (TM) C057 - C063 Ch2+300 to Ch2+600		208	29-Mar-15 A	23-Oct-15 A					
SURE2-050	PE2 Land C057-C063 Tunnel Sand Surcharge Period as +11.5mPD at tunnel area 7mths	209	29-Mar-15 A	23-Oct-15 A					
Land Areas - West (C3)		124	01-Sep-15 A	20-Jan-16 A					
SURE2-170-20	PE2 Land C061-C064 Non-Tunnel Sand Surcharge non tunnel area Laying upto 8.5mPD stg1 64,119r	17	01-Sep-15 A	19-Sep-15 A					
SURE2-170-10	PE2 Land C061-C064 Non-Tunnel Remedial Works by Additional Band Drains	44	18-Sep-15 A	31-Oct-15 A					
SURE2-170-30	PE2 Land C061-C064 Non-Tunnel Sand Surcharge non tunnel area Laying upto 11.5mPD stg1 57,29r	9	21-Sep-15 A	30-Sep-15 A					
SURE2-170-40	PE2 Land C061-C064 Non-Tunnel Sand Surcharge non tunnel area Laying upto 8.5mPD stg2 60,000r	17	02-Nov-15 A	20-Nov-15 A					
SURE2-170-50	PE2 Land C061-C064 Non-Tunnel Sand Surcharge non tunnel area Laying upto 11.5mPD stg2 60,000r	38	20-Nov-15 A	20-Jan-16 A					
South Part		324	31-May-15 A	18-Apr-16	-108				
Edge Areas East C058 to C063		215	31-May-15 A	31-Jan-16	-536				
SUEE2-020	PE2 Edge C058-C063 Sand Surcharge Period as +8.5mPD 4.5mths	135	31-May-15 A	12-Oct-15 A					
SUEE2-025	PE2 Edge C058-C063 Sand Surcharge Strength Test	80	13-Oct-15 A	31-Jan-16	-536				
Edge Areas East C056 to C057		38	31-Oct-15 A	08-Dec-15 A					

█ Remaining Level of Effort ◆ Milestone
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█ Remaining Work
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Activity ID	Activity Name	Original	Start	Finish	Total Float	2015				
						Sep	Oct	Nov	Dec	
SUEE2-610	PE2 Edge C056-C057 DCM works instructed by the Engineer	0	31-Oct-15 A							
SUEE2-620	PE2 Edge C056-C057 DCM Mobilization & Lower Down surcharge	10	01-Nov-15 A	10-Nov-15 A						
SUEE2-630	PE2 Edge C056-C057 DCM Installation (229nrs , 12nos/day)	28	11-Nov-15 A	08-Dec-15 A						
Edge Areas East C052 to C055						152	29-Sep-15 A	27-Feb-16	-557	
SURE2-402	PE2 Edge C052-C055 300m Zone Sand Surcharge CPT Test	8	29-Sep-15 A	06-Oct-15 A						
SURE2-410	PE2 Edge C052-C055 300m Zone Sand Surcharge Laying upto 8.5mPD 61,320m3 10,000m3/day	8	07-Oct-15 A	15-Oct-15 A						
SURE2-420	PE2 Edge C052-C055 300m Zone Sand Surcharge Pause Period at 8.5mPD 4.5mths (27Feb2016)	135	16-Oct-15 A	27-Feb-16	-557					
Land Areas						247	16-Aug-15 A	18-Apr-16	-108	
300m to 100m Zone						242	21-Aug-15 A	18-Apr-16	-449	
SURE2-510	PE2 Land C052-C056 300m Zone Sand Surcharge Laying upto 8.5mPD stg2 122,640m3 10,000m3/d	13	21-Aug-15 A	04-Sep-15 A						
SURE2-520	PE2 Land C052-C056 300m Zone Sand Surcharge Laying upto 11.5mPD 116,695m3 5,000m3/day by	14	05-Sep-15 A	21-Sep-15 A						
SURE2-530	PE2 Land C052-C056 300m Zone Sand Surcharge Period as +11.5mPD 7mths (18Apr2016)	210	22-Sep-15 A	18-Apr-16	-449					
Out of K052 300m						211	16-Aug-15 A	13-Mar-16	-72	
SURE2-020	PE2 Land C052-C060 Non-Tunnel Sand Surcharge Period as +11.5mPD 7mths (13Mar2016)	211	16-Aug-15 A	13-Mar-16	-72					
Land Portion C2b						303	31-Jul-15 A	28-May-16	-146	
Edge Areas						153	01-Aug-15 A	10-Jan-16 A		
SUEC2b-040	PC2b Edge Area CPT Test & Instrumentation Installation at +5.5mPD	112	01-Aug-15 A	20-Nov-15 A						
SUEC2b-050	PC2b Edge Area PBF Surcharge w compaction upto 8.5mPD 12,054m3 5,000m3/day	43	16-Nov-15 A	10-Jan-16 A						
Reclamation Areas						303	31-Jul-15 A	28-May-16	-146	
North						303	31-Jul-15 A	28-May-16	-146	
SURC2b-011	PC2b Main Area North PBF Surcharge w compaction upto 8.5mPD 62,964m3 5,000m3/day	67	31-Jul-15 A	10-Oct-15 A						
SURC2b-014	PC2b Main Area North Sand Surcharge Laying upto 11.5mPD 40,000m3 5,000m3/day	18	12-Oct-15 A	31-Oct-15 A						
SURC2b-020	PC2b Main Area North Sand Surcharge Period as +11.5mPD 7mths (28May2016)	210	01-Nov-15 A	28-May-16	-146					
South						253	01-Aug-15 A	09-Apr-16	-117	
SURC2b-012	PC2b Main Area South PBF Surcharge Laying upto 11.5mPD 128,842m3 10,000m3/day by Dump Tr	36	01-Aug-15 A	11-Sep-15 A						
SURC2b-034	PC2b Main Area South PBF Surcharge Period as +11.5mPD 7mths (9Apr2016)	211	12-Sep-15 A	09-Apr-16	-117					
Land Portion C2c						257	01-Sep-15 A	23-May-16	-56	
Edge Areas						80	01-Sep-15 A	20-Nov-15 A		
SUEC2c-005	PC2c Edge Area PBF CPT Test & Instrumentation Installation at +5.5mPD	81	01-Sep-15 A	20-Nov-15 A						
Reclamation Areas						257	01-Sep-15 A	23-May-16	-56	
West						257	01-Sep-15 A	23-May-16	-56	
SURC2c-W010	PC2c Main Area Public Surcharge w compaction upto 8.5mPD 79,119m3 5,000m3/day	28	01-Sep-15 A	30-Sep-15 A						
SURC2c-W020	PC2c Main Area Sand Surcharge Laying upto 11.5mPD stg1 80,000m3 10,000m3/day	22	01-Oct-15 A	26-Oct-15 A						
SURC2c-W030	PC2c Main Area Sand Surcharge Period 7mths (23May2016)	201	27-Oct-15 A	23-May-16	-56					
East						60	01-Nov-15 A	20-Jan-16 A		
SURC2c-E010	PC2c Main Area Public Surcharge w compaction upto 8.5mPD 79,119m3 5,000m3/day	18	01-Nov-15 A	20-Nov-15 A						
SURC2c-E020	PC2c Main Area Sand Surcharge Laying upto 11.5mPD stg2 109,120m3 5,000m3/day	36	20-Nov-15 A	20-Jan-16 A						
Geotechnical Instrumentation Works						65	16-Nov-15 A	20-Dec-15 A		
Geotechnical Instrumentation Works for Seawalls						0	16-Nov-15 A	16-Nov-15 A		
Cluster Type SB 2nrs Inclinometer Cluster inside cells						0	16-Nov-15 A	16-Nov-15 A		
SB-2 C112 Portion C2a						0	16-Nov-15 A	16-Nov-15 A		
CTSB2-040	Completion of Monitoring of SB-2 C112 PC2a	0		16-Nov-15 A						
Cluster Type SC 3nrs Strain Gauge and Inclinometer Cluster inside cells						0	16-Nov-15 A	16-Nov-15 A		
SC-3 C108 Portion C2a						0	16-Nov-15 A	16-Nov-15 A		
CTSC3-040	Completion of Monitoring of SC-3 C108 PC2a	0		16-Nov-15 A						
Geotechnical Instrumentation Works for Reclamation RA & RB						29	17-Nov-15 A	20-Dec-15 A		
Settlement Marker Type 2						29	17-Nov-15 A	20-Dec-15 A		
SMT2-100	M2 - Installation of Settlement Marker Type2 at PE1	29	17-Nov-15 A	20-Dec-15 A						
Portion D						204	01-Aug-15 A	09-Jan-16 A		
Submission						0	21-Oct-15 A	21-Oct-15 A		
Design Submission						0	21-Oct-15 A	21-Oct-15 A		
Structural Analysis for Box Culvert EC1 w Precast & Cast in-situ Method						0	21-Oct-15 A	21-Oct-15 A		
PD-DGN-09010	Structural Analysis for Box culvert EC1 with Precast and Cast in-situ Method	0		21-Oct-15 A						
Precast Yard for Seawall Blocks & Culverts						141	01-Aug-15 A	20-Dec-15 A		
Concrete Blocks						141	01-Aug-15 A	20-Dec-15 A		
PD-PY1-0200	Precast Seawall Blocks for Permanent construction 1,990nrs (3,180 - 1190)	142	01-Aug-15 A	20-Dec-15 A						
Culverts						101	27-Aug-15 A	05-Dec-15 A		
Culverts EC1						101	27-Aug-15 A	05-Dec-15 A		
EC1-1						82	27-Aug-15 A	17-Nov-15 A		
PY-EC1-01010	PD EC1-01 Casting Bed	10	27-Aug-15 A	05-Sep-15 A						
PY-EC1-01020	PD EC1-01 Base Reinforcement	39	21-Sep-15 A	29-Oct-15 A						
PY-EC1-01030	PD EC1-01 Base Formwork	8	30-Oct-15 A	06-Nov-15 A						
PY-EC1-01040	PD EC1-01 Base Concrete	1	06-Nov-15 A	06-Nov-15 A						
PY-EC1-01060	PD EC1-01 Base Curing	11	07-Nov-15 A	17-Nov-15 A						

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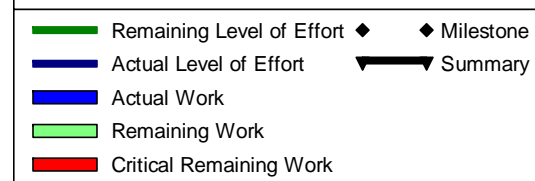
Activity ID	Activity Name	Original	Start	Finish	Total Float	2015			
						Sep	Oct	Nov	Dec
PY-EC1-01050	PD EC1-01 Base Removal of Formwork	2	07-Nov-15 A	08-Nov-15 A					
EC1-2		49	03-Sep-15 A	22-Oct-15 A					
PY-EC1-02020	PD EC1-02 Base Reinforcement	15	03-Sep-15 A	17-Sep-15 A					
PY-EC1-02030	PD EC1-02 Base Formwork	21	21-Sep-15 A	11-Oct-15 A					
PY-EC1-02060	PD EC1-02 Base Curing	15	28-Sep-15 A	12-Oct-15 A					
PY-EC1-02040	PD EC1-02 Base Concrete	1	13-Oct-15 A	13-Oct-15 A					
PY-EC1-02050	PD EC1-02 Base Removal of Formwork	8	15-Oct-15 A	22-Oct-15 A					
EC1-3		56	01-Sep-15 A	27-Oct-15 A					
PY-EC1-03020	PD EC1-03 Base Reinforcement	17	01-Sep-15 A	17-Sep-15 A					
PY-EC1-03030	PD EC1-03 Base Formwork	5	28-Sep-15 A	02-Oct-15 A					
PY-EC1-03040	PD EC1-03 Base Concrete	1	12-Oct-15 A	12-Oct-15 A					
PY-EC1-03060	PD EC1-03 Base Curing	15	13-Oct-15 A	27-Oct-15 A					
PY-EC1-03050	PD EC1-03 Base Removal of Formwork	1	23-Oct-15 A	23-Oct-15 A					
EC1-4		64	10-Sep-15 A	13-Nov-15 A					
PY-EC1-04020	PD EC1-04 Base Reinforcement	37	10-Sep-15 A	16-Oct-15 A					
PY-EC1-04030	PD EC1-04 Base Formwork	3	24-Oct-15 A	26-Oct-15 A					
PY-EC1-04040	PD EC1-04 Base Concrete	1	27-Oct-15 A	27-Oct-15 A					
PY-EC1-04050	PD EC1-04 Base Removal of Formwork	1	29-Oct-15 A	29-Oct-15 A					
PY-EC1-04060	PD EC1-04 Base Curing	15	30-Oct-15 A	13-Nov-15 A					
EC1-5		79	10-Sep-15 A	28-Nov-15 A					
PY-EC1-05010	PD EC1-05 Casting Bed	9	10-Sep-15 A	18-Sep-15 A					
PY-EC1-05020	PD EC1-05 Base Reinforcement	15	15-Oct-15 A	29-Oct-15 A					
PY-EC1-05030	PD EC1-05 Base Formwork	12	31-Oct-15 A	11-Nov-15 A					
PY-EC1-05040	PD EC1-05 Base Concrete	1	12-Nov-15 A	12-Nov-15 A					
PY-EC1-05050	PD EC1-05 Base Removal of Formwork	3	13-Nov-15 A	15-Nov-15 A					
PY-EC1-05060	PD EC1-05 Base Curing	16	13-Nov-15 A	28-Nov-15 A					
EC1-6		79	18-Sep-15 A	05-Dec-15 A					
PY-EC1-06010	PD EC1-06 Casting Bed	5	18-Sep-15 A	22-Sep-15 A					
PY-EC1-06030	PD EC1-06 Base Formwork	35	16-Oct-15 A	19-Nov-15 A					
PY-EC1-06020	PD EC1-06 Base Reinforcement	14	30-Oct-15 A	12-Nov-15 A					
PY-EC1-06040	PD EC1-06 Base Concrete	1	20-Nov-15 A	20-Nov-15 A					
PY-EC1-06060	PD EC1-06 Base Curing	15	21-Nov-15 A	05-Dec-15 A					
PY-EC1-06050	PD EC1-06 Base Removal of Formwork	2	27-Nov-15 A	28-Nov-15 A					
EC1-7		67	25-Sep-15 A	30-Nov-15 A					
PY-EC1-07010	PD EC1-07 Casting Bed	5	25-Sep-15 A	29-Sep-15 A					
PY-EC1-07020	PD EC1-07 Base Reinforcement	14	10-Nov-15 A	23-Nov-15 A					
PY-EC1-07030	PD EC1-07 Base Formwork	5	24-Nov-15 A	28-Nov-15 A					
PY-EC1-07040	PD EC1-07 Base Concrete	2	29-Nov-15 A	30-Nov-15 A					
EC1-8		11	21-Nov-15 A	01-Dec-15 A					
PY-EC1-08010	PD EC1-08 Casting Bed	4	21-Nov-15 A	24-Nov-15 A					
PY-EC1-08020	PD EC1-08 Base Reinforcement	7	25-Nov-15 A	01-Dec-15 A					
Site Construction		203	02-Aug-15 A	09-Jan-16 A					
C1 to C4		203	02-Aug-15 A	09-Jan-16 A					
Removal of Temporary Seawall		16	18-Aug-15 A	03-Sep-15 A					
Removal of North Temporary Seawall		16	18-Aug-15 A	03-Sep-15 A					
PD-V2-0045	PD C4 - Removal of North Temporary Seawall East2 CH5+800 to CH5+650	17	18-Aug-15 A	03-Sep-15 A					
Installations of Precast Culverts except sloping outfalls		165	17-Aug-15 A	03-Dec-15 A					
Culvert C1		92	02-Sep-15 A	02-Dec-15 A					
C1-3		4	13-Nov-15 A	17-Nov-15 A					
PD-C1-3-070	PD C1-3 Manhole Insitu concrete	5	13-Nov-15 A	17-Nov-15 A					
C1-4		37	03-Oct-15 A	08-Nov-15 A					
PD-C1-4-070	PD C1-4 Manhole Insitu concrete	6	03-Oct-15 A	08-Oct-15 A					
PD-C1-4-090	PD C1-3/4 Movement Joint Insitu	4	05-Nov-15 A	08-Nov-15 A					
C1-5		4	29-Nov-15 A	02-Dec-15 A					
PD-C1-5-070	PD C1-5 Manhole Insitu concrete	4	29-Nov-15 A	02-Dec-15 A					
C1-6		10	02-Sep-15 A	12-Sep-15 A					
PD-C1-6-080	PD C1-5/6 Movement Joint Installation	3	02-Sep-15 A	04-Sep-15 A					
PD-C1-6-060	PD C1-6 Removal of South Steel Bulkhead	5	05-Sep-15 A	09-Sep-15 A					
PD-C1-6-130	PD C1 Handover to HY/2013/02	0		12-Sep-15 A					
Culvert C2		96	26-Aug-15 A	30-Nov-15 A					
C2-2		13	26-Aug-15 A	08-Sep-15 A					
PD-C2-2-010	PD C2-2 & C2-3 Back & Delivery to site stg5	8	26-Aug-15 A	02-Sep-15 A					
PD-C2-2-100	PD C2-2 Backfill Beside of Culvert	3	01-Sep-15 A	03-Sep-15 A					
PD-C2-2-015	PD C2-2 Install the buoyancy Tank	2	03-Sep-15 A	04-Sep-15 A					

█ Remaining Level of Effort ◆ Milestone
█ Actual Level of Effort ▼ Summary
█ Actual Work
█ Remaining Work
█ Critical Remaining Work

Activity ID	Activity Name	Original	Start	Finish	Total Float	2015			
						Sep	Oct	Nov	Dec
PD-C2-2-110	PD C2-2 Backfill upto +3.5mPD except Manholes	3	04-Sep-15 A	06-Sep-15 A					
PD-C2-2-020	PD C2-2 floating to the location	1	05-Sep-15 A	05-Sep-15 A					
PD-C2-2-040	PD C2-2 Installation	1	05-Sep-15 A	05-Sep-15 A					
PD-C2-2-050	PD C2-2 Removal of North Steel Bulkhead	3	06-Sep-15 A	08-Sep-15 A					
C2-3		68	04-Sep-15 A	10-Nov-15 A					
PD-C2-3-100	PD C2-3 Backfill Beside of Culvert	4	04-Sep-15 A	07-Sep-15 A					
PD-C2-3-015	PD C2-3 Install the buoyancy Tank	2	05-Sep-15 A	06-Sep-15 A					
PD-C2-3-110	PD C2-3 Backfill upto +3.5mPD except Manholes	3	07-Sep-15 A	09-Sep-15 A					
PD-C2-3-020	PD C2-3 floating to the location	1	09-Sep-15 A	09-Sep-15 A					
PD-C2-3-040	PD C2-3 Installation	1	09-Sep-15 A	09-Sep-15 A					
PD-C2-3-050	PD C2-3 Removal of North Steel Bulkhead	5	10-Sep-15 A	14-Sep-15 A					
PD-C2-3-080	PD C2-2/3 Movement Joint Installation	3	15-Sep-15 A	17-Sep-15 A					
PD-C2-3-060	PD C2-3 Removal of South Steel Bulkhead	5	18-Sep-15 A	22-Sep-15 A					
PD-C2-3-070	PD C2-3 Manhole Insitu concrete	6	27-Oct-15 A	01-Nov-15 A					
PD-C2-3-090	PD C2-2/3 Movement Joint Insitu	6	05-Nov-15 A	10-Nov-15 A					
C2-4		85	06-Sep-15 A	30-Nov-15 A					
PD-C2-4-100	PD C2-4 Backfill Beside of Culvert	5	06-Sep-15 A	10-Sep-15 A					
PD-C2-4-010	PD C2-4 Back & Delivery to site stg6	5	09-Sep-15 A	13-Sep-15 A					
PD-C2-4-110	PD C2-4 Backfill upto +3.5mPD except Manholes	3	10-Sep-15 A	12-Sep-15 A					
PD-C2-4-015	PD C2-4 Install the buoyancy Tank	2	14-Sep-15 A	15-Sep-15 A					
PD-C2-4-020	PD C2-4 floating to the location	1	15-Sep-15 A	15-Sep-15 A					
PD-C2-4-040	PD C2-4 Installation	2	15-Sep-15 A	16-Sep-15 A					
PD-C2-4-050	PD C2-4 Removal of North Steel Bulkhead	5	17-Sep-15 A	21-Sep-15 A					
PD-C2-4-080	PD C2-3/4 Movement Joint Installation	3	22-Sep-15 A	24-Sep-15 A					
PD-C2-4-060	PD C2-4 Removal of South Steel Bulkhead	5	25-Sep-15 A	29-Sep-15 A					
PD-C2-4-090	PD C2-3/4 Movement Joint Insitu	6	05-Nov-15 A	10-Nov-15 A					
PD-C2-4-070	PD C2-4 Manhole Insitu concrete	5	26-Nov-15 A	30-Nov-15 A					
C2-5		74	10-Sep-15 A	22-Nov-15 A					
PD-C2-5-100	PD C2-5 Backfill Beside of Culvert	3	10-Sep-15 A	12-Sep-15 A					
PD-C2-5-110	PD C2-5 Backfill upto +3.5mPD except Manholes	3	13-Sep-15 A	15-Sep-15 A					
PD-C2-5-010	PD C2-5 Back & Delivery to site stg7	5	16-Sep-15 A	20-Sep-15 A					
PD-C2-5-015	PD C2-5 Install the buoyancy Tank	5	18-Sep-15 A	22-Sep-15 A					
PD-C2-5-020	PD C2-5 floating to the location	1	23-Sep-15 A	23-Sep-15 A					
PD-C2-5-040	PD C2-5 Installation	1	23-Sep-15 A	23-Sep-15 A					
PD-C2-5-080	PD C2-4/5 Movement Joint Installation	4	29-Sep-15 A	02-Oct-15 A					
PD-C2-5-060	PD C2-5 Removal of South Steel Bulkhead	5	03-Oct-15 A	07-Oct-15 A					
PD-C2-5-130	PD C2 Handover to Hy/2013/02	0		05-Oct-15 A					
PD-C2-5-090	PD C2-4/5 Movement Joint Insitu	6	17-Nov-15 A	22-Nov-15 A					
Culvert C3		157	17-Aug-15 A	26-Nov-15 A					
PD-C3-0010	PD C3 Excavation 68,000m3 2,500m3/day	18	17-Aug-15 A	03-Sep-15 A					
PD-C3-0020	PD C3 Leveling of Foundation	26	04-Sep-15 A	29-Sep-15 A					
C3-2		33	25-Sep-15 A	28-Oct-15 A					
PD-C3-2-010	PD C3-2 & C3-3 Back & Delivery to site stg8	5	25-Sep-15 A	29-Sep-15 A					
PD-C3-2-015	PD C3-2 Install the buoyancy Tank	2	30-Sep-15 A	01-Oct-15 A					
PD-C3-2-020	PD C3-2 floating to the location	1	02-Oct-15 A	02-Oct-15 A					
PD-C3-2-040	PD C3-2 Installation	1	02-Oct-15 A	02-Oct-15 A					
PD-C3-2-050	PD C3-2 Removal of North Steel Bulkhead	5	03-Oct-15 A	07-Oct-15 A					
PD-C3-2-100	PD C3-2 Backfill Beside of Culvert	3	24-Oct-15 A	26-Oct-15 A					
PD-C3-2-110	PD C3-2 Backfill upto +3.5mPD except Manholes	2	27-Oct-15 A	28-Oct-15 A					
C3-3		60	27-Sep-15 A	26-Nov-15 A					
PD-C3-3-015	PD C3-3 Install the buoyancy Tank	3	27-Sep-15 A	29-Sep-15 A					
PD-C3-3-020	PD C3-3 floating to the location	3	03-Oct-15 A	05-Oct-15 A					
PD-C3-3-040	PD C3-3 Installation	1	06-Oct-15 A	06-Oct-15 A					
PD-C3-3-050	PD C3-3 Removal of North Steel Bulkhead	5	08-Oct-15 A	12-Oct-15 A					
PD-C3-3-080	PD C3-2/3 Movement Joint Installation	41	09-Oct-15 A	19-Nov-15 A					
PD-C3-3-060	PD C3-3 Removal of South Steel Bulkhead	5	11-Oct-15 A	15-Oct-15 A					
PD-C3-3-100	PD C3-3 Backfill Beside of Culvert	3	26-Oct-15 A	28-Oct-15 A					
PD-C3-3-110	PD C3-3 Backfill upto +3.5mPD except Manholes	2	29-Oct-15 A	30-Oct-15 A					
PD-C3-3-090	PD C3-2/3 Movement Joint Insitu	4	19-Nov-15 A	22-Nov-15 A					
PD-C3-3-070	PD C3-3 Manhole Insitu concrete	5	22-Nov-15 A	26-Nov-15 A					
C3-4		47	08-Oct-15 A	23-Nov-15 A					
PD-C3-4-010	PD C3-4 Back & Delivery to site stg9	3	08-Oct-15 A	10-Oct-15 A					
PD-C3-4-015	PD C3-4 Install the buoyancy Tank	2	10-Oct-15 A	11-Oct-15 A					

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Activity ID	Activity Name	Original	Start	Finish	Total Float	2015			
						Sep	Oct	Nov	Dec
PD-C3-4-020	PD C3-4 floating to the location	1	12-Oct-15 A	12-Oct-15 A					
PD-C3-4-040	PD C3-4 Installation	1	12-Oct-15 A	12-Oct-15 A					
PD-C3-4-080	PD C3-3/4 Movement Joint Installation	3	13-Oct-15 A	15-Oct-15 A					
PD-C3-4-050	PD C3-4 Removal of North Steel Bulkhead	5	14-Oct-15 A	18-Oct-15 A					
PD-C3-4-060	PD C3-4 Removal of South Steel Bulkhead	5	16-Oct-15 A	20-Oct-15 A					
PD-C3-4-100	PD C3-4 Backfill Beside of Culvert	3	28-Oct-15 A	30-Oct-15 A					
PD-C3-4-110	PD C3-4 Backfill upto +3.5mPD except Manholes	2	31-Oct-15 A	01-Nov-15 A					
PD-C3-4-090	PD C3-3/4 Movement Joint Insitu	5	19-Nov-15 A	23-Nov-15 A					
C3-5		98	15-Oct-15 A	03-Nov-15 A					
PD-C3-5-010	PD C3-5 Back & Delivery to site stg10	5	15-Oct-15 A	19-Oct-15 A					
PD-C3-5-060	PD C3-5 Removal of South Steel Bulkhead	5	16-Oct-15 A	20-Oct-15 A					
PD-C3-5-015	PD C3-5 Install the buoyancy Tank	2	17-Oct-15 A	18-Oct-15 A					
PD-C3-5-080	PD C3-4/5 Movement Joint Installation	3	19-Oct-15 A	21-Oct-15 A					
PD-C3-5-020	PD C3-5 floating to the location	1	19-Oct-15 A	19-Oct-15 A					
PD-C3-5-040	PD C3-5 Installation	1	19-Oct-15 A	19-Oct-15 A					
PD-C3-5-100	PD C3-5 Backfill Beside of Culvert	3	30-Oct-15 A	01-Nov-15 A					
PD-C3-5-110	PD C3-5 Backfill upto +3.5mPD except Manholes	2	02-Nov-15 A	03-Nov-15 A					
PD-C3-5-130	PD C3 Handover to Hy/2013/02	0		03-Nov-15 A					
Culvert C4		132	19-Sep-15 A	03-Dec-15 A					
PD-C4-0010	PD C4 Excavation 68,000m3 2,500m3/day	37	19-Sep-15 A	25-Oct-15 A					
PD-C4-0020	PD C4 Leveling of Foundation 3,450m2 200m2/day	5	26-Oct-15 A	30-Oct-15 A					
C4-2		98	23-Oct-15 A	23-Nov-15 A					
PD-C4-2-010	PD C4-2 & C4-3 Back & Delivery to site stg11	6	23-Oct-15 A	28-Oct-15 A					
PD-C4-2-015	PD C4-2 Install the buoyancy Tank	2	29-Oct-15 A	30-Oct-15 A					
PD-C4-2-020	PD C4-2 floating to the location	2	30-Oct-15 A	31-Oct-15 A					
PD-C4-2-040	PD C4-2 Installation	1	01-Nov-15 A	01-Nov-15 A					
PD-C4-2-060	PD C4-2 Removal of South Steel Bulkhead	4	04-Nov-15 A	07-Nov-15 A					
PD-C4-2-100	PD C4-2 Backfill Beside of Culvert	3	07-Nov-15 A	09-Nov-15 A					
PD-C4-2-110	PD C4-2 Backfill upto +3.5mPD except Manholes	4	10-Nov-15 A	13-Nov-15 A					
PD-C4-2-050	PD C4-2 Removal of North Steel Bulkhead	3	21-Nov-15 A	23-Nov-15 A					
C4-3		18	30-Oct-15 A	17-Nov-15 A					
PD-C4-3-015	PD C4-3 Install the buoyancy Tank	5	30-Oct-15 A	03-Nov-15 A					
PD-C4-3-020	PD C4-3 floating to the location	2	04-Nov-15 A	05-Nov-15 A					
PD-C4-3-050	PD C4-3 Removal of North Steel Bulkhead	3	05-Nov-15 A	07-Nov-15 A					
PD-C4-3-040	PD C4-3 Installation	1	06-Nov-15 A	06-Nov-15 A					
PD-C4-3-100	PD C4-3 Backfill Beside of Culvert	3	11-Nov-15 A	13-Nov-15 A					
PD-C4-3-060	PD C4-3 Removal of South Steel Bulkhead	4	12-Nov-15 A	15-Nov-15 A					
PD-C4-3-110	PD C4-3 Backfill upto +3.5mPD except Manholes	4	14-Nov-15 A	17-Nov-15 A					
C4-4		21	08-Nov-15 A	28-Nov-15 A					
PD-C4-4-010	PD C4-4 Back & Delivery to site stg12	3	08-Nov-15 A	10-Nov-15 A					
PD-C4-4-015	PD C4-4 Install the buoyancy Tank	2	11-Nov-15 A	12-Nov-15 A					
PD-C4-4-050	PD C4-4 Removal of North Steel Bulkhead	3	12-Nov-15 A	14-Nov-15 A					
PD-C4-4-020	PD C4-4 floating to the location	2	13-Nov-15 A	14-Nov-15 A					
PD-C4-4-040	PD C4-4 Installation	1	14-Nov-15 A	14-Nov-15 A					
PD-C4-4-100	PD C4-4 Backfill Beside of Culvert	3	15-Nov-15 A	17-Nov-15 A					
PD-C4-4-060	PD C4-4 Removal of South Steel Bulkhead	4	25-Nov-15 A	28-Nov-15 A					
C4-5		18	15-Nov-15 A	03-Dec-15 A					
PD-C4-5-010	PD C4-5 Back & Delivery to site stg13	3	15-Nov-15 A	17-Nov-15 A					
PD-C4-5-015	PD C4-5 Install the buoyancy Tank	2	18-Nov-15 A	19-Nov-15 A					
PD-C4-5-020	PD C4-5 floating to the location	1	20-Nov-15 A	20-Nov-15 A					
PD-C4-5-040	PD C4-5 Installation	1	20-Nov-15 A	20-Nov-15 A					
PD-C4-5-060	PD C4-5 Removal of South Steel Bulkhead	5	29-Nov-15 A	03-Dec-15 A					
Permanent Access to Portion A		21	21-Sep-15 A	12-Oct-15 A					
PD-A2080	PD - C1 Divert Access	22	21-Sep-15 A	12-Oct-15 A					
Removal of Temporary Access to Portion A		7	13-Oct-15 A	20-Oct-15 A					
PD-A1100	PD C1 - Removal of Temporary Access	8	13-Oct-15 A	20-Oct-15 A					
Construction of Sloping Outfalls		24	19-Nov-15 A	12-Dec-15 A					
Culvert C1 Sloping Outfall		24	19-Nov-15 A	12-Dec-15 A					
PD-C1-0110	PD C1-1 Outfall Excavation	24	19-Nov-15 A	12-Dec-15 A					
Extension Culvert EC1 by one submerble barge		163	02-Aug-15 A	01-Dec-15 A					
Excavation & Supporting		163	02-Aug-15 A	01-Dec-15 A					
PD-EC1-0-010	PD EC1 Sheetpiles at EC1-6	74	02-Aug-15 A	20-Oct-15 A					
PD-EC1-0-020	PD EC1 Excavation 31,000m3	78	20-Oct-15 A	10-Nov-15 A					



Activity ID	Activity Name	Original	Start	Finish	Total Float	2015			
						Sep	Oct	Nov	Dec
PD-EC1-0-030	PD EC1 Formation of Foundation EC1-1, EC1-2 & EC1-3	7	07-Nov-15 A	13-Nov-15 A					
PD-EC1-0-040	PD EC1 Formation of Foundation EC1-4, EC1-5 & EC1-6	7	13-Nov-15 A	19-Nov-15 A					
PD-EC1-0-050	PD EC1 Formation of Foundation EC1-7 & EC1-8	37	20-Nov-15 A	01-Dec-15 A					
In situ Concrete									
EC1-1									
PD-EC1-1-010	PD EC1-1, EC1-2 & EC1-3 Back & Delivery stg14	41	18-Nov-15 A	30-Nov-15 A					
PD-EC1-1-020	PD EC1-1 Buoyancy	41	18-Nov-15 A	25-Nov-15 A					
PD-EC1-1-030	PD EC1-1 Installation of Precast Culvert Base	2	26-Nov-15 A	27-Nov-15 A					
EC1-2									
PD-EC1-2-020	PD EC1-2 Buoyancy	3	28-Nov-15 A	30-Nov-15 A					
Construction of Permanent Seawall									
Vertical Seawall Type V2 6+136 to 5+650									
Foundation Leveling									
PD-V2-0055	PD C1/C2 - Vertical Seawall V2 VSOP19-16 Foundation Leveling 3,000m2 and Geotextile	116	15-Oct-15 A	09-Jan-16 A					
PD-V2-0060	PD C2/C3 - Vertical Seawall V2 VSOP15-11 Foundation Leveling 3,000m2 and Geotextile	73	15-Oct-15 A	31-Oct-15 A					
PD-V2-0065	PD C3/C4 - Vertical Seawall V2 VSOP10-05 Foundation Leveling 3,000m2 and Geotextile	14	02-Nov-15 A	16-Nov-15 A					
Seawall Blocks Installation									
PD-V2-0090	PD C1/C2 - Vertical Seawall Blocks V2 VSOP19-16 Type 2A5, 2A4 & 2A3 606nrs (30nrs/day)	60	20-Nov-15 A	31-Dec-15 A					
Works Area WA2 (Tung Chung)									
Zone A									
A1880	Maintenance of Engineer's Accommodation (28Feb2017)	57	14-Nov-15 A	09-Jan-16 A					
Works Area TKO Fill Bank									
WA-TKO-1040	Operate and Maintain Public Fill Sorting Facilities in Zone A, B1 & B2 (30Nov2016)	1459	21-May-12 A	28-Feb-17	0				

█ Remaining Level of Effort ◆ ◆ Milestone
█ Actual Level of Effort ▬ Summary
█ Actual Work
█ Remaining Work
█ Critical Remaining Work

Appendix C - Implementation Schedule of Environmental Mitigation Measures

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
Air Quality				
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"> • 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; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones. • 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; • When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary 	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>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"> • 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; • 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; • 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; • 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; • Any skip hoist for material transport should be totally enclosed by impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides; • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an 		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;</p> <ul style="list-style-type: none"> • 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. • No burning of debris or other materials on the works areas is allowed; • 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; • Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading; • 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; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should 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 • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable 		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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.		
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
S5.5.7.1 of HKBCFEIA	A5	The following mitigation measures should be adopted to prevent fugitive dust emissions for concrete batching plant: <ul style="list-style-type: none"> • Loading, unloading, handling, transfer or storage of any dusty materials should be carried out in totally enclosed system; • 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; • Vents for all silos and cement/ pulverised fuel ash (PFA) weighing scale should be fitted with fabric filtering system; • The materials which may generate airborne dusty emissions should be wetted by water spray system; 	All construction sites	N/A

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> • All receiving hoppers should be enclosed on three sides up to 3m above unloading point; • All conveyor transfer points should be totally enclosed; • All access and route roads within the premises should be paved and wetted; and • Vehicle cleaning facilities should be provided and used by all concrete trucks 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"> • All road surface within the barging facilities will be paved; • Dust enclosures will be provided for the loading ramp; • Vehicles will be required to pass through designated wheels wash facilities; and • Continuous water spray at the loading points. 	All construction sites	N/A (Construction in process)
Construction Noise (Air borne)				
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"> • only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • 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; • plant known to emit noise strongly in one direction, where possible, be orientated 	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		so that the noise is directed away from nearby NSRs; <ul style="list-style-type: none"> • silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; • material stockpiles, mobile container site officer and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities. 		
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 ²), 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	N6	Implement a noise monitoring under EM&A programme.	Selected	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
TMCLKLEIA			representative noise monitoring station	
Waste Management (Construction Waste)				
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><u>Construction and Demolition Material</u></p> <p>The following mitigation measures should be implemented in handling the waste:</p> <ul style="list-style-type: none"> • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt ‘Selective Demolition’ technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; 	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; • 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&D materials and to minimize their generation during the course of construction; • In addition, disposal of the C&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 • The surplus surcharge should be transferred to a fill bank. 		
S8.3.9- S8.3.11 of HKBCFEIA and S12.6 of TMCLKLEIA	WM5	<p><u>C&D Waste</u></p> <ul style="list-style-type: none"> • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or 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. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers 	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>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.</p>		
<p>S8.2.12- S8.3.15 of HKBCFEIA and S12.6 of TMCLKLEIA</p>	<p>WM6</p>	<p><u>Chemical Waste</u></p> <ul style="list-style-type: none"> • 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. • 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. • 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. • 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 	<p>All construction sites</p>	<p>V</p>

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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.		
S8.3.16 of HKBCFEIA and S12.6 of TMCLKLEIA	WM7	<p><u>Sewage</u></p> <ul style="list-style-type: none"> 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. 	All construction sites	V
S8.3.17 of HKBCFEIA and S12.6 of TMCLKLEIA	WM8	<p><u>General Refuse</u></p> <ul style="list-style-type: none"> 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 separately from construction and chemical wastes. 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. 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. 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 	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>considered by the Contractor. In addition, waste separation facilities for paper, aluminum cans, plastic bottles etc., should be provided.</p> <ul style="list-style-type: none"> • Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including reduction, reuse and recycling of wastes. • 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. • All waste containers shall be in a secure area on hardstanding. 		
Water Quality (Construction Phase)				
	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>	During filling	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> • 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; • 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; • 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 +2.5mPD, unless otherwise agreement from EPD was obtained; • 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 • 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. • 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 		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>to prevent sediment loss at navigation accesses. The length of each staggered layers shall be at least 200m;</p> <ul style="list-style-type: none"> • Single layer silt curtain to be applied around the North-east airport water intake; • The silt-curtains should be maintained in good condition to ensure the sediment plume generated from filling be confined effectively within the site boundary; • The filling works shall be scheduled to spread the works evenly over a working day; • Cellular structure shall be used for seawall construction; • 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; • 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 • 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. 		
S9.11.1.3 of HKBCFEIA and S6.10 of	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>	All land-based construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
TMCLKLEIA		<ul style="list-style-type: none"> • wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters; • sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided; • 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; • 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; • temporary access roads should be surfaced with crushed stone or gravel; • rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities; • measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system; • open stockpiles of construction materials (e.g. aggregates and sand) on site 		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>should be covered with tarpaulin or similar fabric during rainstorms;</p> <ul style="list-style-type: none"> • 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 from getting into foul sewers; • discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system; • 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; • wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain; • the section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel; • wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects; • 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; 		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> • the contractors shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately; • waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance; • 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 • surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the storm water system.. 		
S9.14 of HKBCFEIA and S6.10 of TMCLKLEIA	W3	Implement a water quality monitoring programme	At identified monitoring location	V
S6.10 of TMCLKLEIA	W4	All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice.	All construction site areas	V
Ecology (Construction Phase)				
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E1	<ul style="list-style-type: none"> • Install silt curtain during the construction • Limit works fronts • Construct seawall prior to reclamation filling where practicable 	Seawall, reclamation area	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> • Good site practices • Strict enforcement of no marine dumping • Site runoff control • Spill response plan 		
S10.7 of HKBCFEIA	E2	<ul style="list-style-type: none"> • 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. 	Land-based works areas	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E3	<ul style="list-style-type: none"> • Good site practices, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time. 	Land-based works areas	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E4	<ul style="list-style-type: none"> • Dolphin Exclusion Zone • Dolphin watching plan 	Marine works	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E5	<ul style="list-style-type: none"> • Decouple compressors and other equipment on working vessels • Proposal on design and implementation of acoustic decoupling measures applied during reclamation works • Avoidance of percussive piling 	Marine works	V
S10.7 of	E6	<ul style="list-style-type: none"> • Control vessel speed 	Marine traffic	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
HKBCFEIA and S8.14 of TMCLKLEIA		<ul style="list-style-type: none"> • Skipper training • Predefined and regular routes for working vessels; avoid Brothers Islands 		
S10.10 of HKBCFEIA and S8.14 of TMCLKLEIA	E7	<ul style="list-style-type: none"> • Vessel based dolphin monitoring 	Northeast and Northwest Lantau	V
Fisheries				
S11.7 of HKBCFEIA	F1	<ul style="list-style-type: none"> • Reduce re-suspension of sediments • Limit works fronts • Good site practices • Strict enforcement of no marine dumping • Spill response plan 	Seawall, reclamation area	V
S11.7 of HKBCFEIA	F2	<ul style="list-style-type: none"> • Install silt-grease trap in the drainage system collecting surface runoff 	Reclamation area	V
Landscape & Visual (Construction Phase)				
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</p>	All construction site areas	N/A

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		rock materials and planting strip area accommodating screen buffer to enhance “natural-look” of new coastline.		
S10.9 of TMCLKLEIA	LV2	<u>Mitigate Landscape Impacts</u> CM7 Ensure no run-off into water body adjacent to the Project Area.	All construction site areas	V
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
EM&A				
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"> An Environmental Team needs to be employed as per the EM&A Manual. Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures. An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&A Manual are fully complied with. 	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 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$
AMS3B*	368 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$
AMS6	360 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$
AMS7A^	370 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$

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

^ Action Level set out at AMS7 Hong Kong SkyCity Marriot Hotel is adopted

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

Location	Action Level	Limit Level
AMS2	176 $\mu\text{g}/\text{m}^3$	260 $\mu\text{g}/\text{m}^3$
AMS3B*	167 $\mu\text{g}/\text{m}^3$	260 $\mu\text{g}/\text{m}^3$
AMS6	173 $\mu\text{g}/\text{m}^3$	260 $\mu\text{g}/\text{m}^3$
AMS7A	183 $\mu\text{g}/\text{m}^3$	260 $\mu\text{g}/\text{m}^3$

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

^ Action Level set out at AMS7 Hong Kong SkyCity Marriot Hotel 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

Parameters	Action	Limit
DO in mg L ⁻¹ (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 ⁻¹ (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.

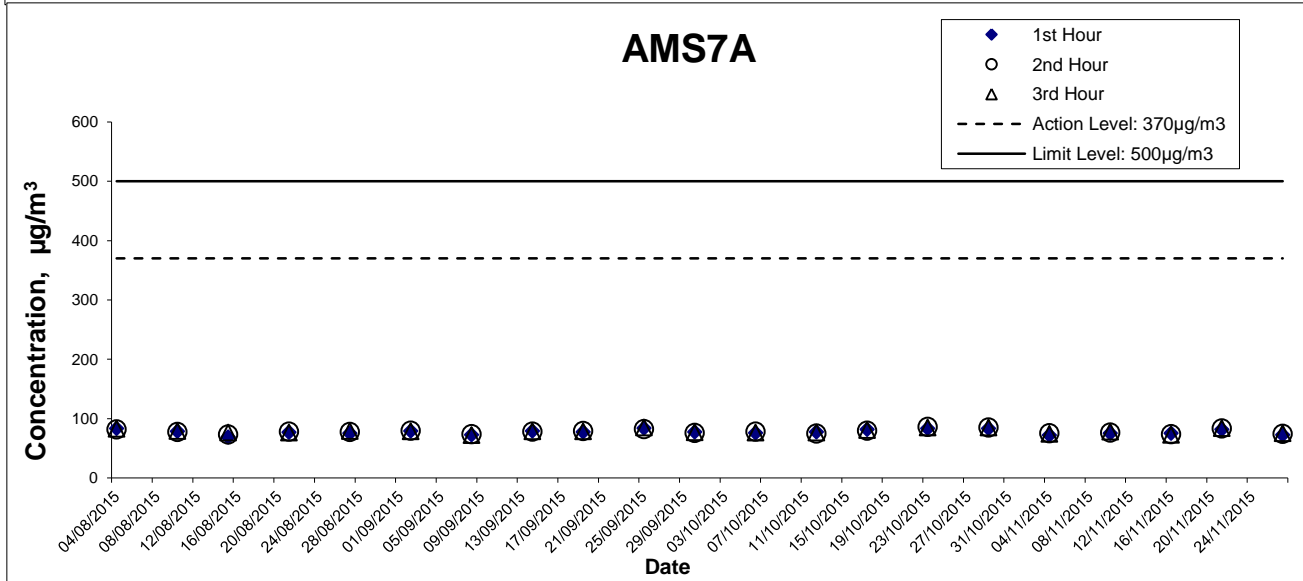
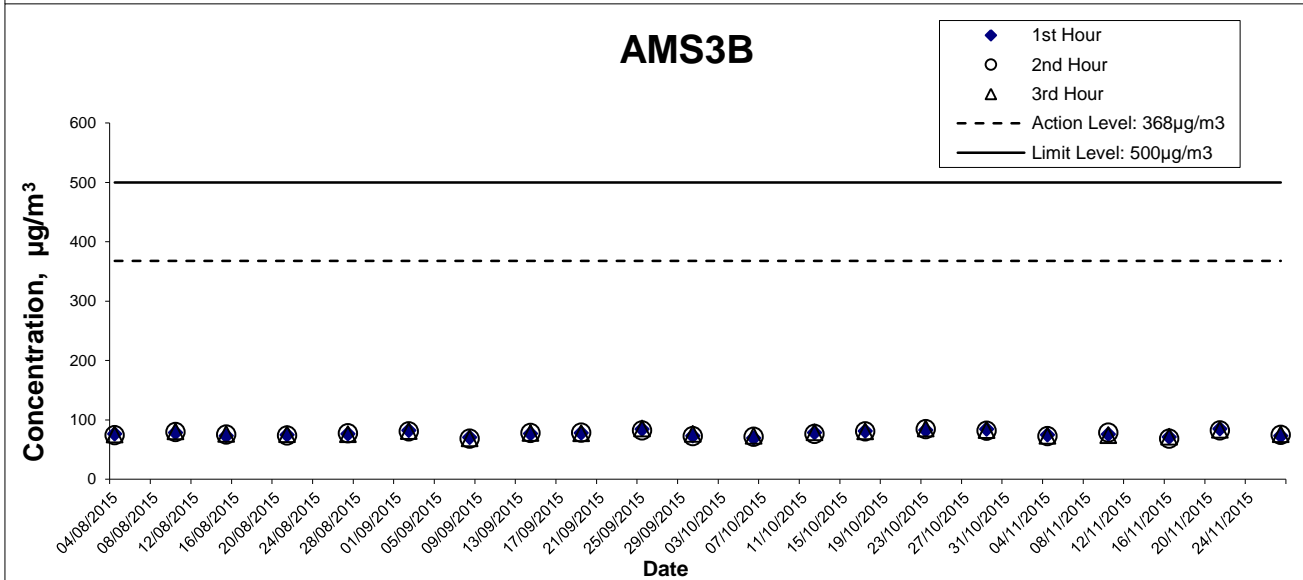
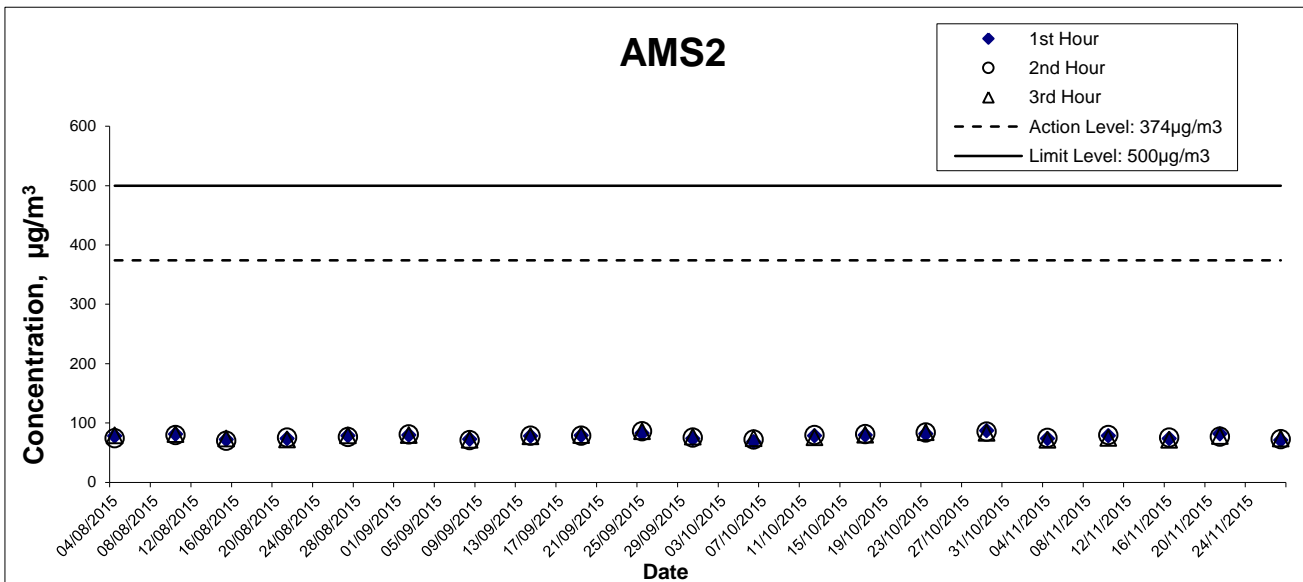
Table 5(a) Action and Limit Levels for Chinese White Dolphin Monitoring - Approach to Define Action Level (AL) and Limit Level (LL):

	North Lantau Social Cluster	
	NEL	NWL
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

	North Lantau Social Cluster	
	NEL	NWL
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)]	

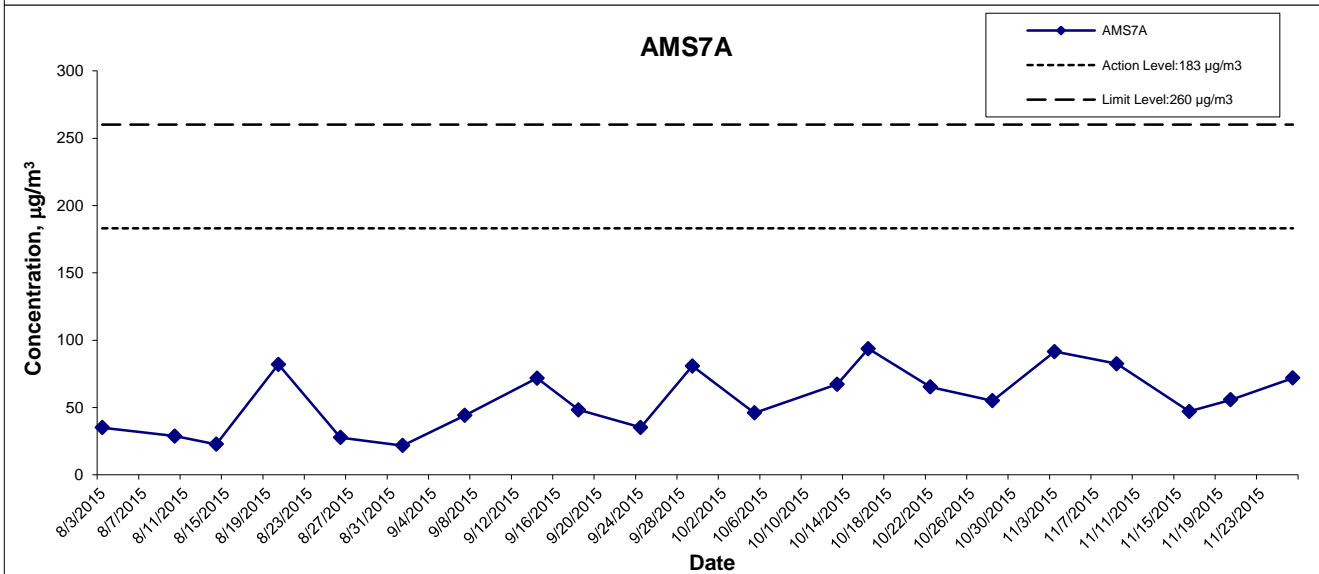
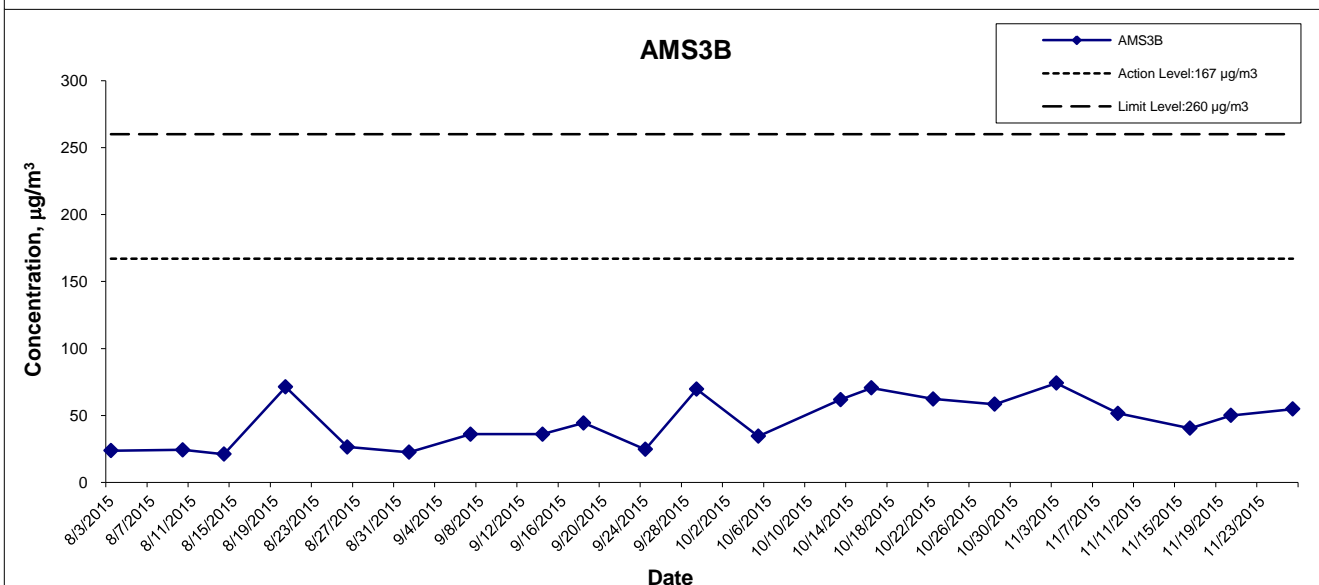
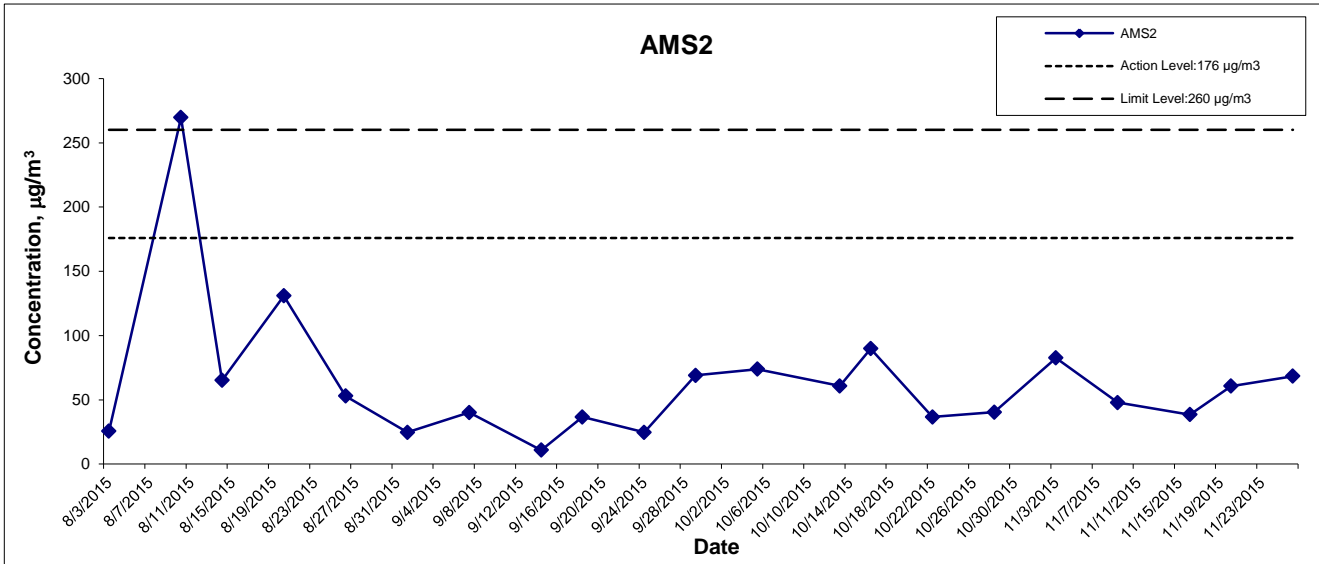


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 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

**Graphical Presentation of Impact 1-hour TSP
 Monitoring Results**



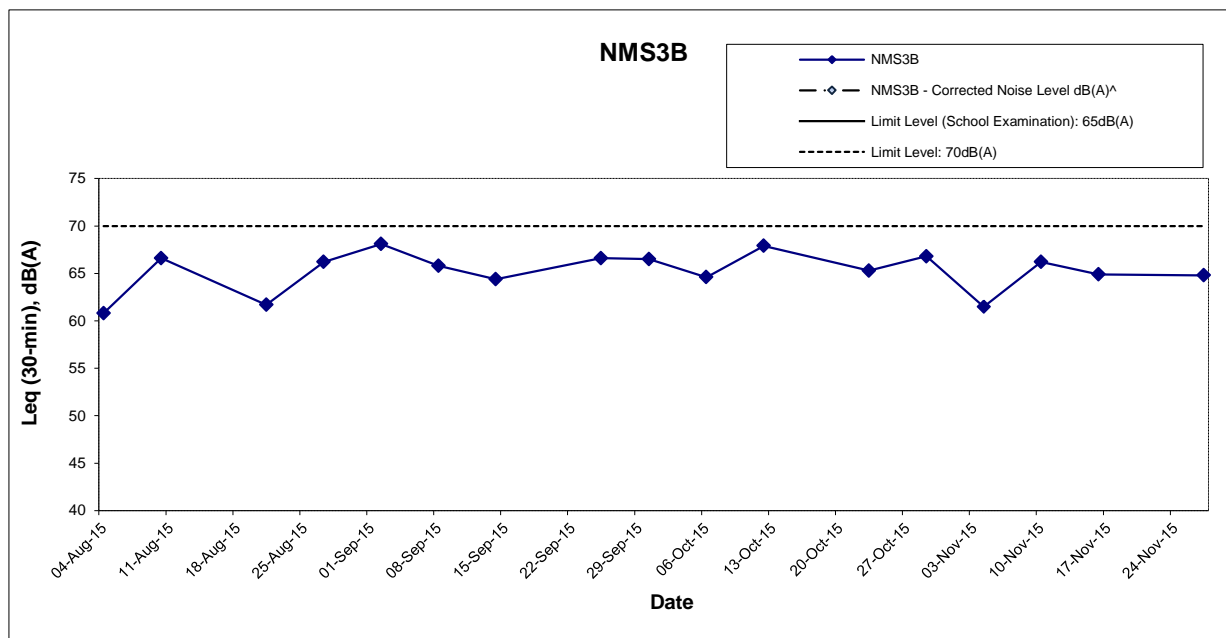
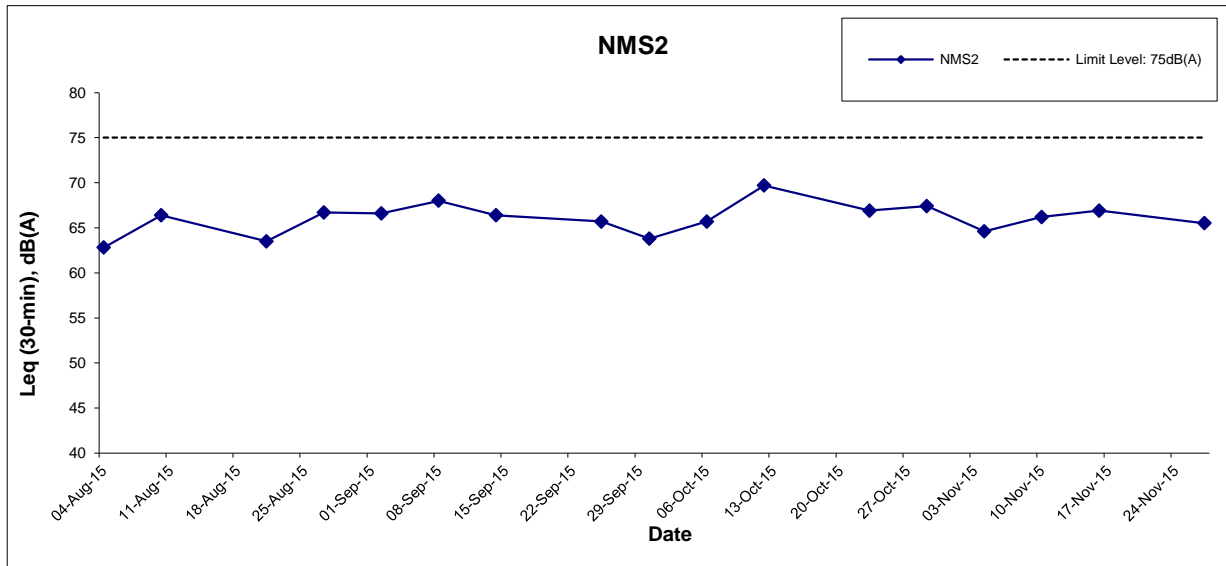


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Graphical Presentation of Impact 24-hour TSP
 Monitoring Results





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.

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- RECLAMATION WORKS**

**Graphical Presentation of Impact Daytime
Construction Noise Monitoring Results**

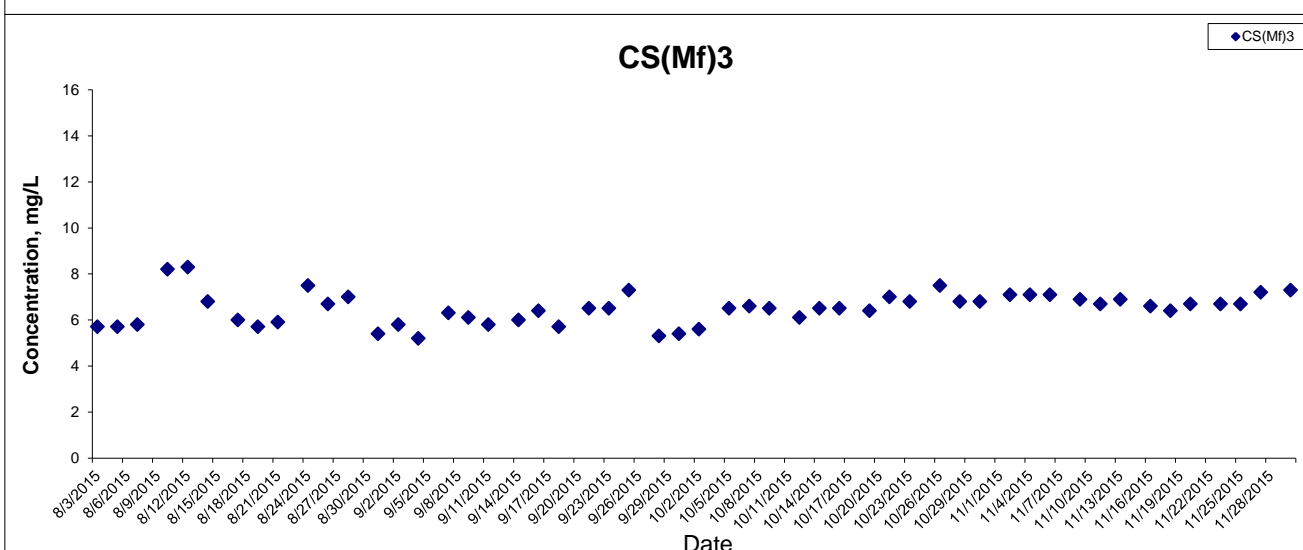
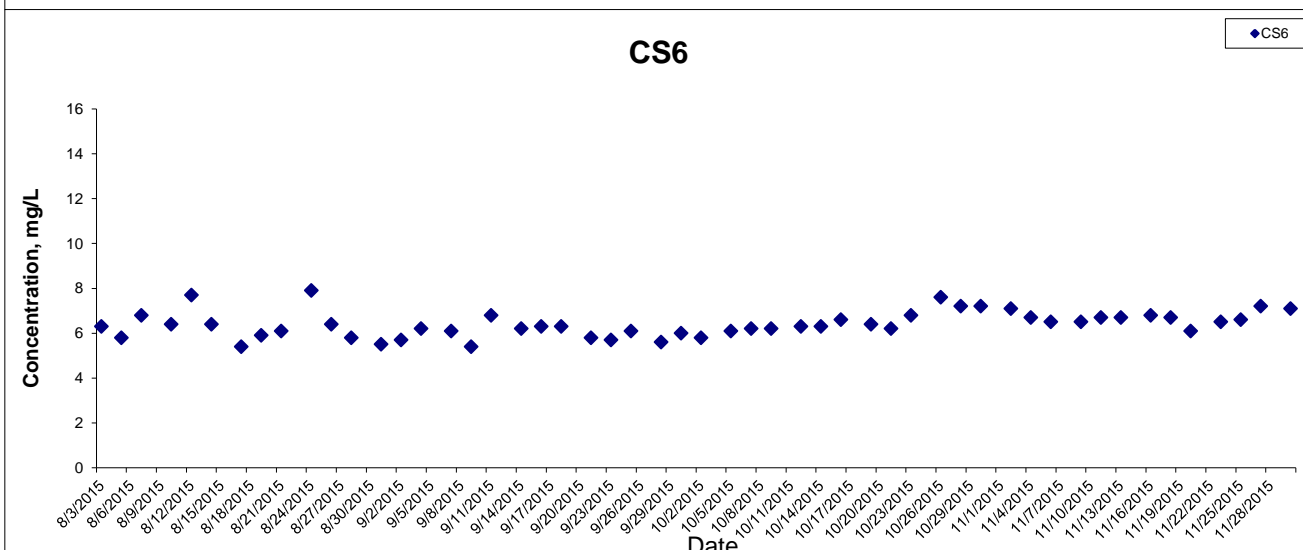
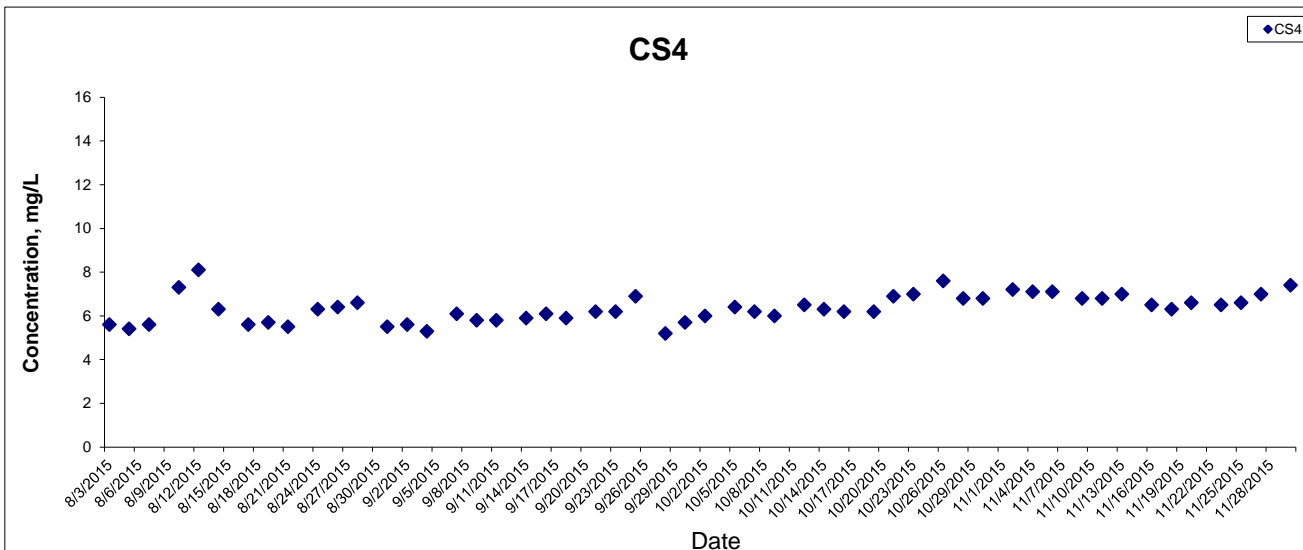


Project No.: 60249820

Date: Dec 2015

Appendix F

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



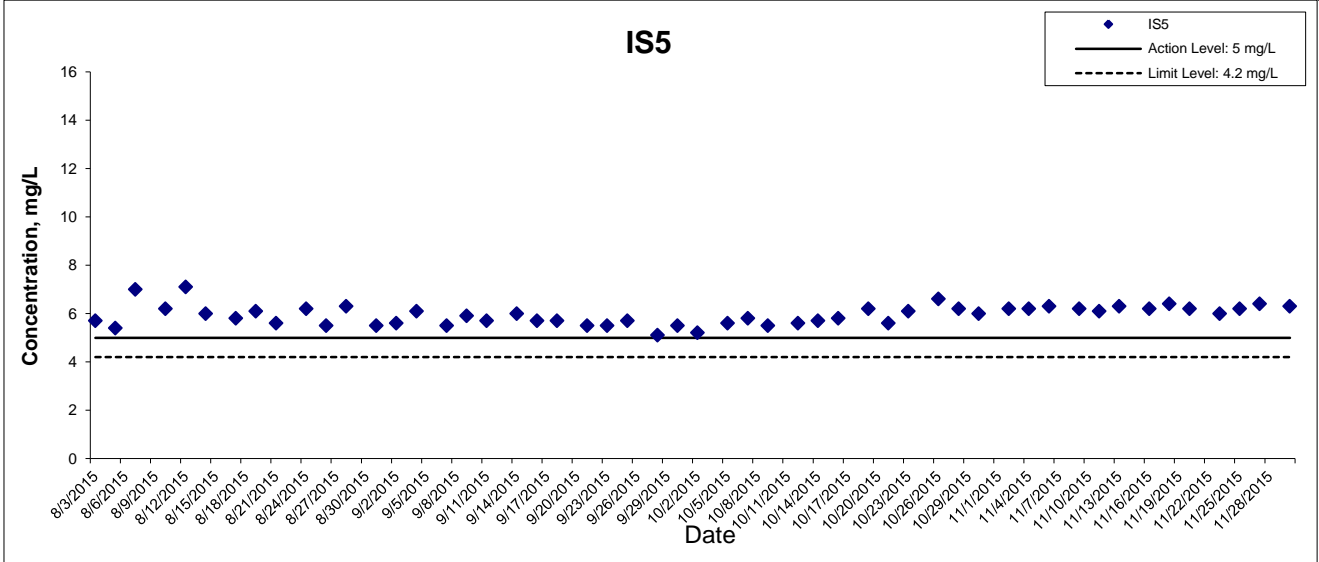
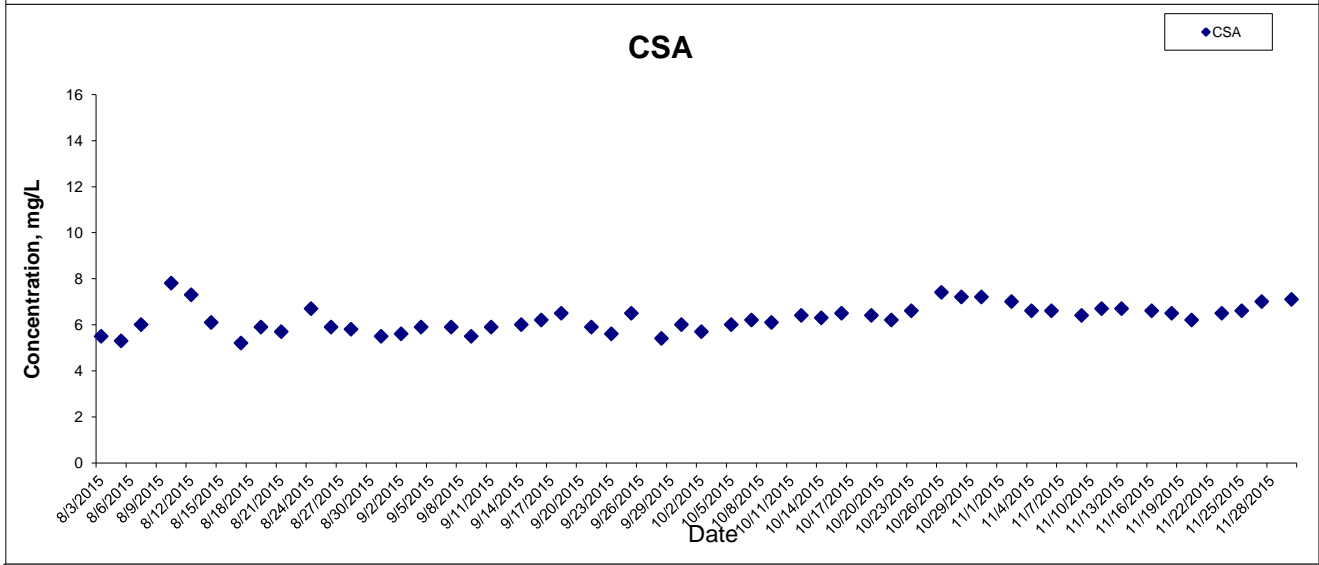
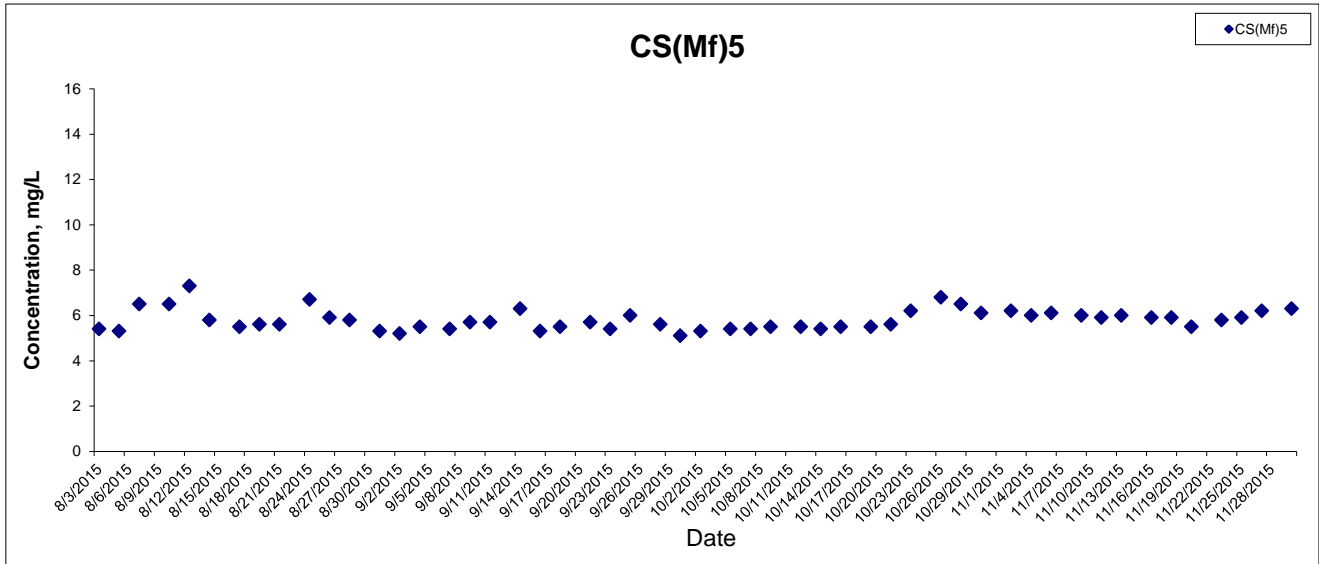
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 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results



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



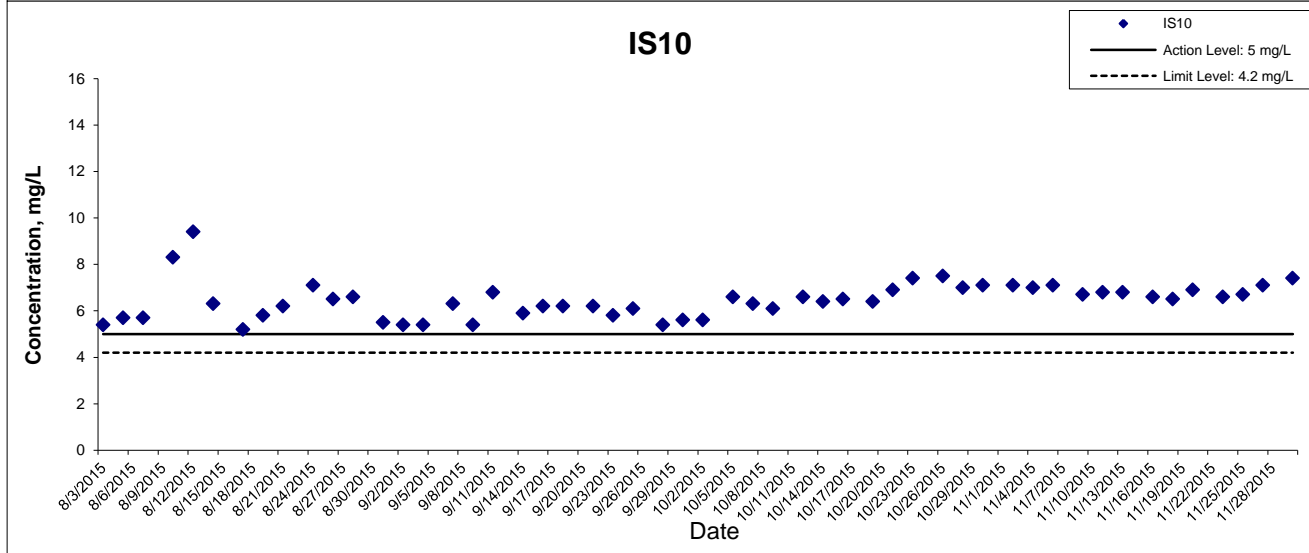
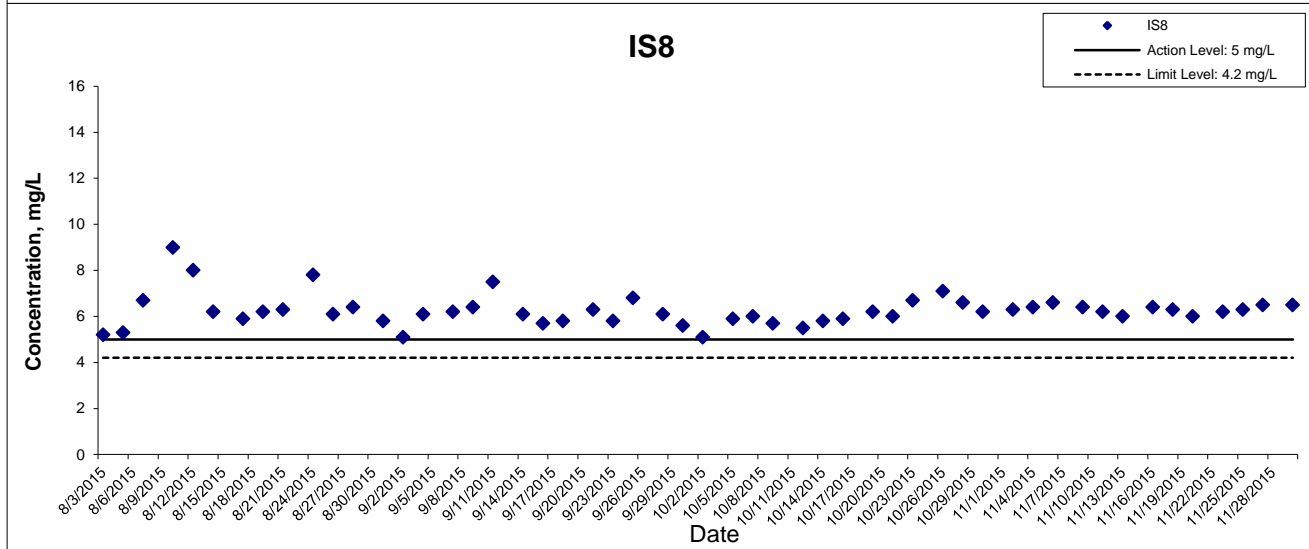
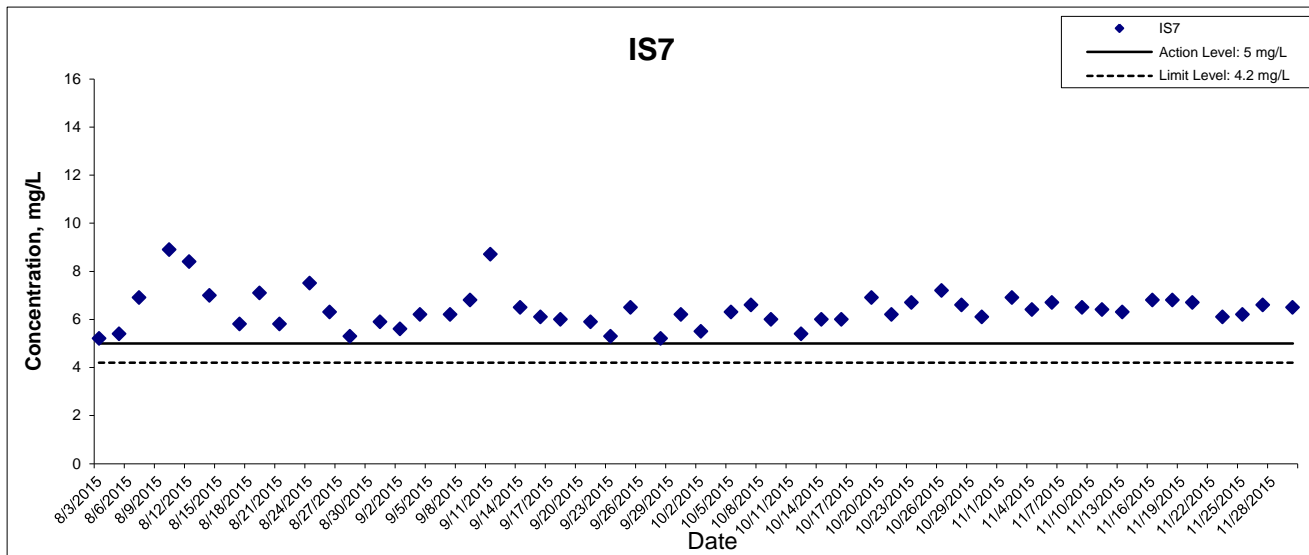
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Graphical Presentation of Impact Water Quality
 Monitoring Results

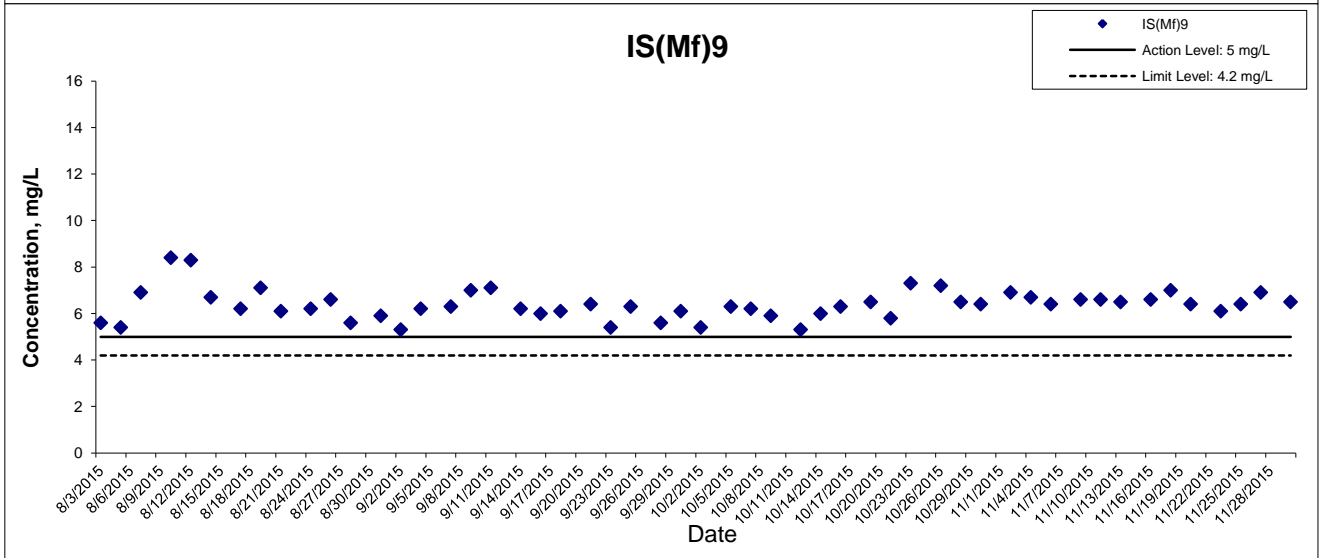
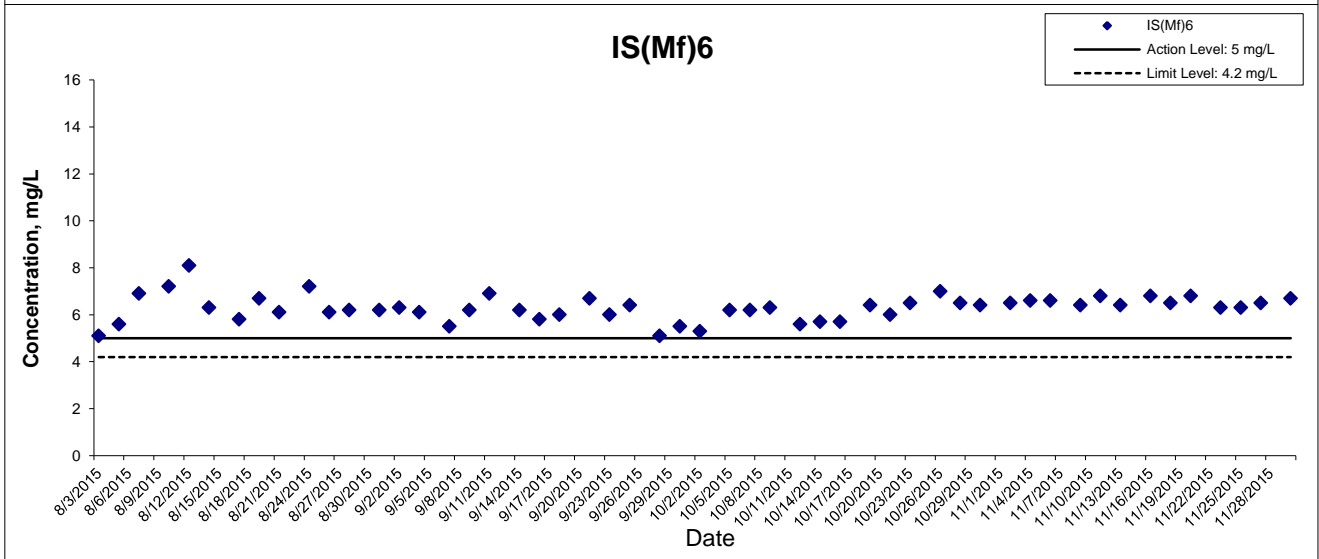
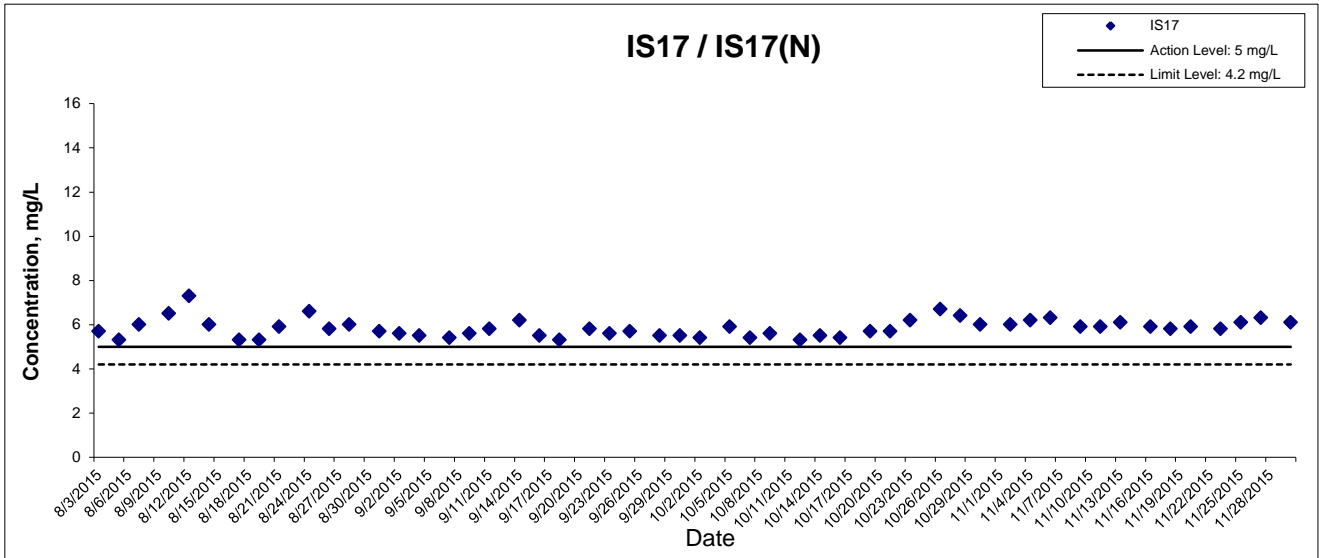


Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



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

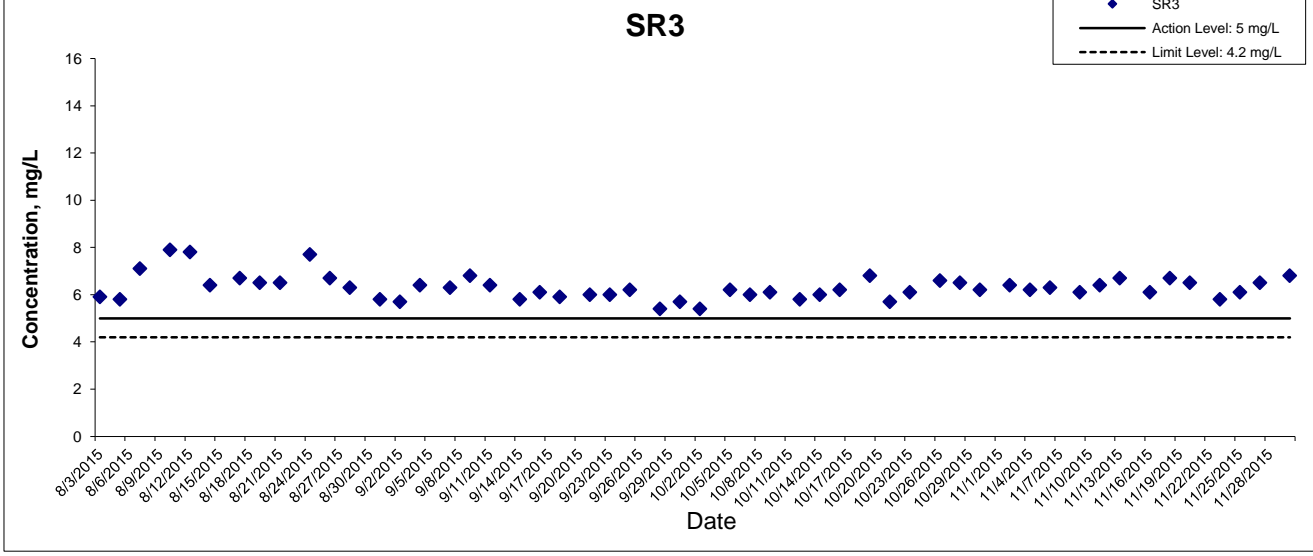
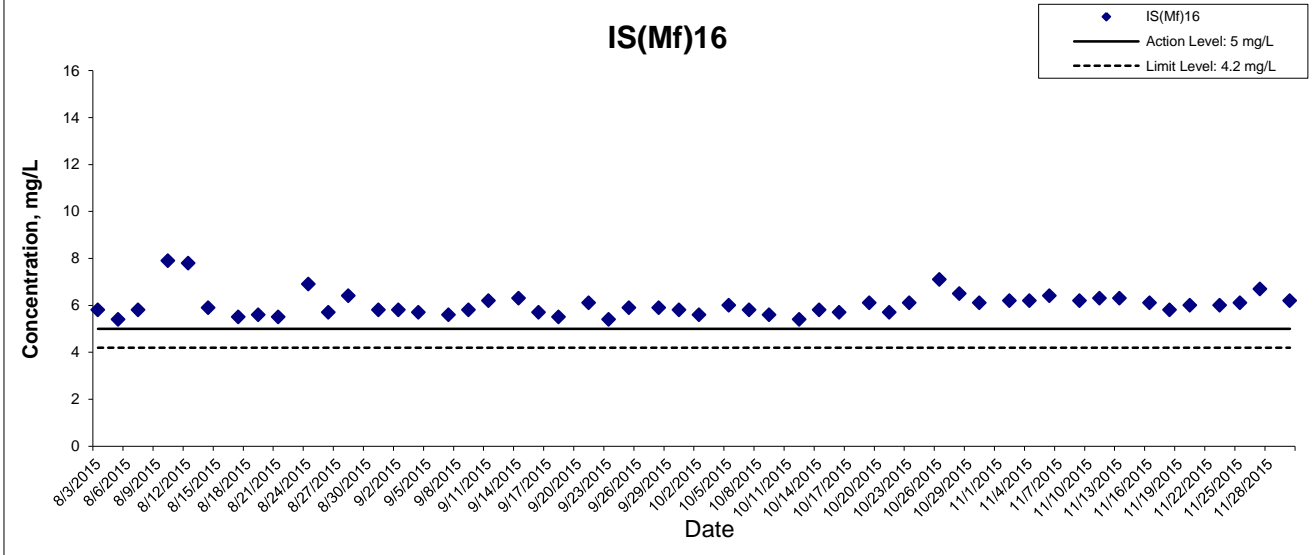
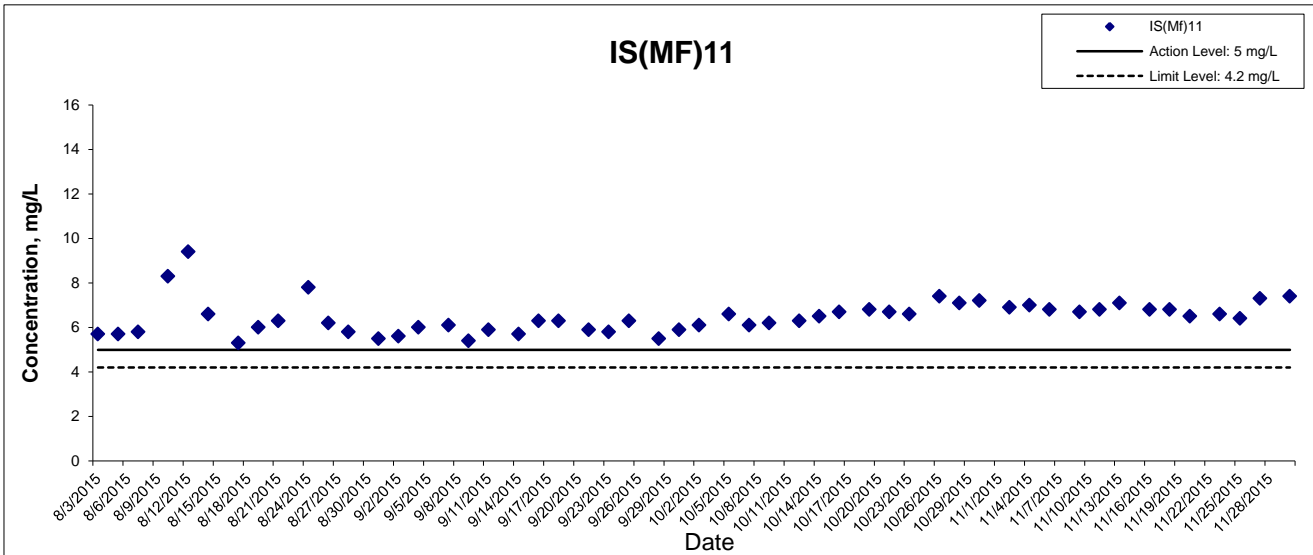


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**HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS**

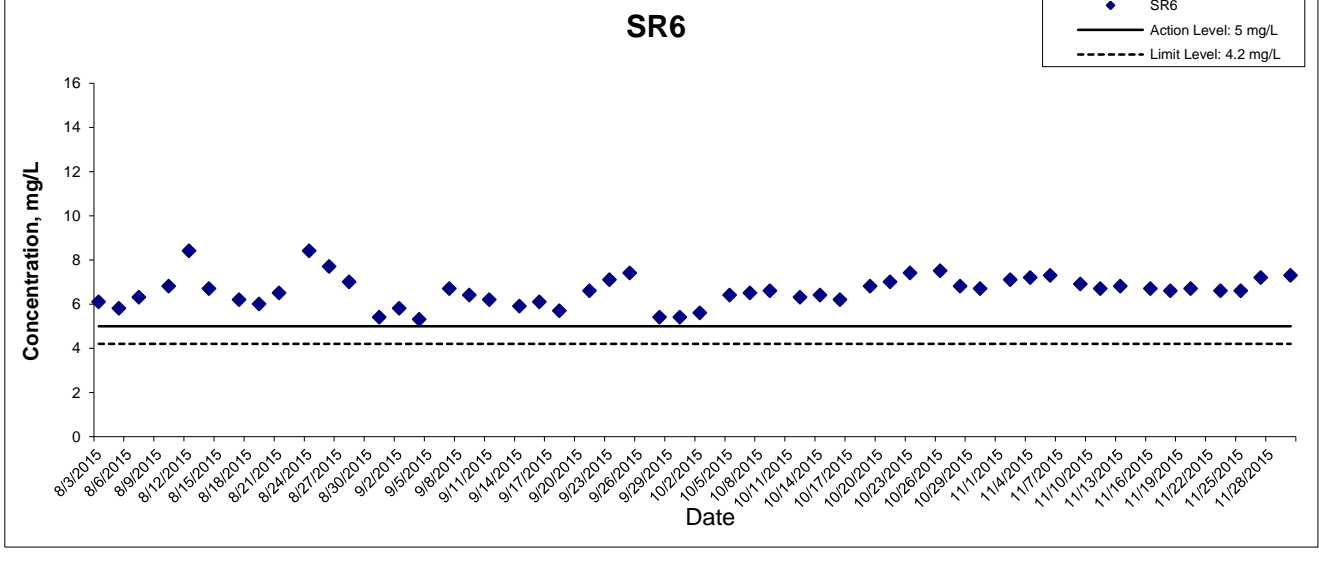
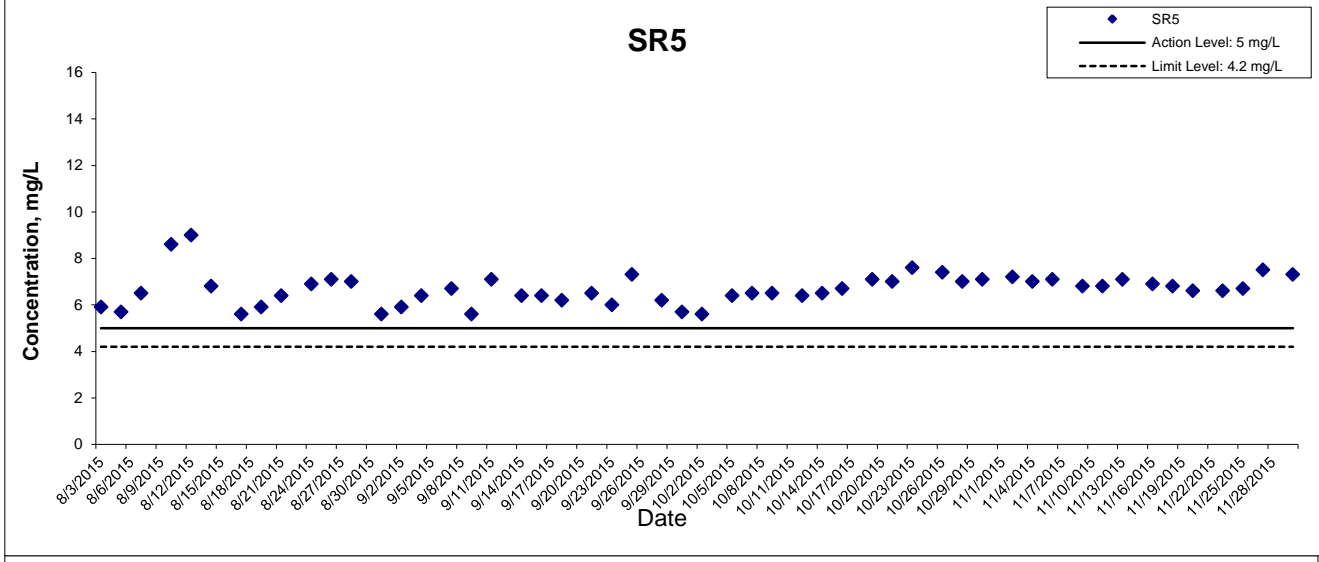
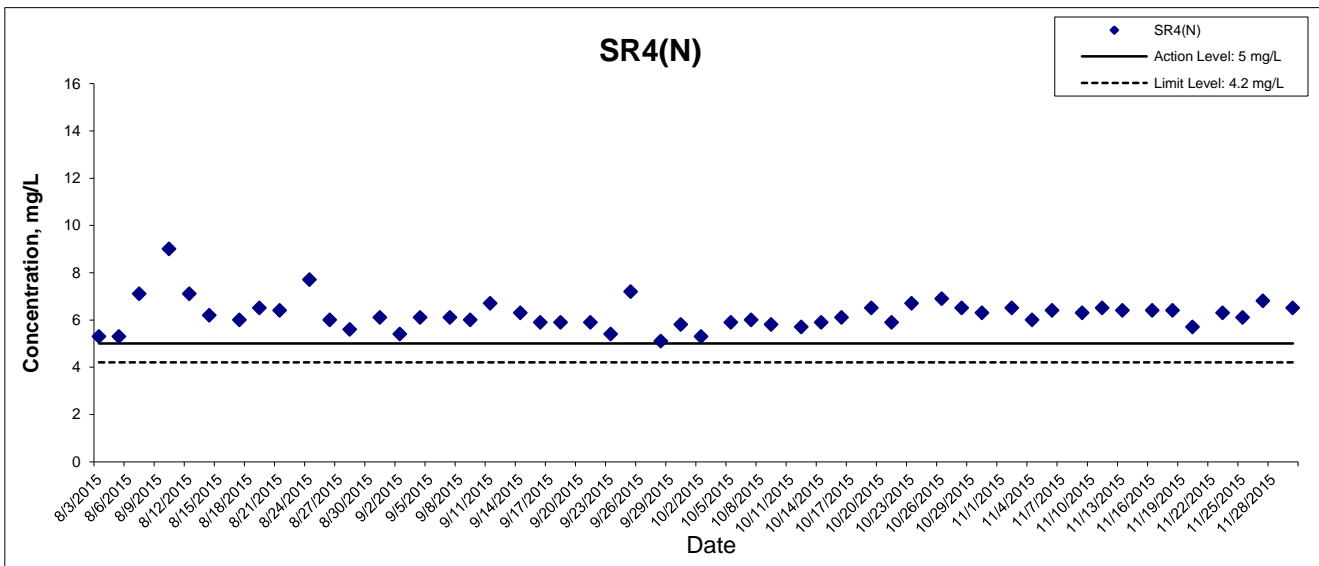
**Graphical Presentation of Impact Water Quality
 Monitoring Results**





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

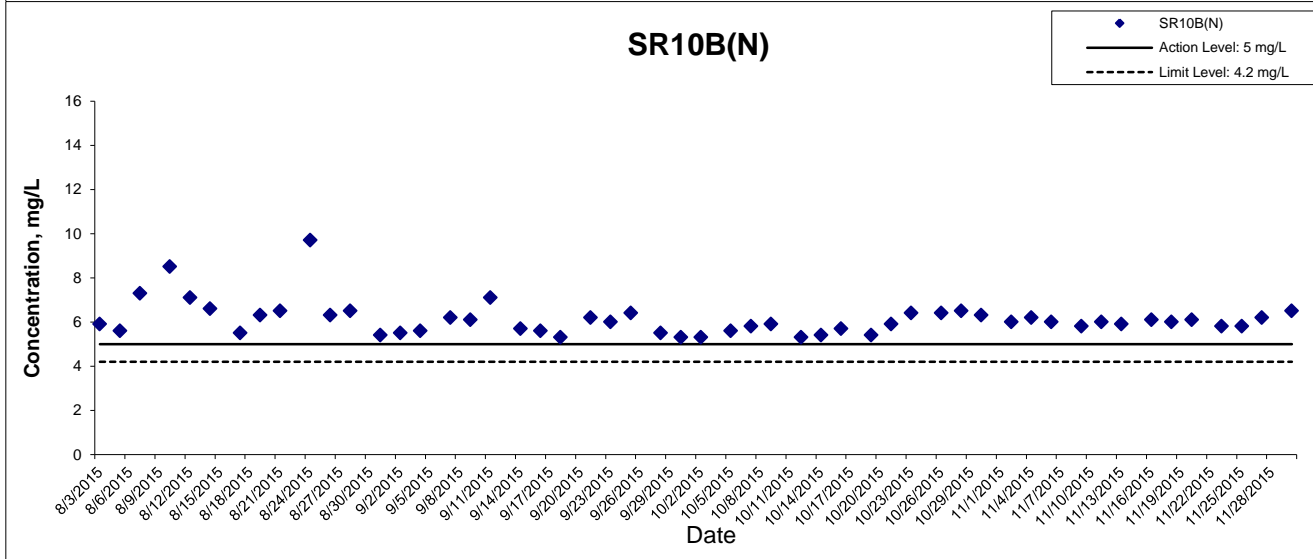
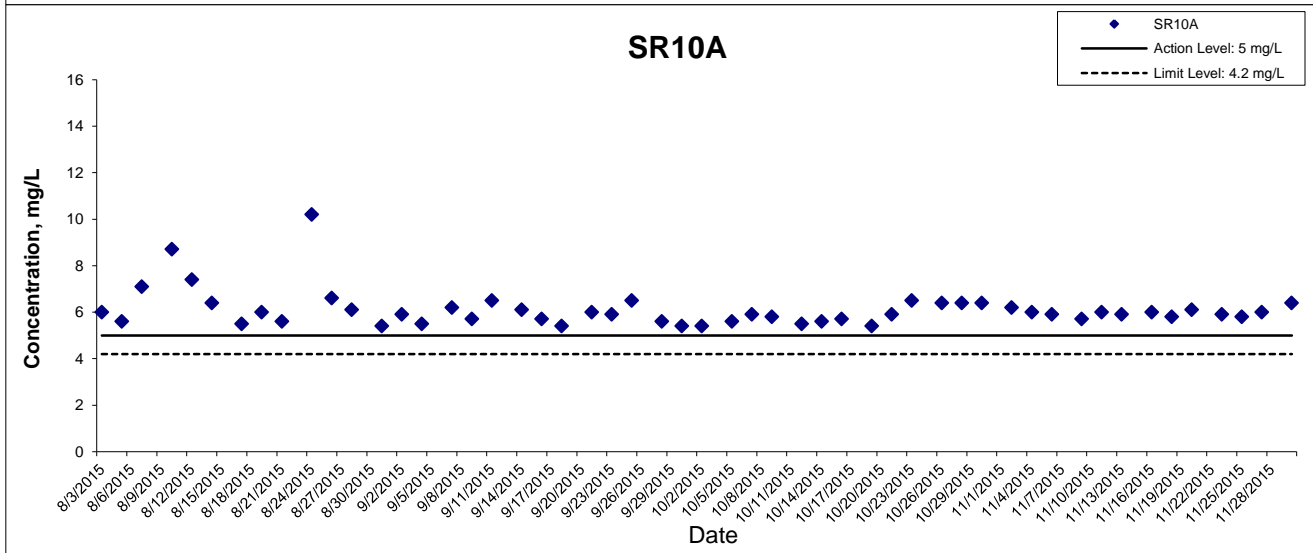
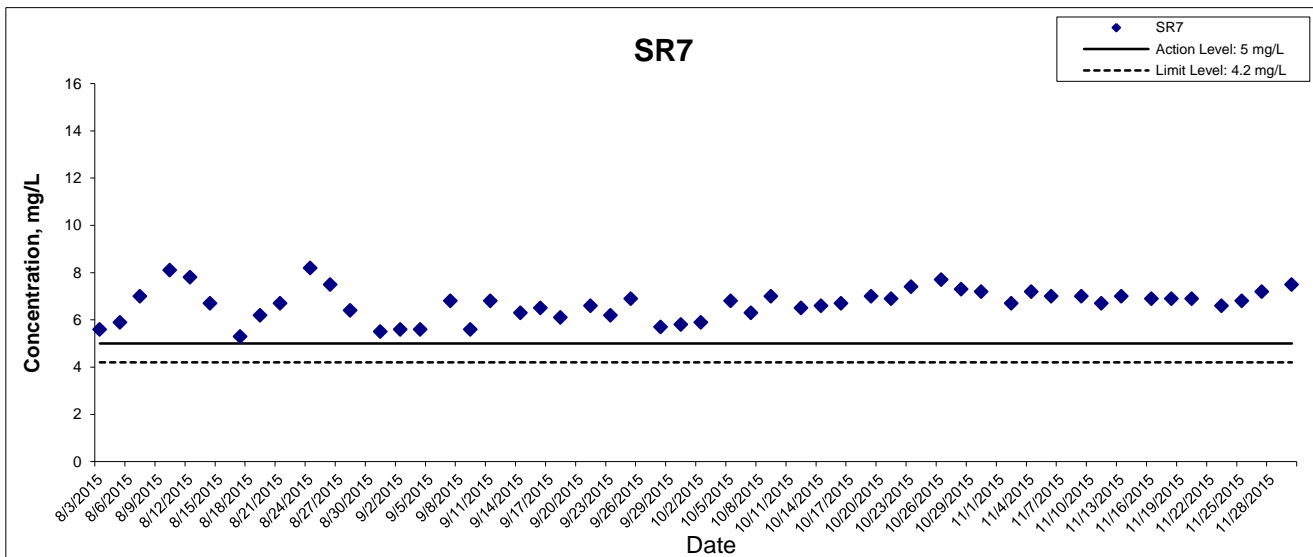


- RECLAMATION WORKS Graphical Presentation of Impact Water Quality
Monitoring Results

Project No.: 60249820

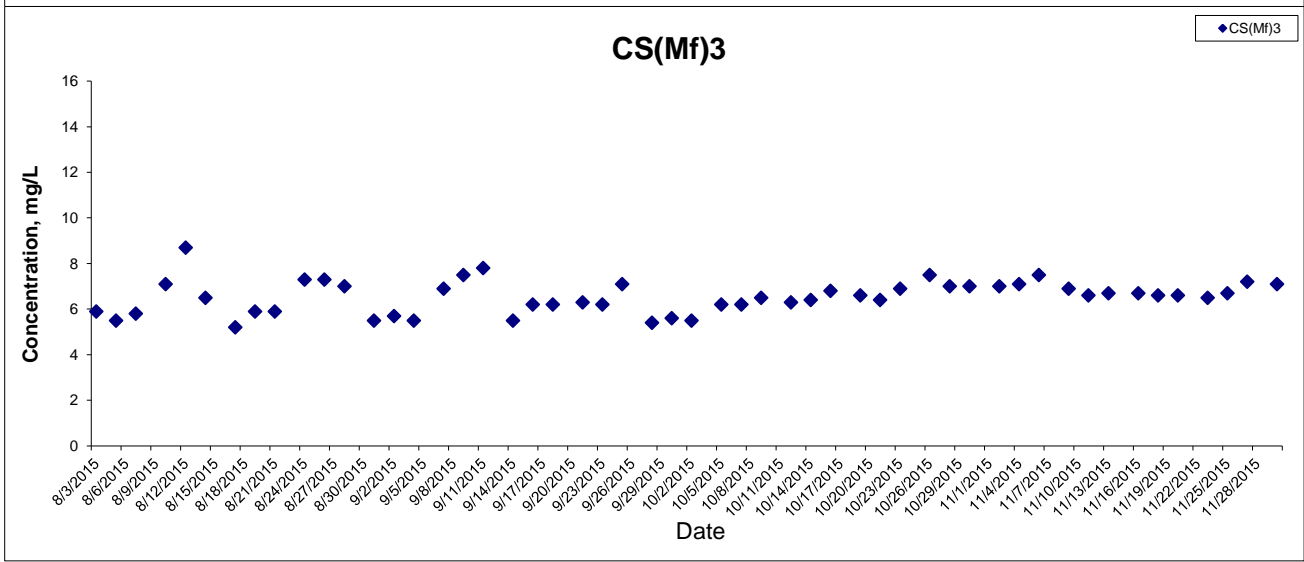
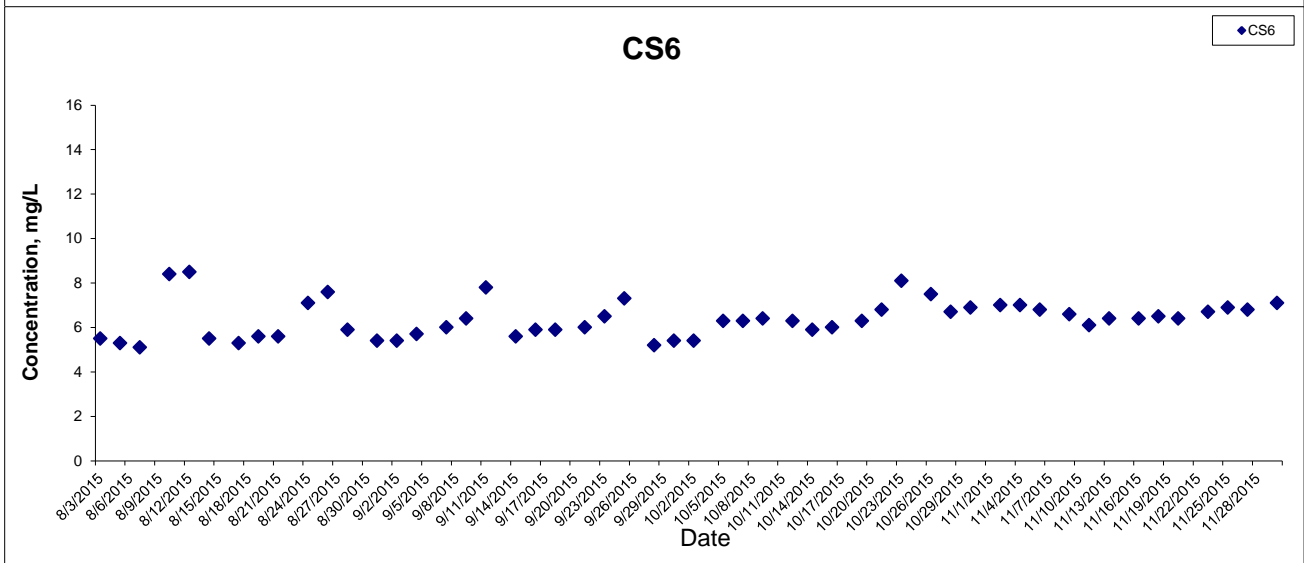
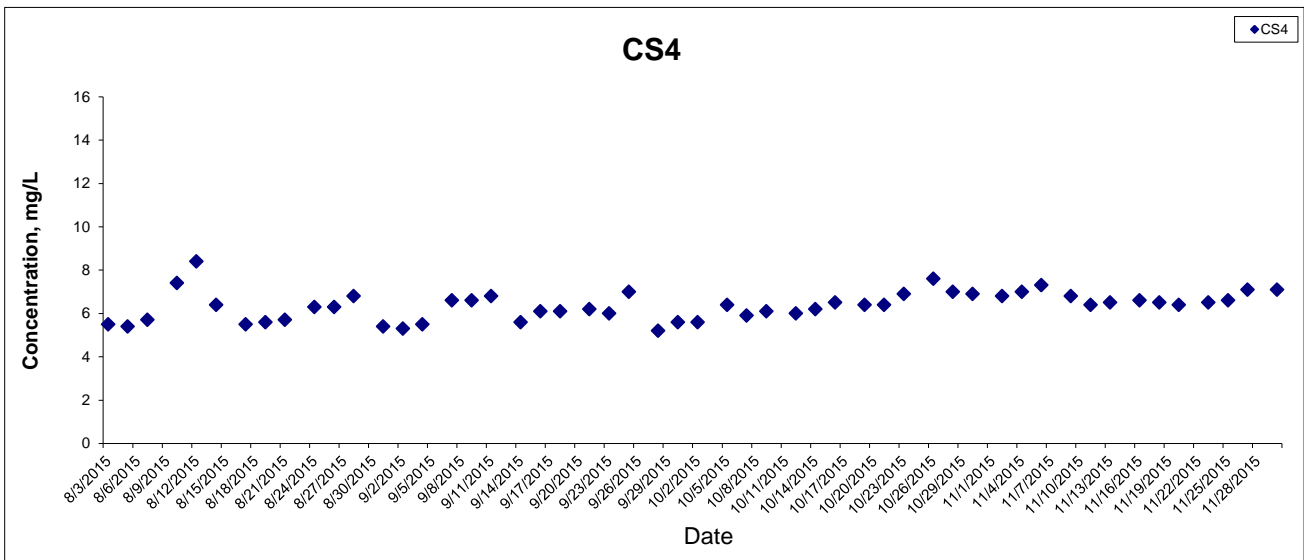
Date: December 2015

Appendix J



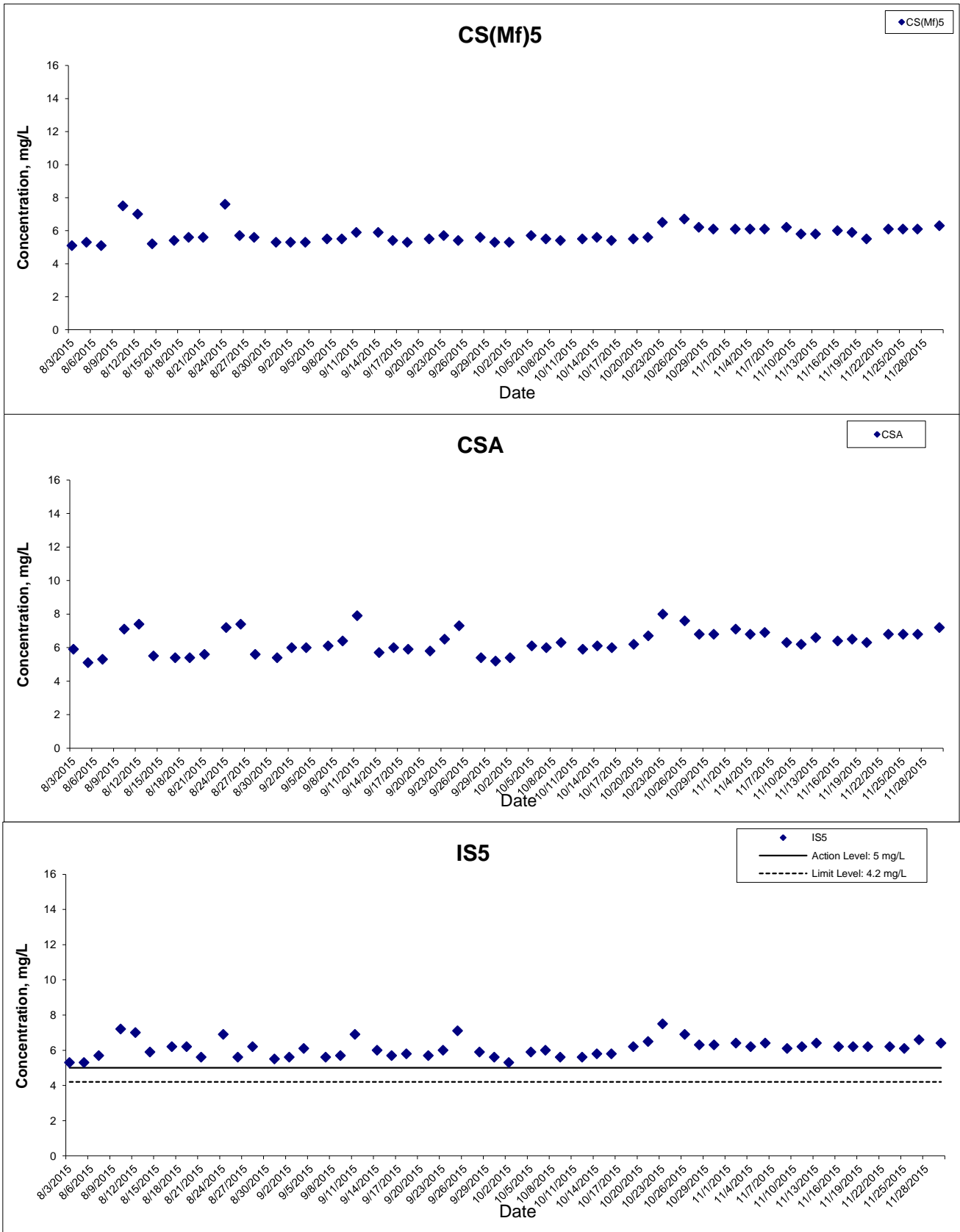
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Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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



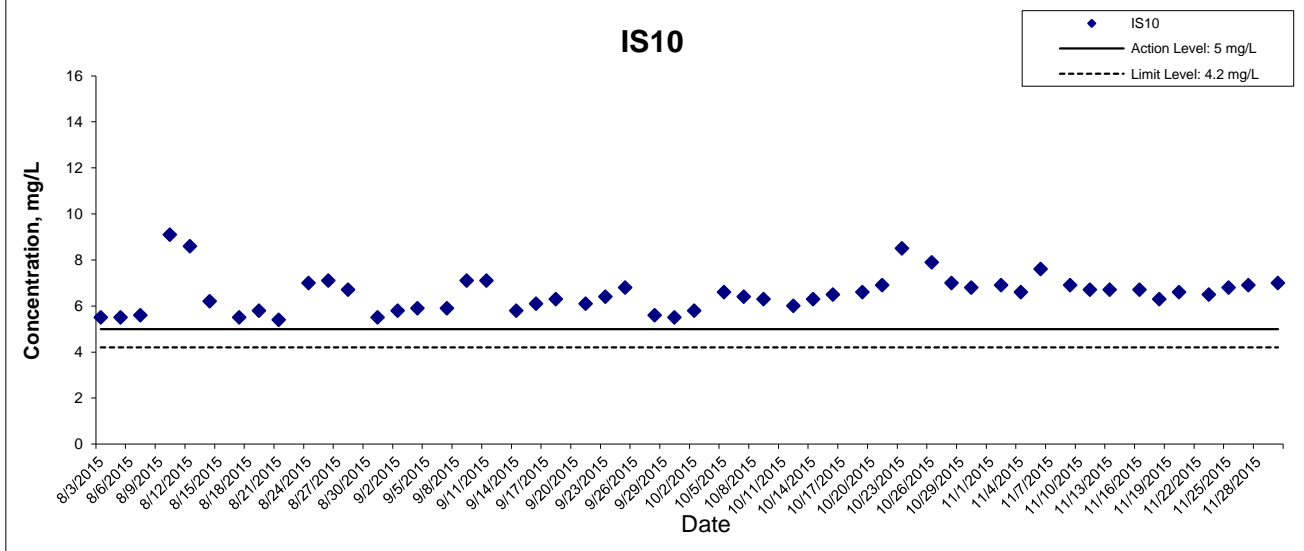
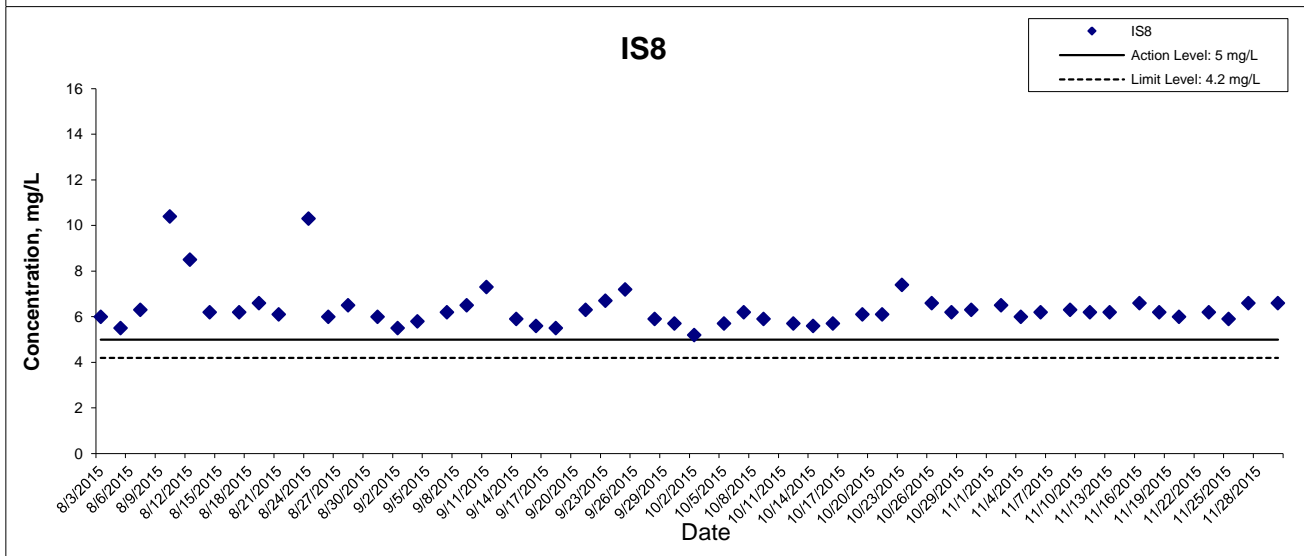
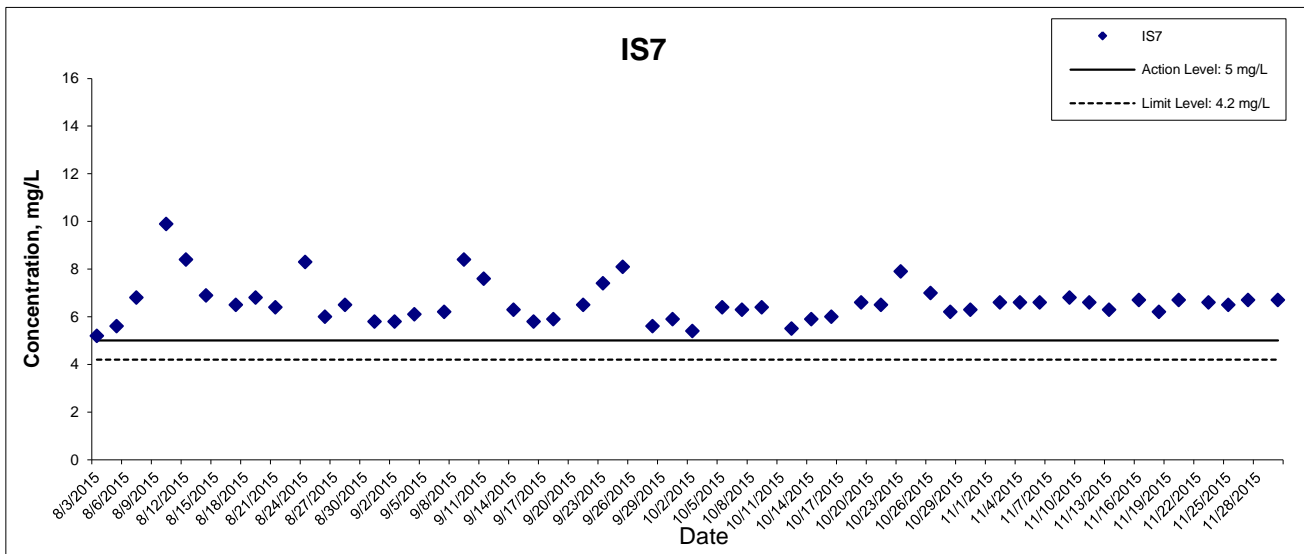
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HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results



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



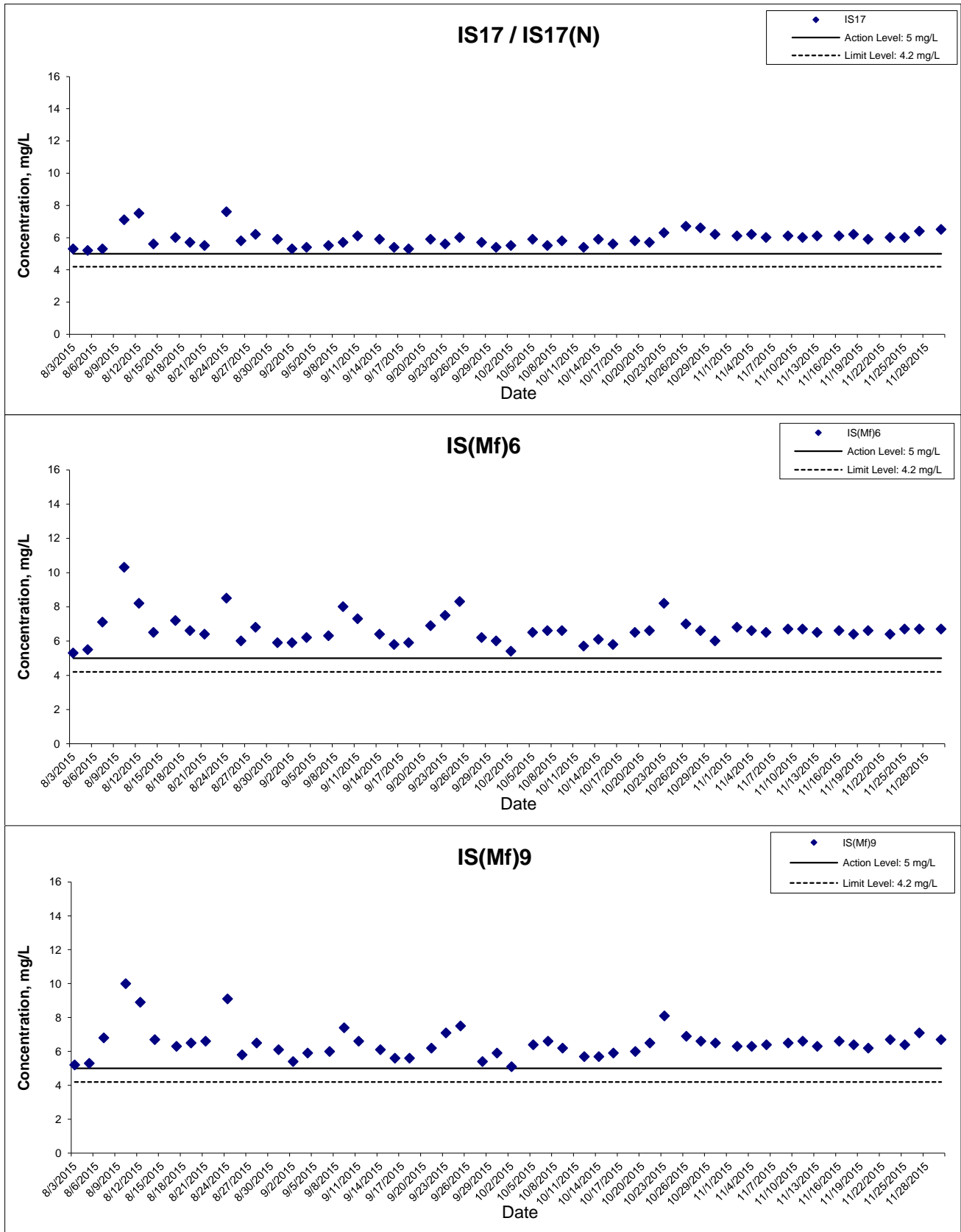
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HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
Monitoring Results



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



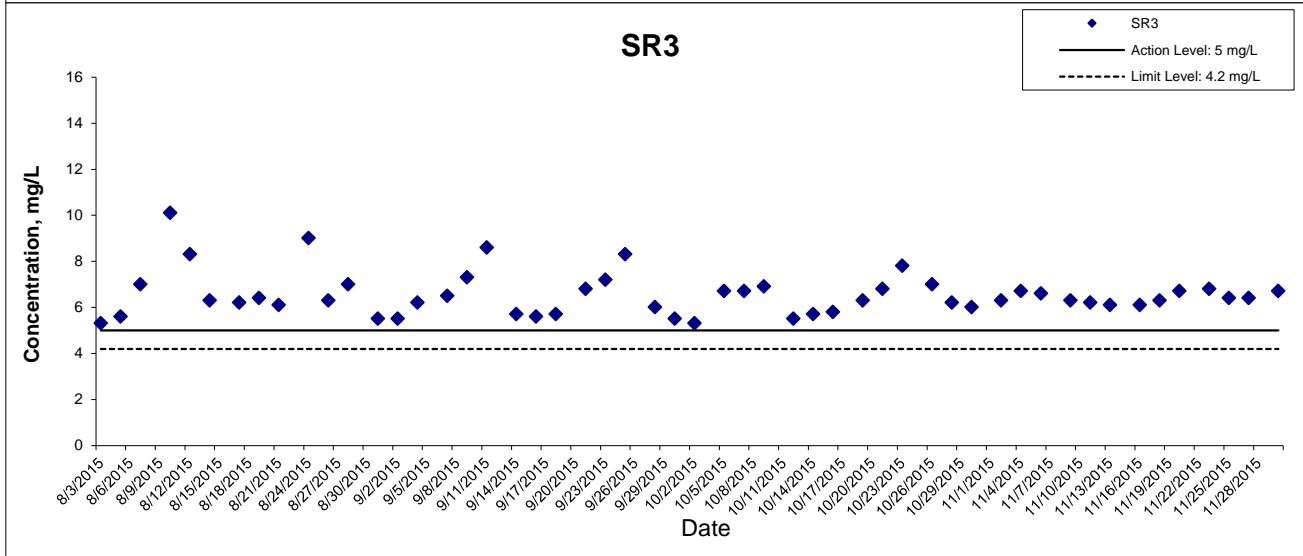
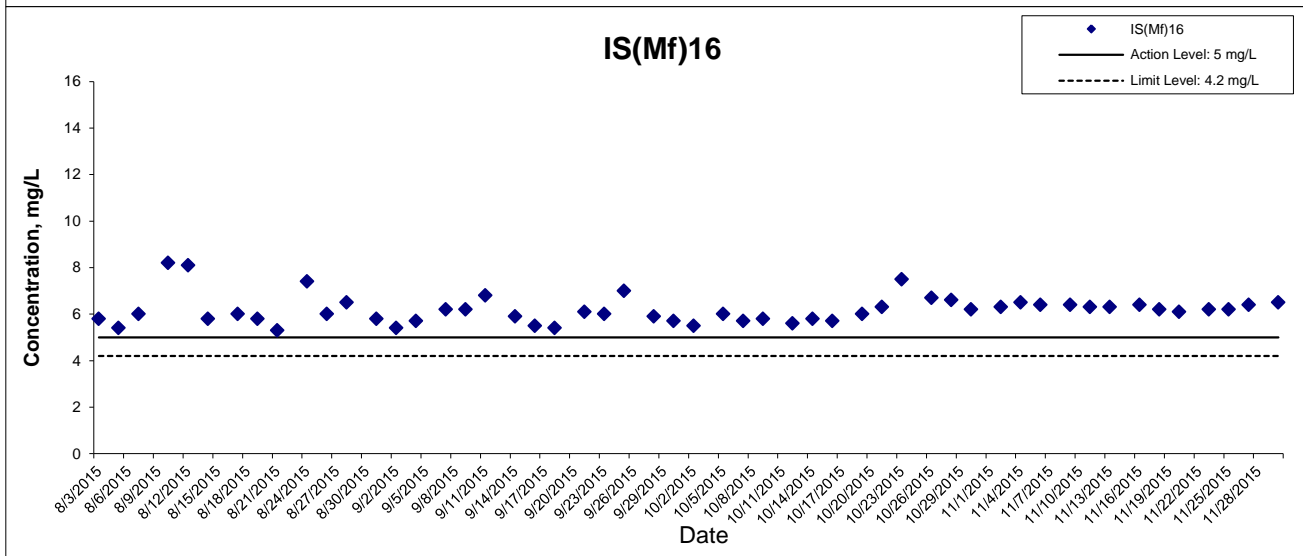
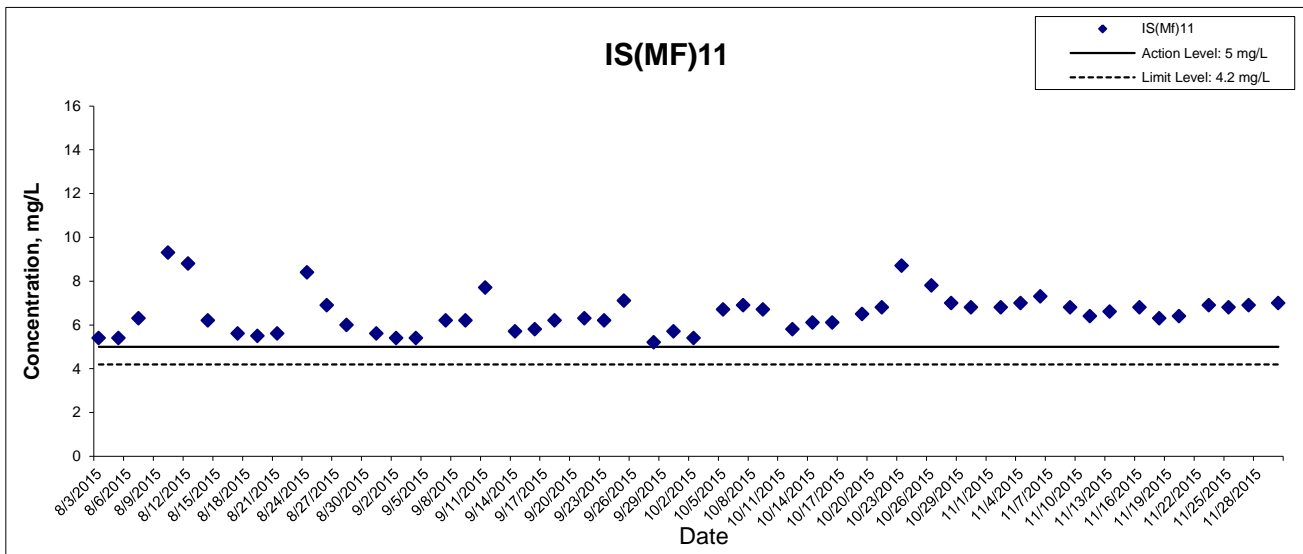
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 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results



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



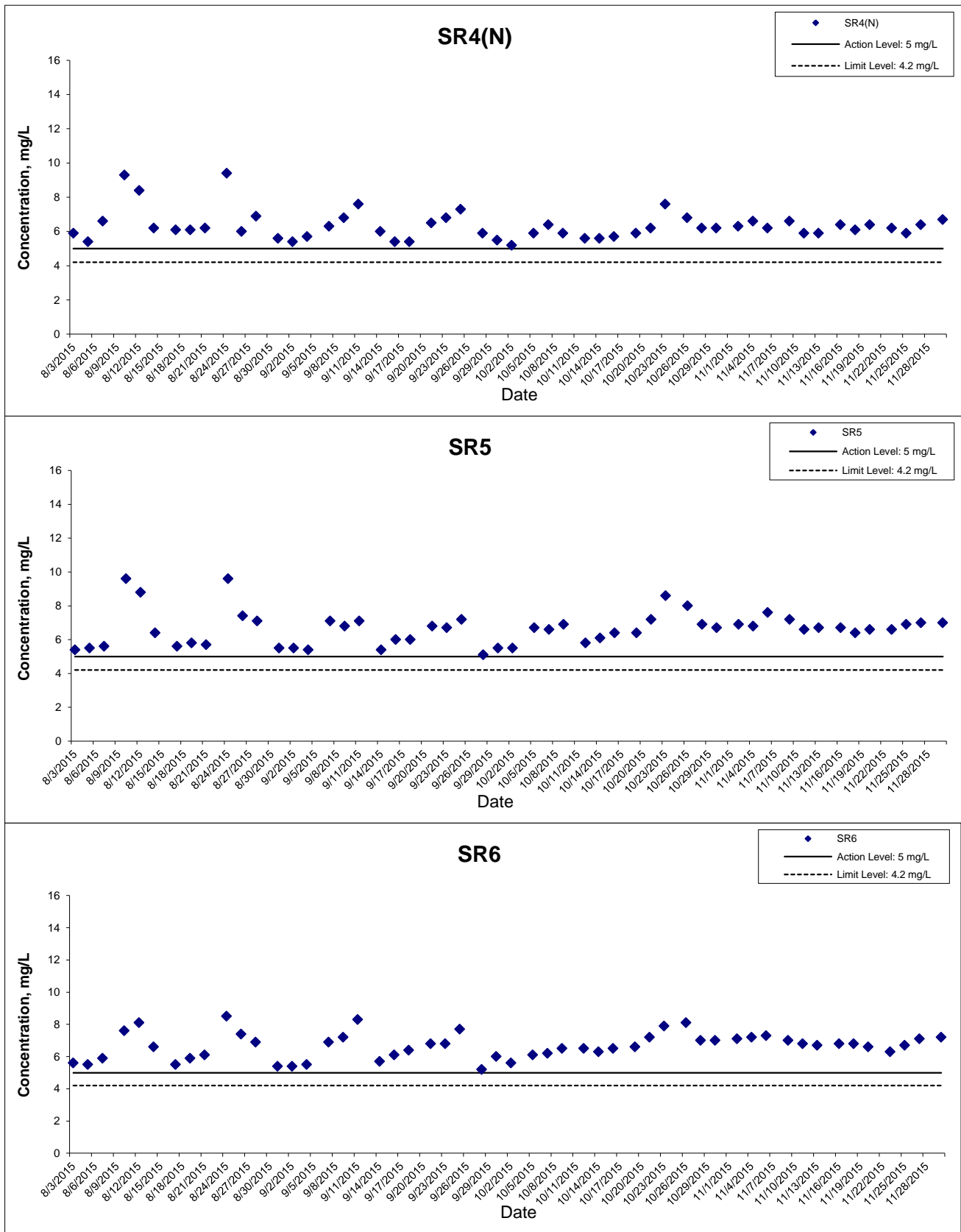
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HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results



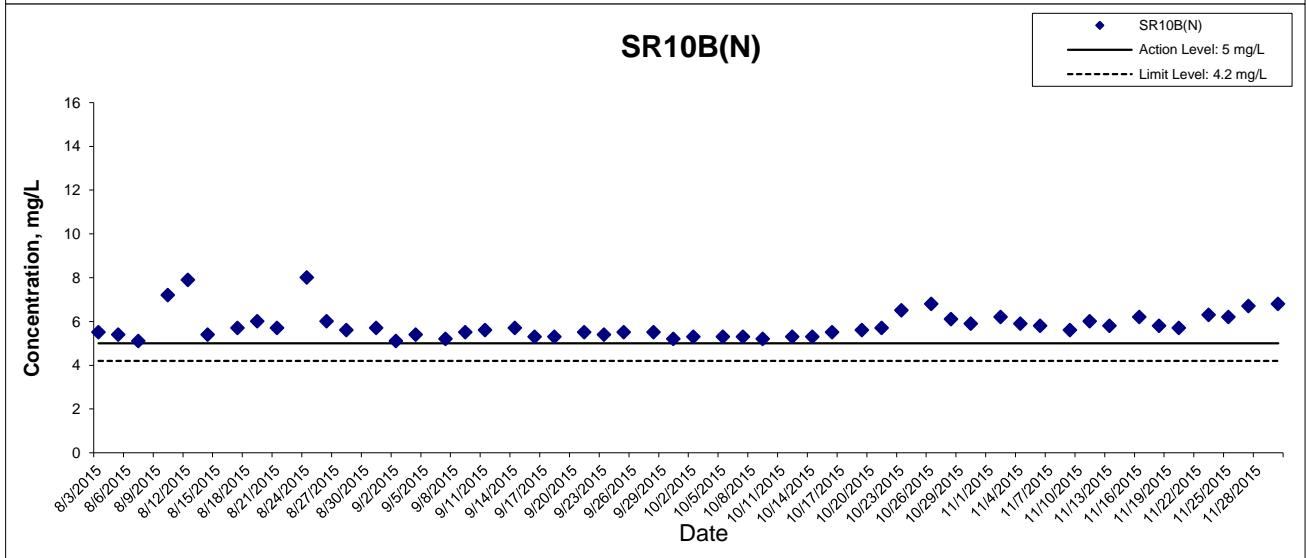
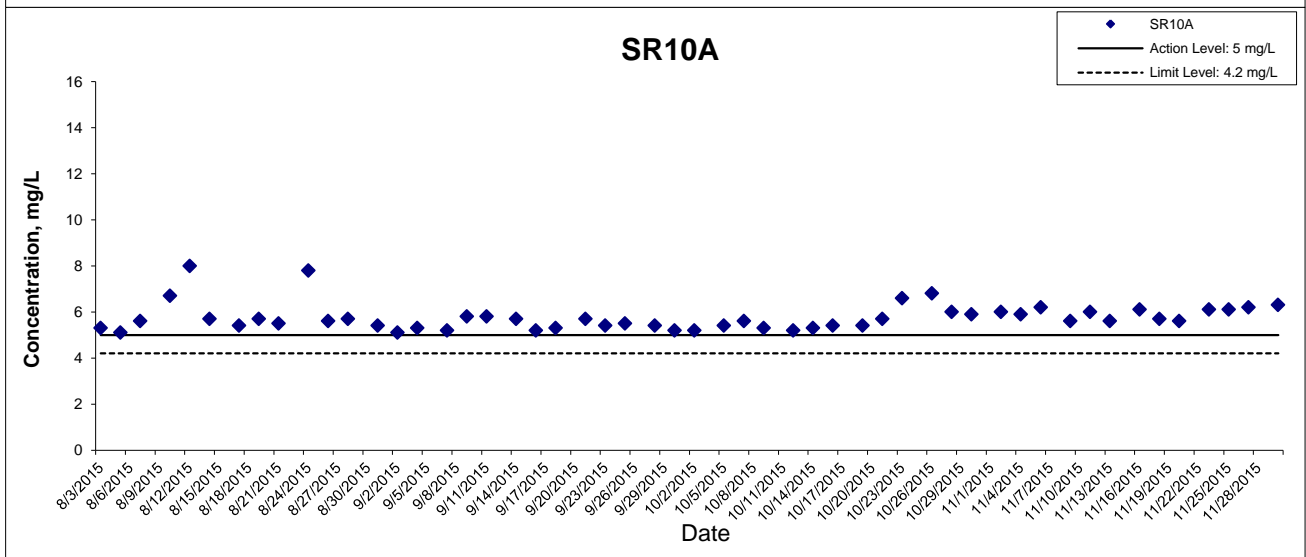
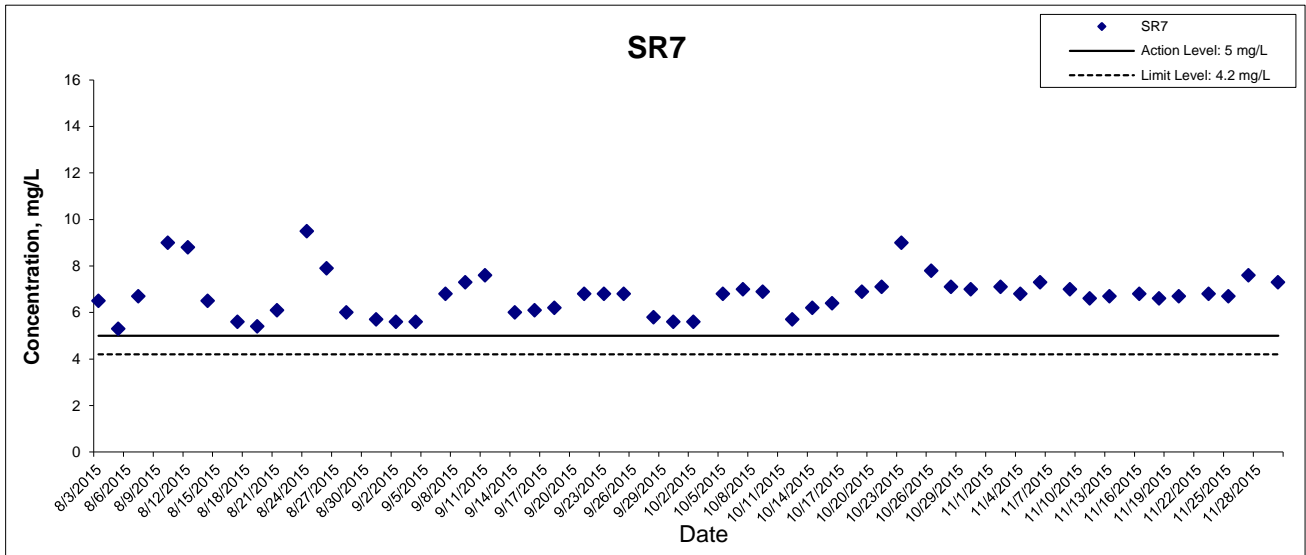
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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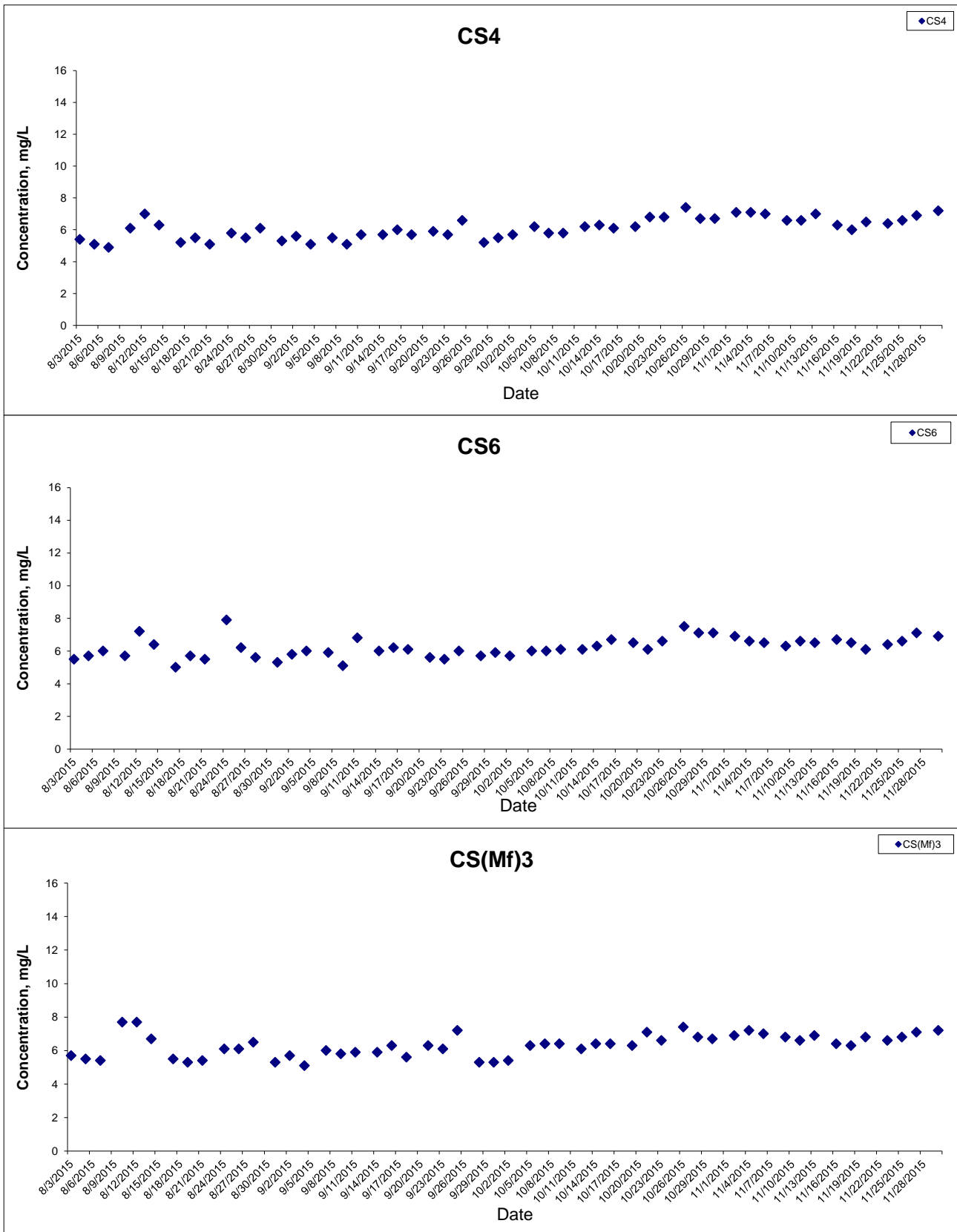
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



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Dissolved Oxygen (Bottom) at Mid-Ebb Tide



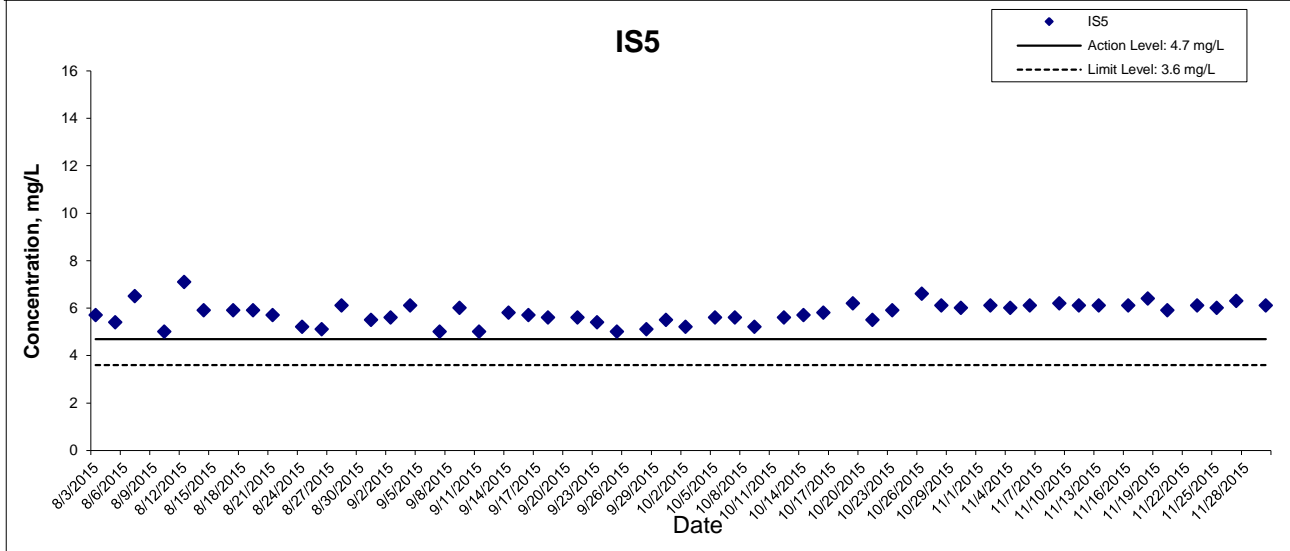
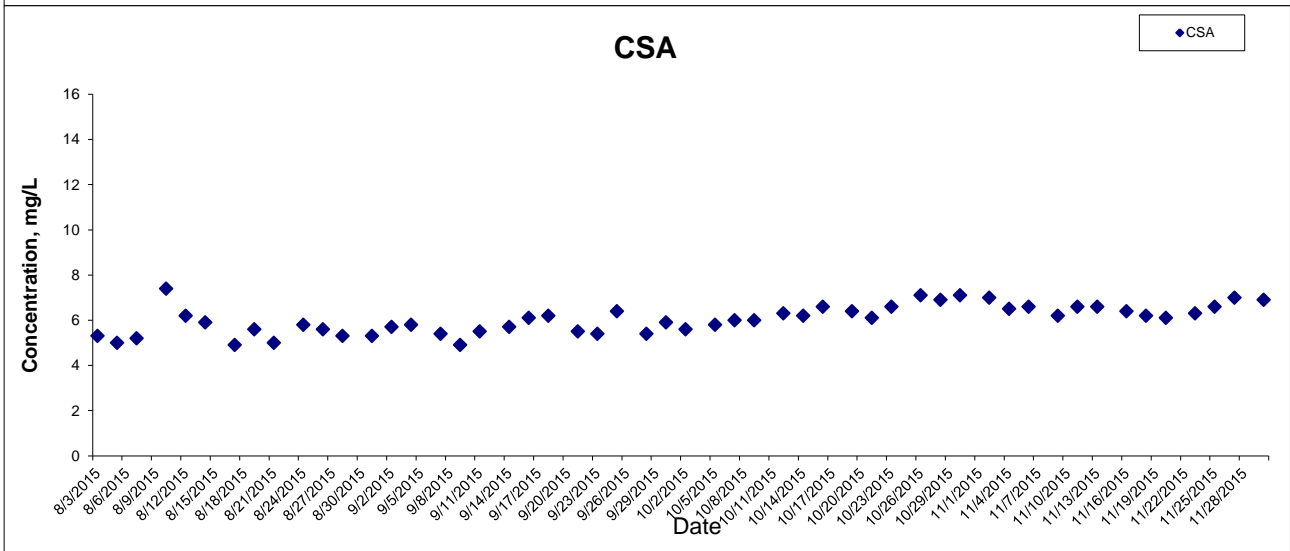
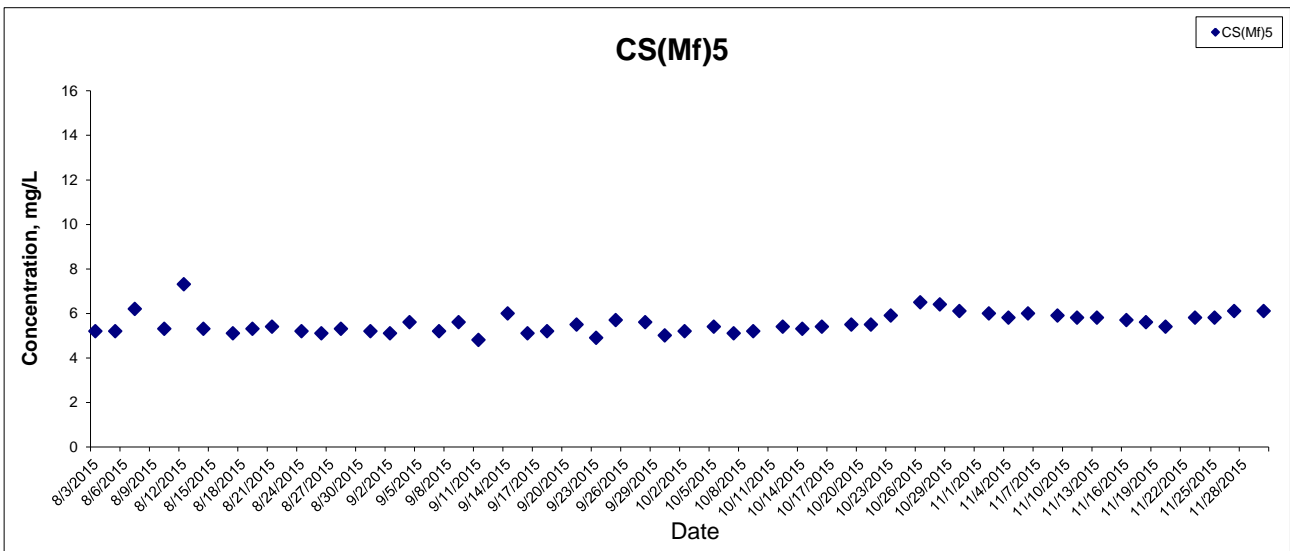
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HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results

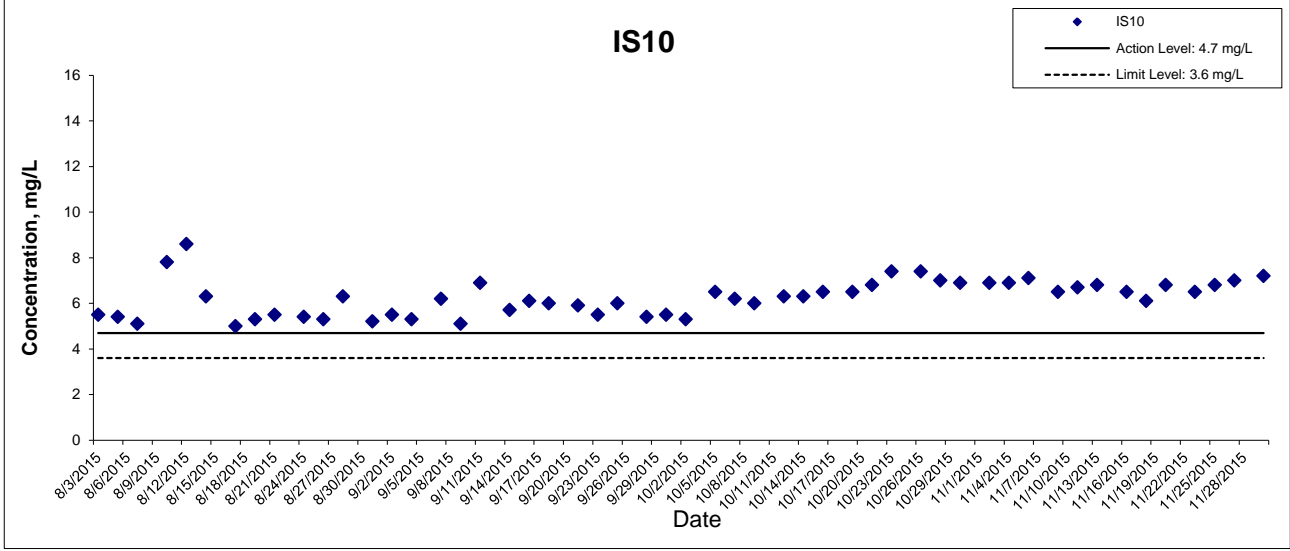
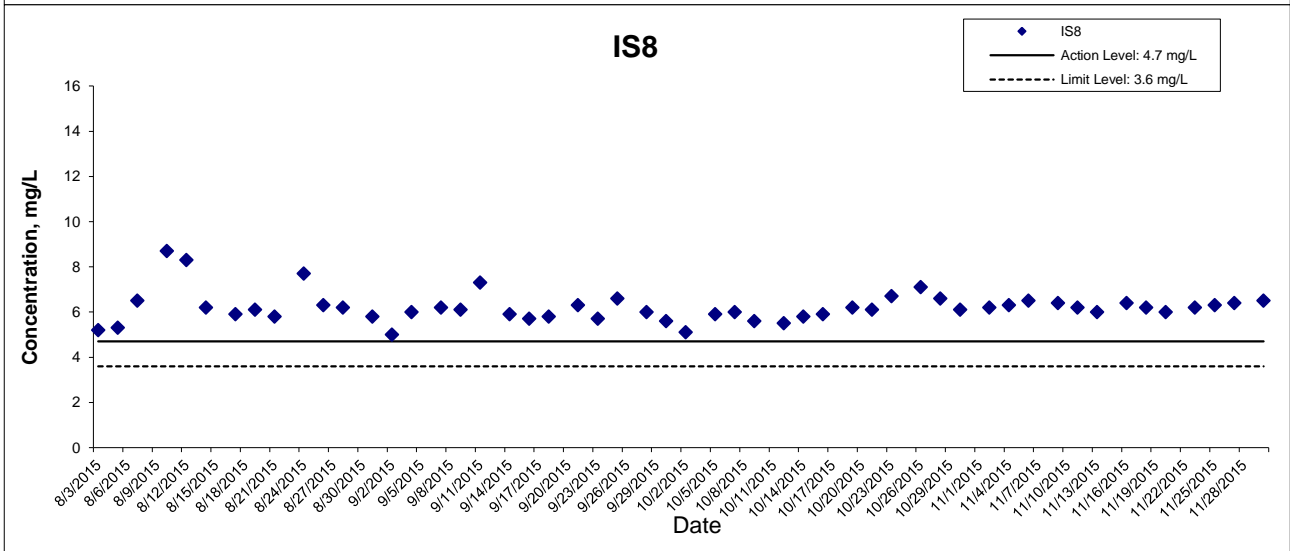
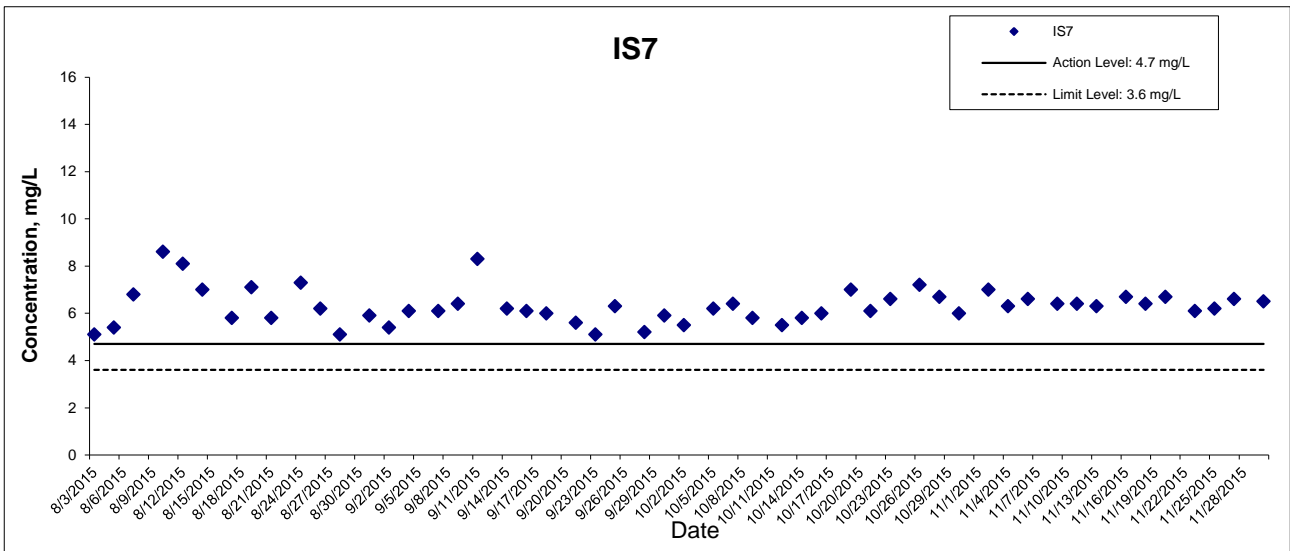


Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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Dissolved Oxygen (Bottom) at Mid-Ebb Tide



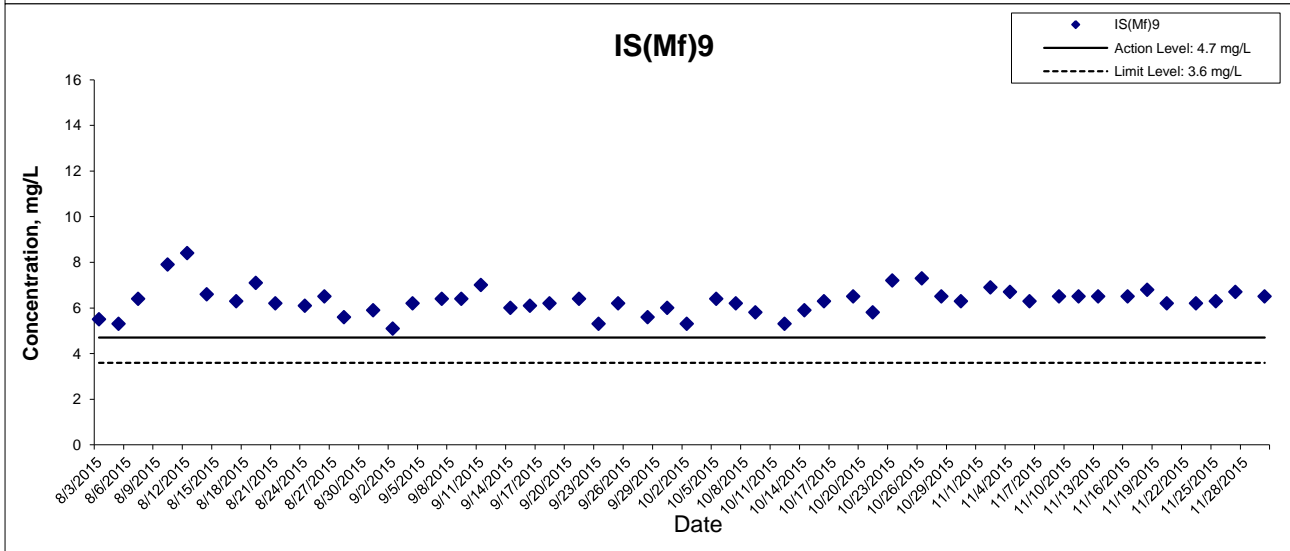
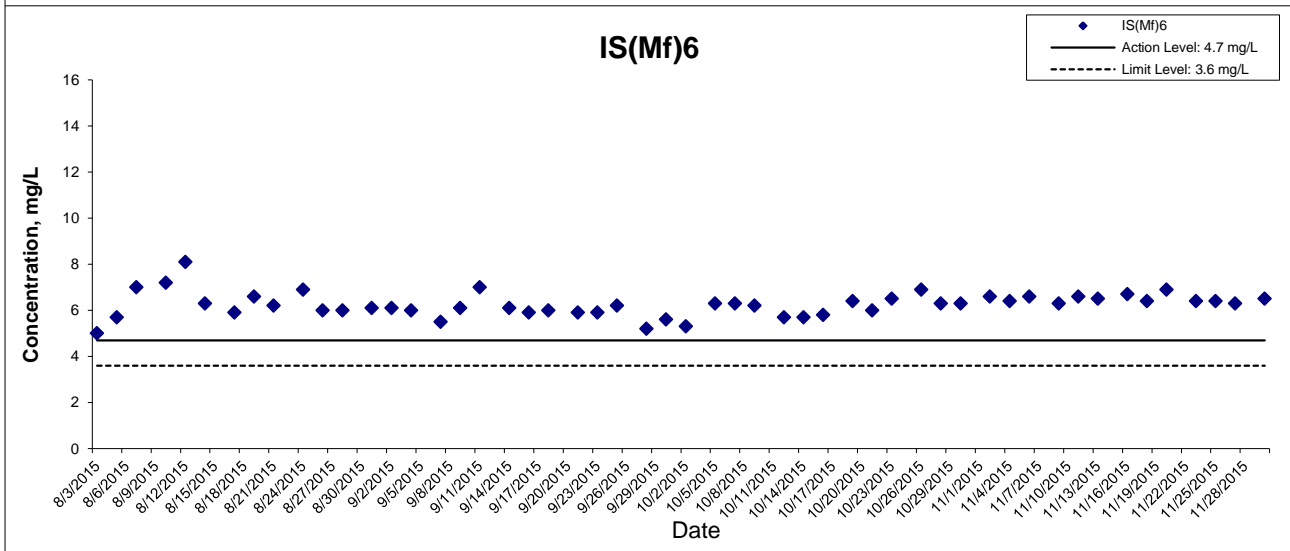
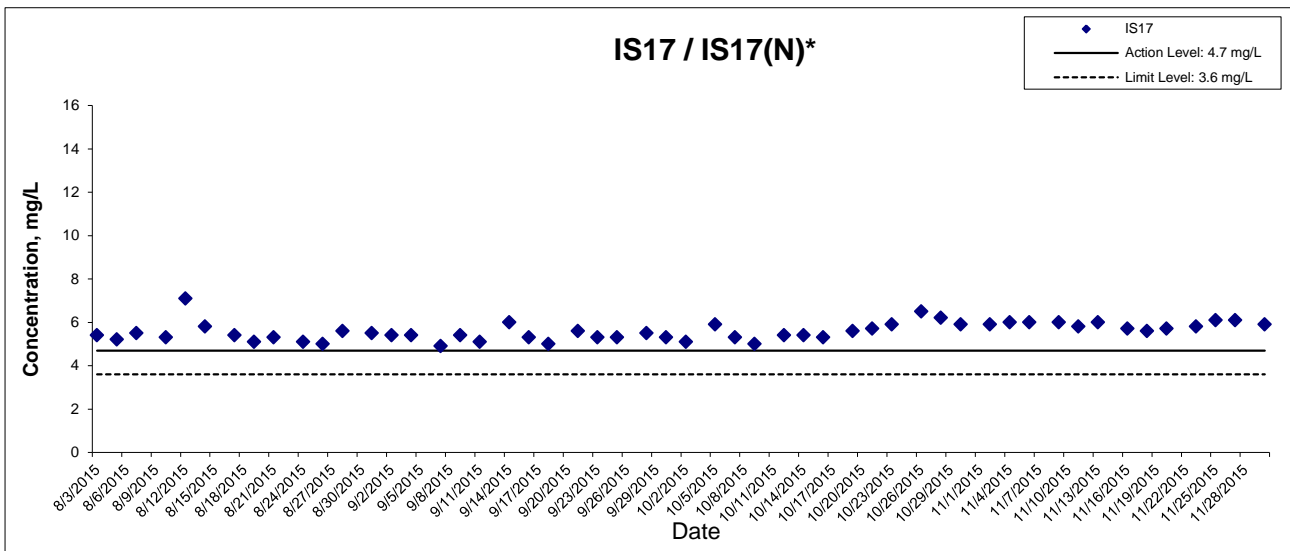
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HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results

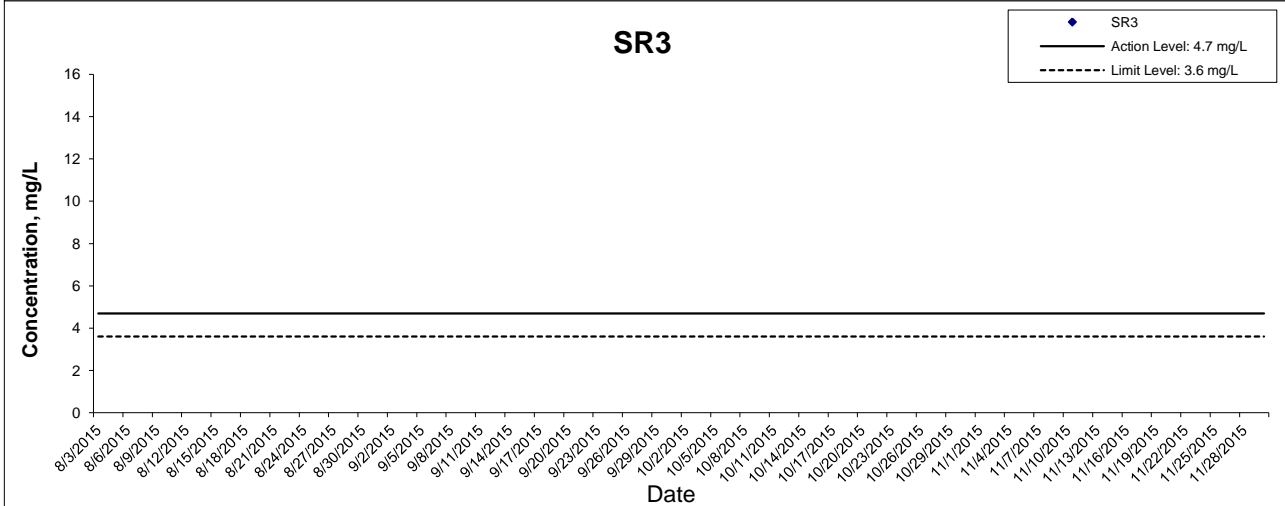
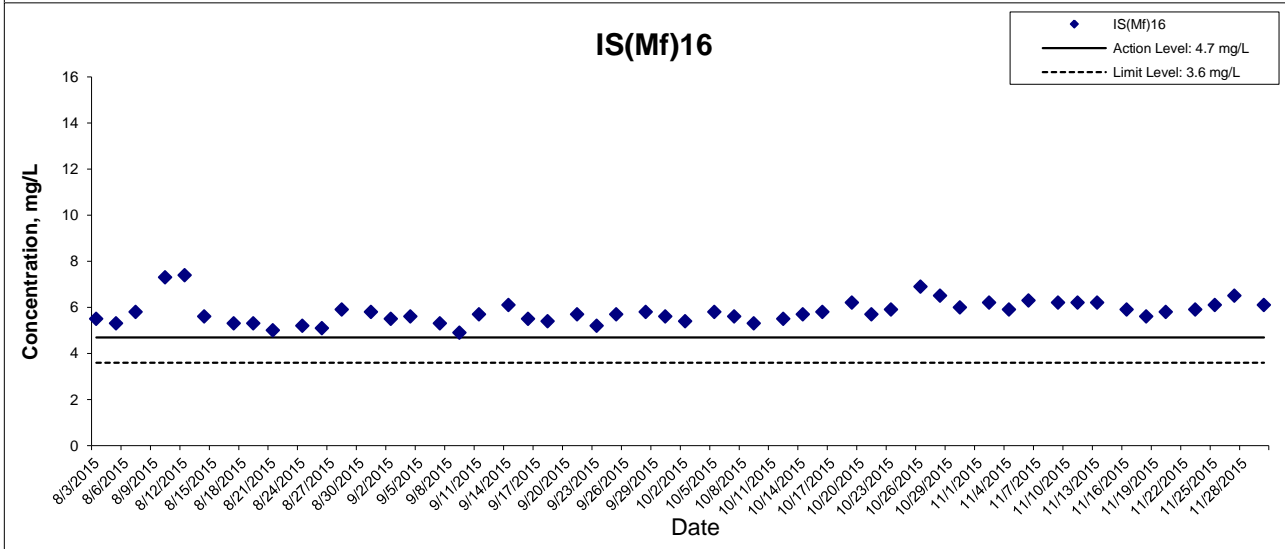
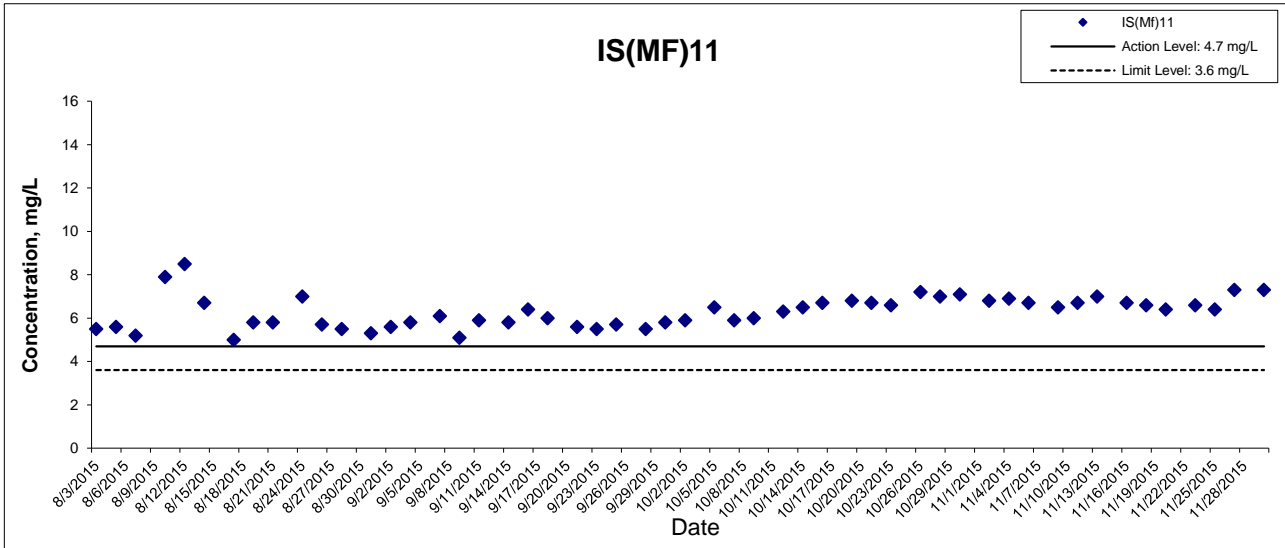


Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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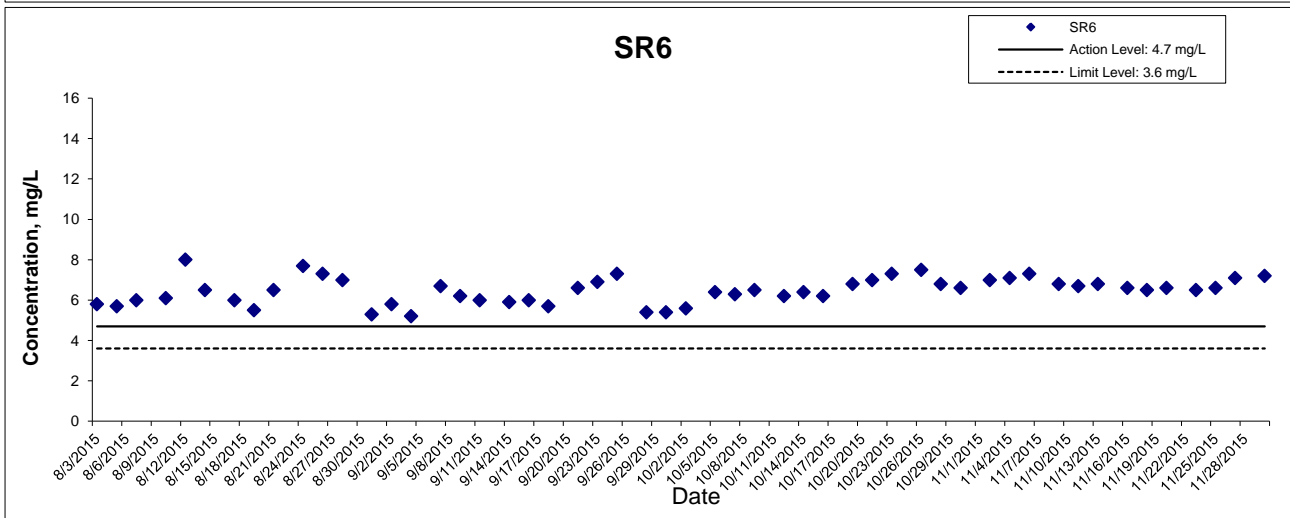
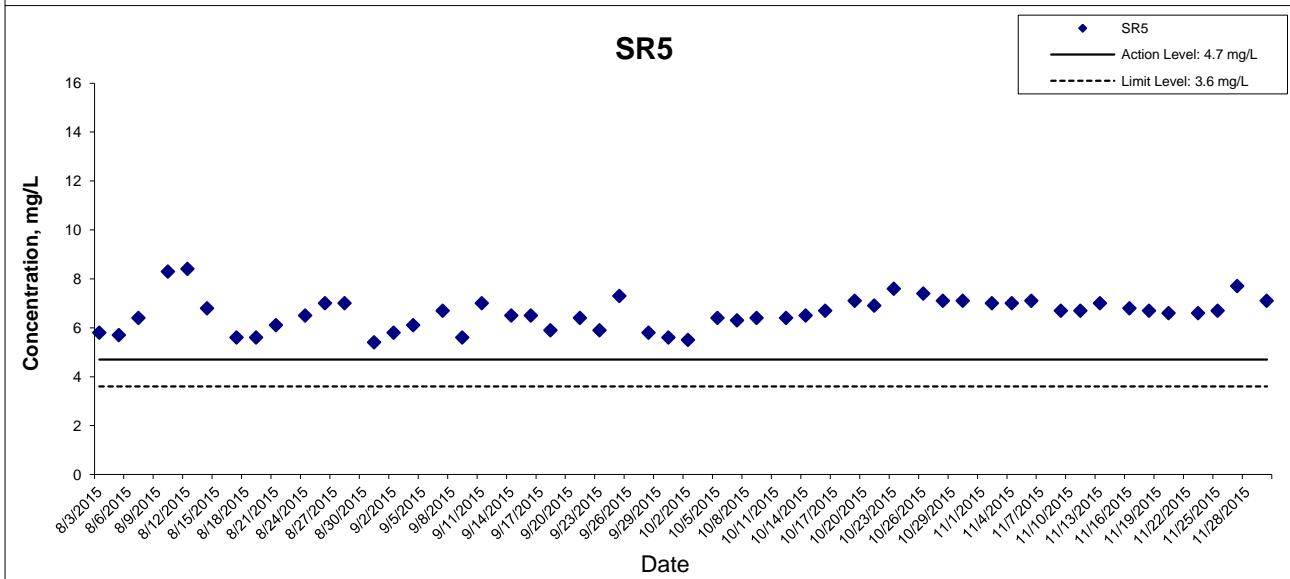
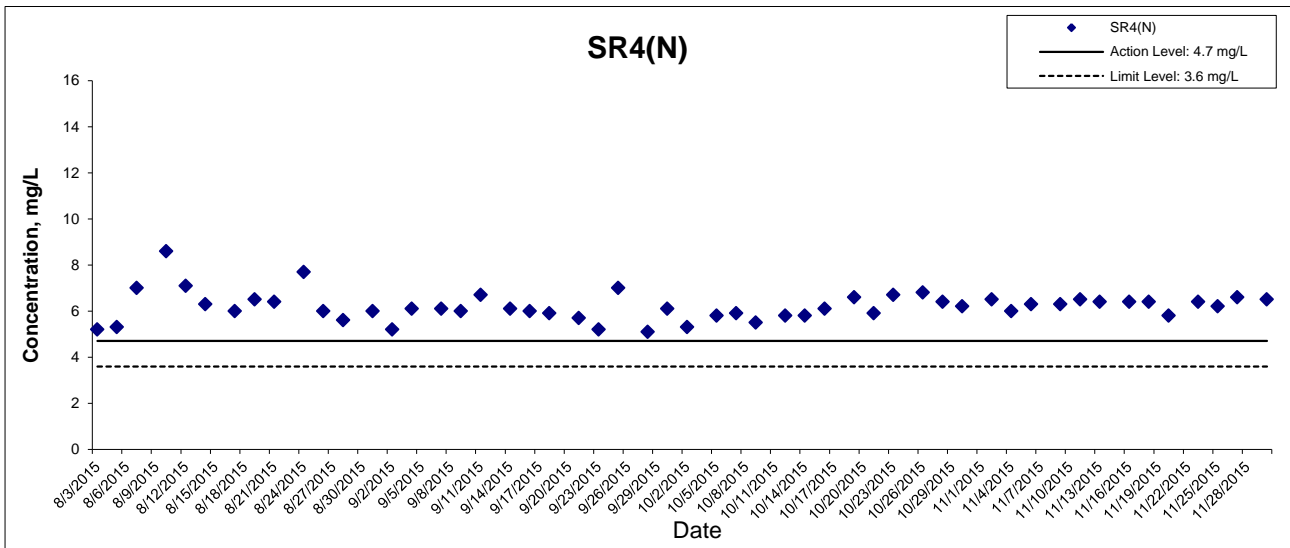
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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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Dissolved Oxygen (Bottom) at Mid-Ebb Tide



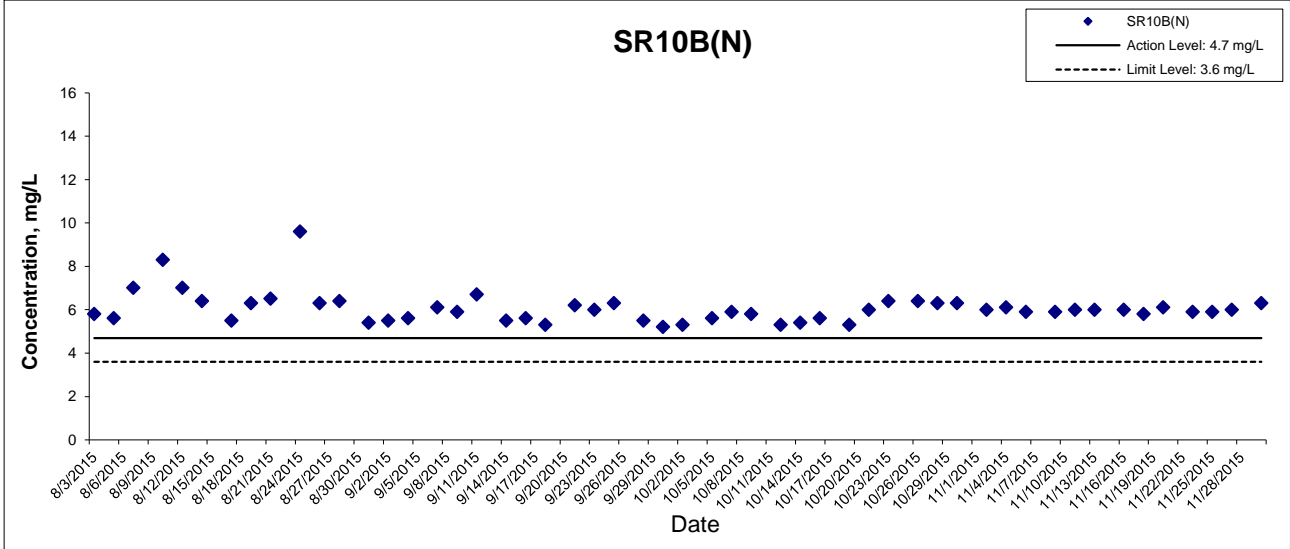
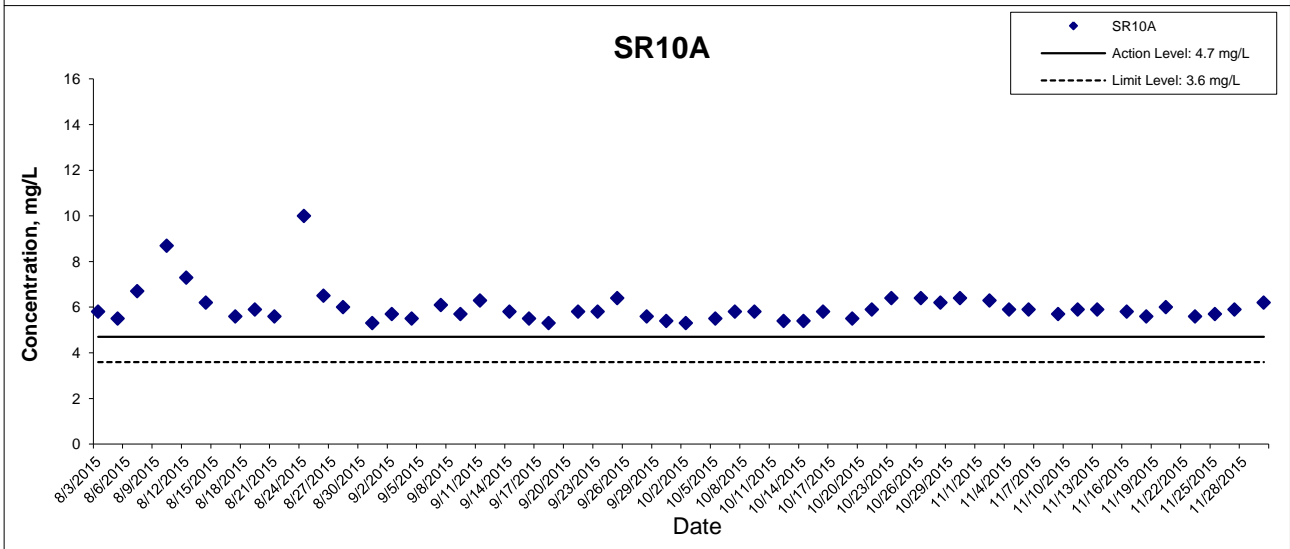
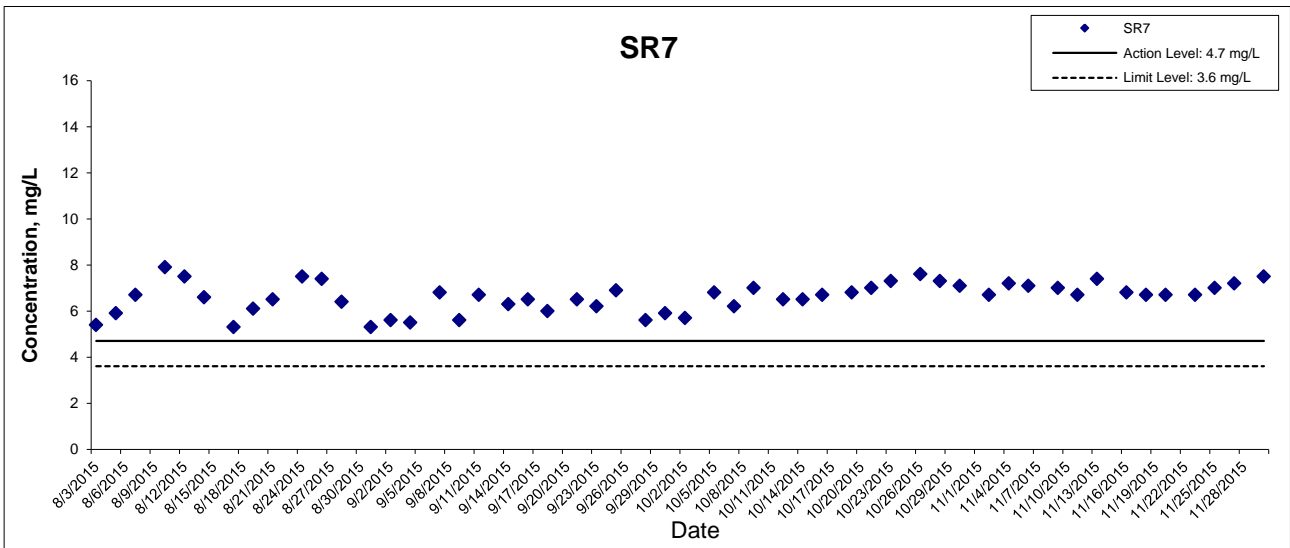
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HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results

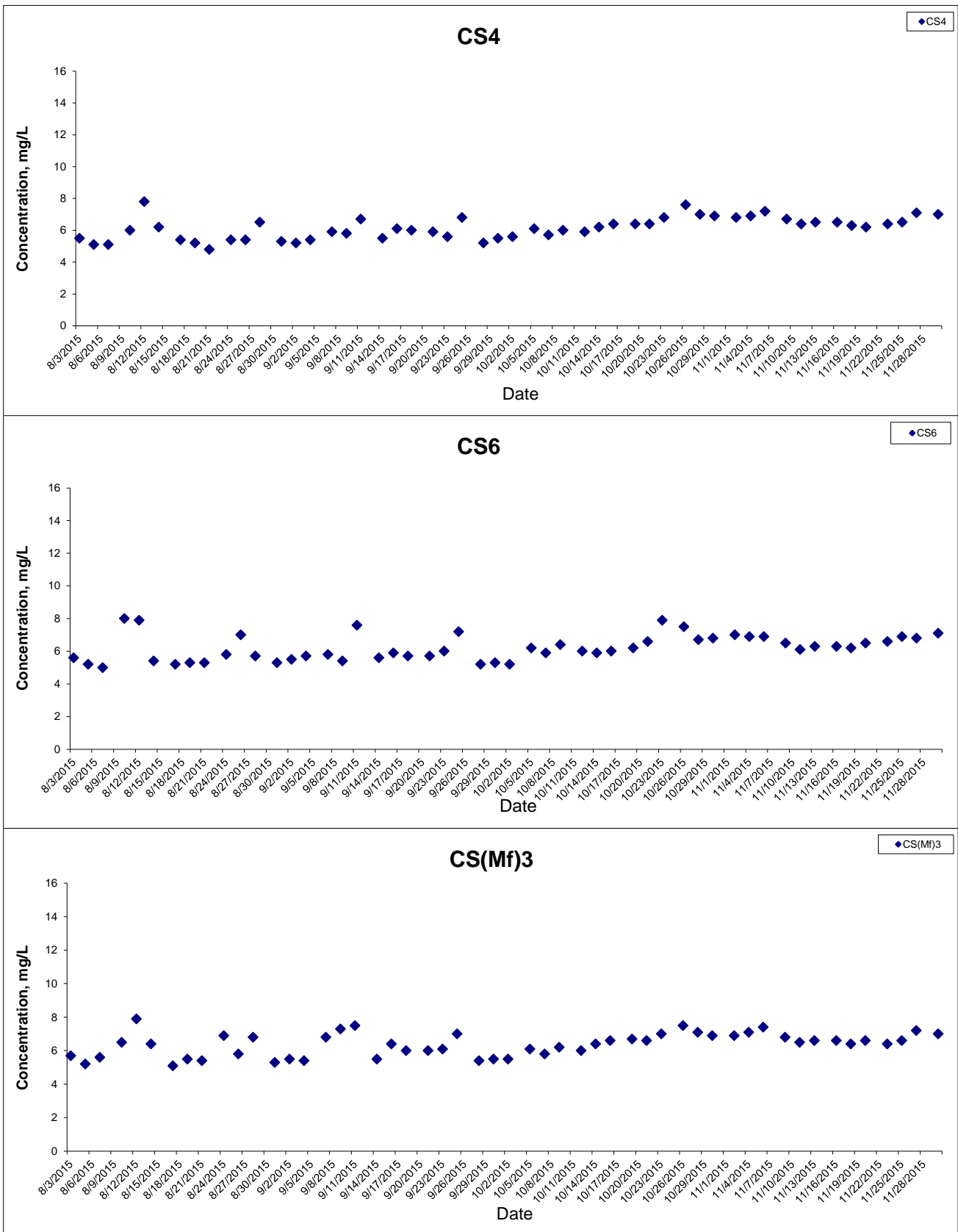


Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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Dissolved Oxygen (Bottom) at Mid-Flood Tide



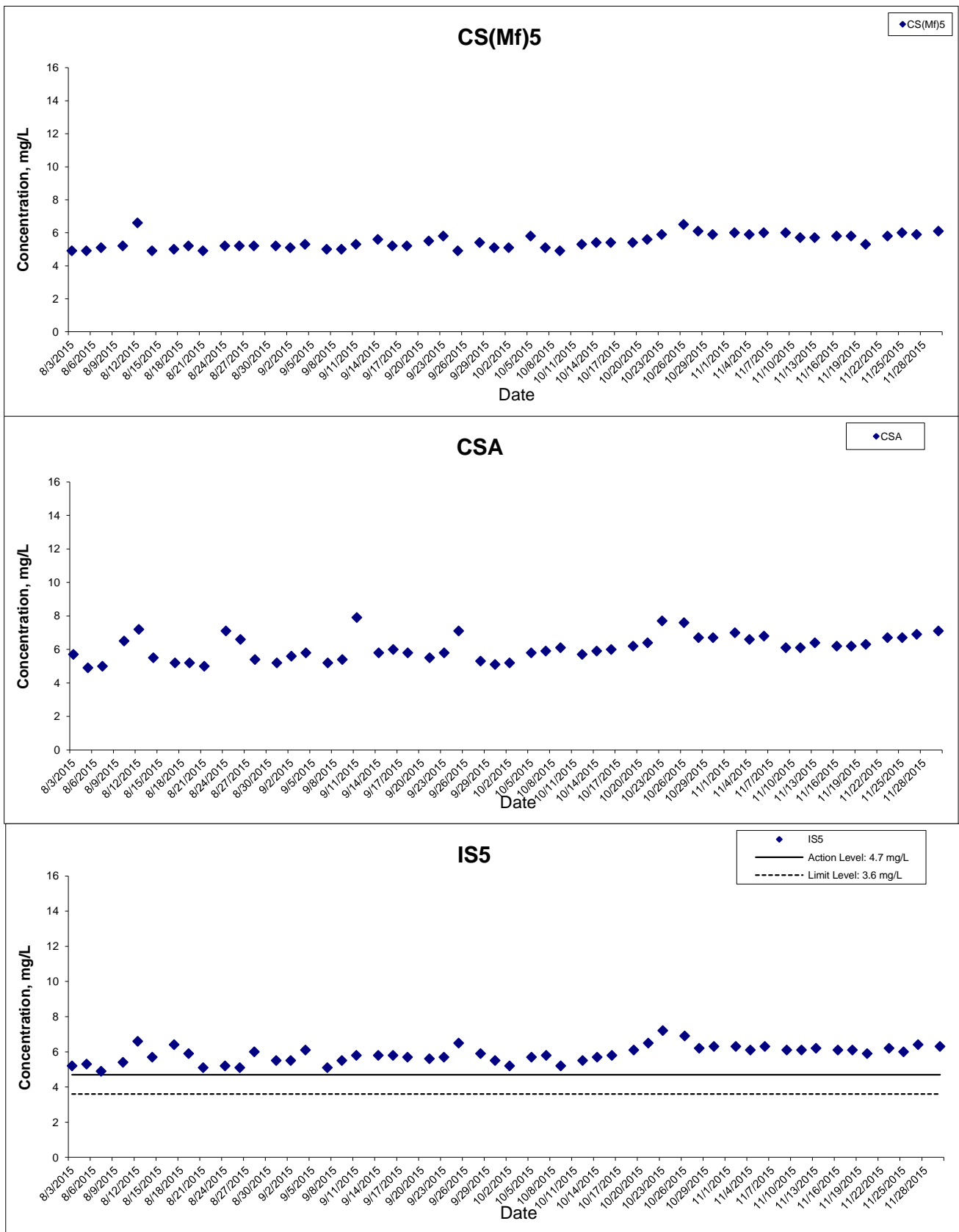
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HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
 Monitoring Results

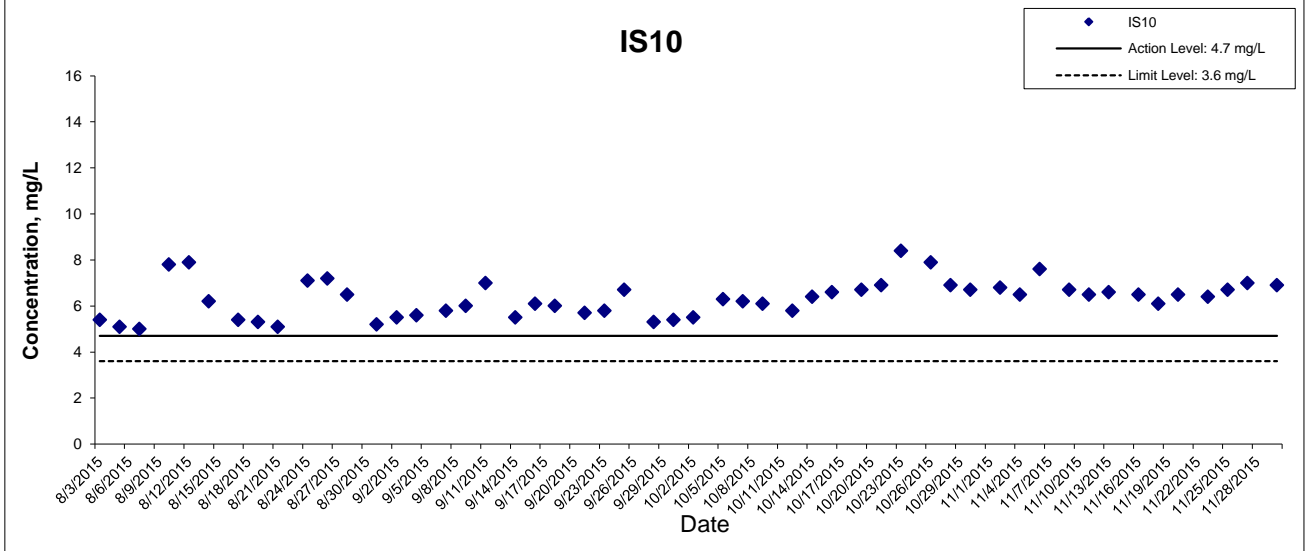
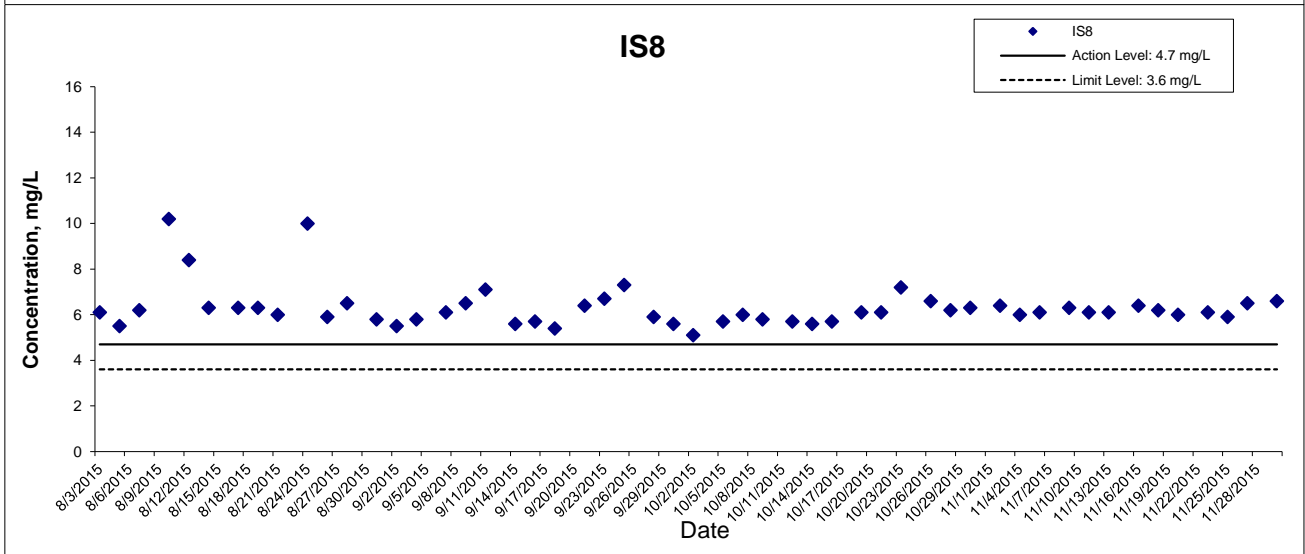
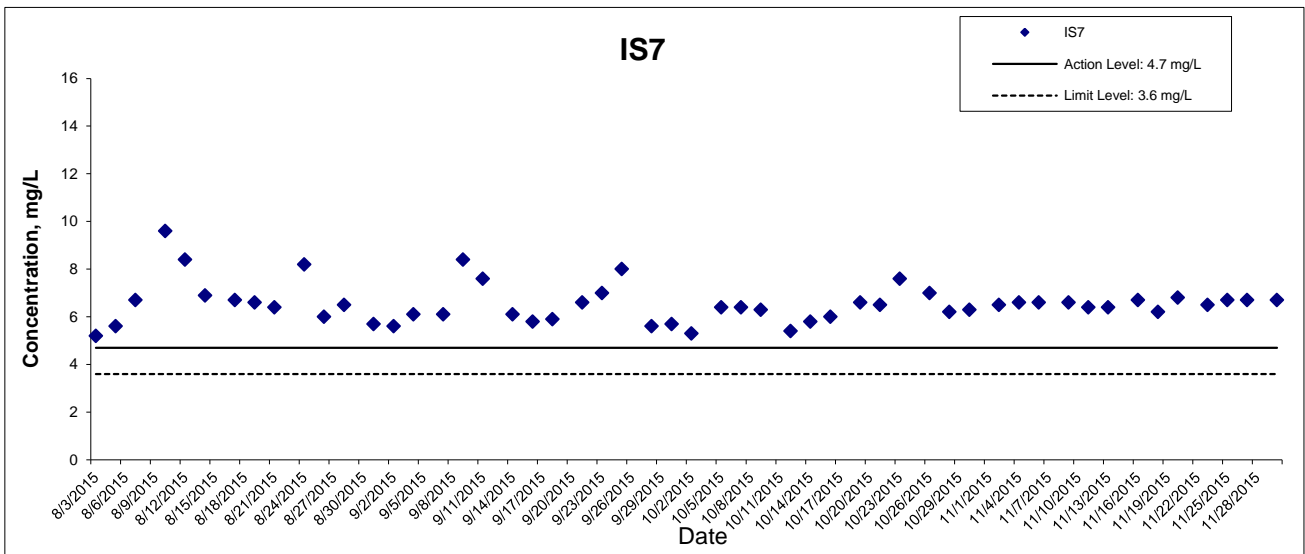


Dissolved Oxygen (Bottom) at Mid-Flood Tide



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Dissolved Oxygen (Bottom) at Mid-Flood Tide



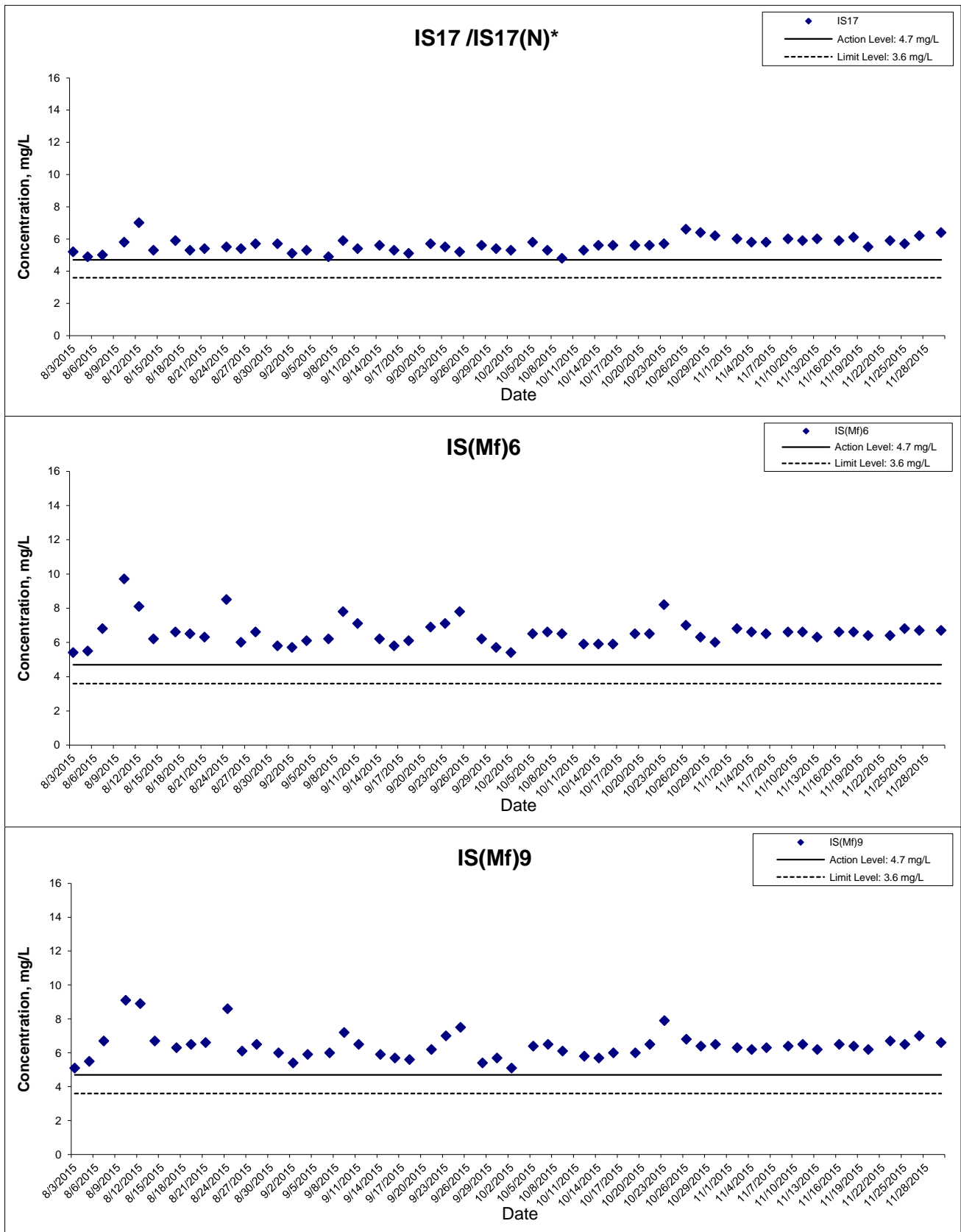
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**HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS**

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

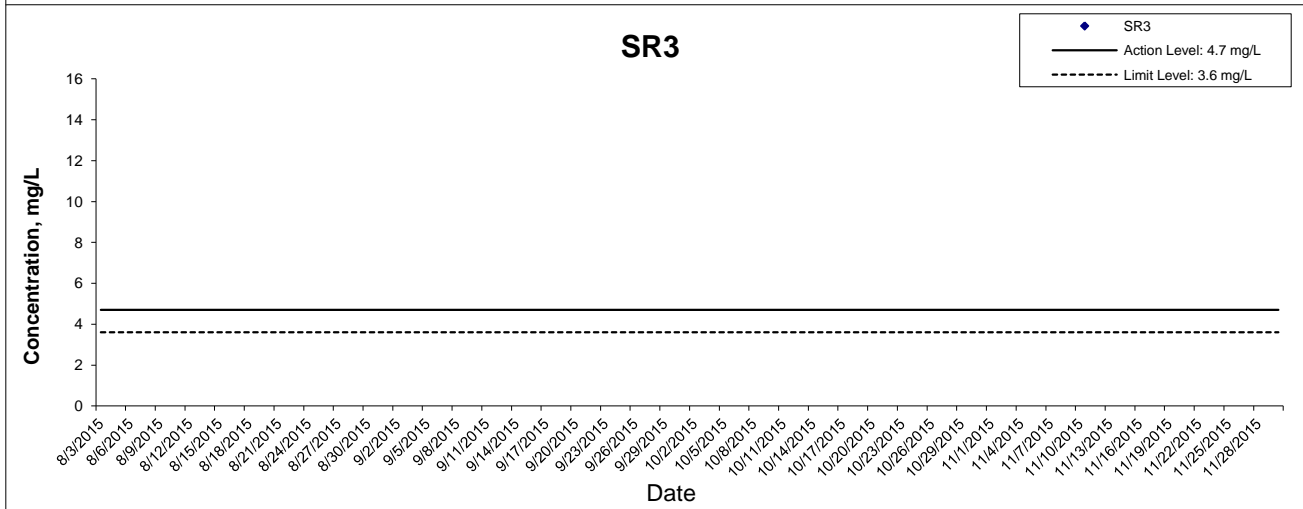
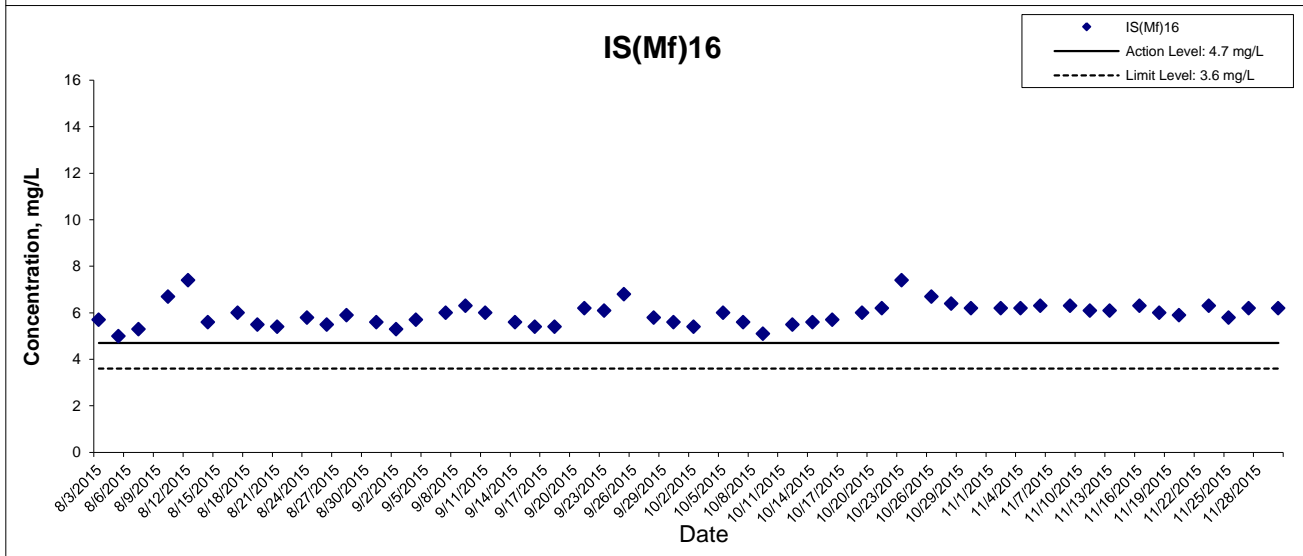
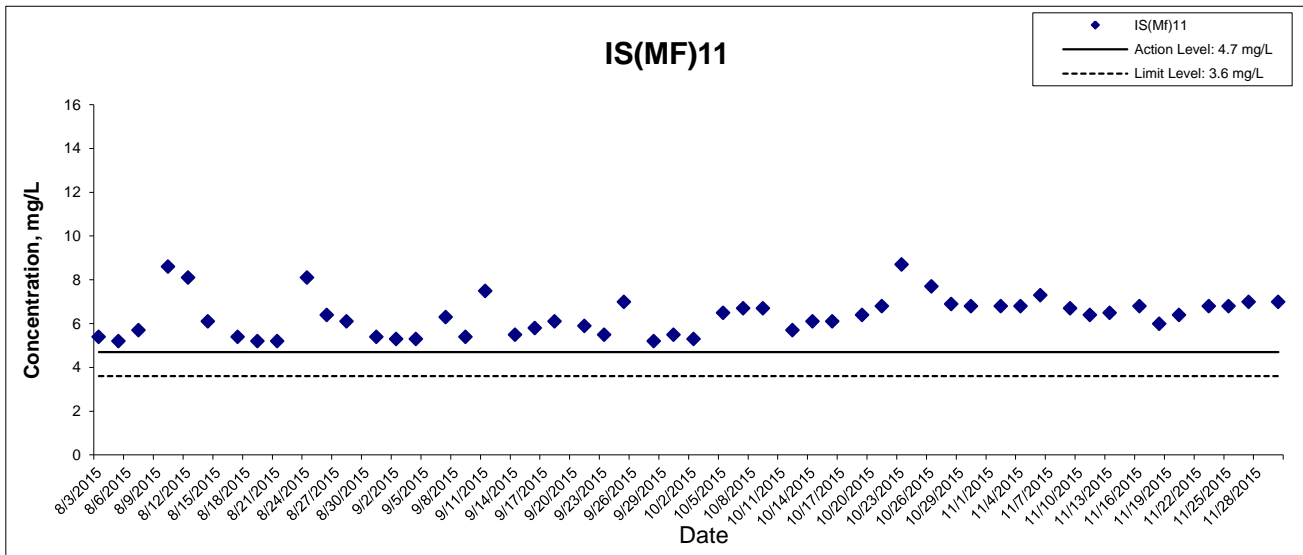


Dissolved Oxygen (Bottom) at Mid-Flood Tide



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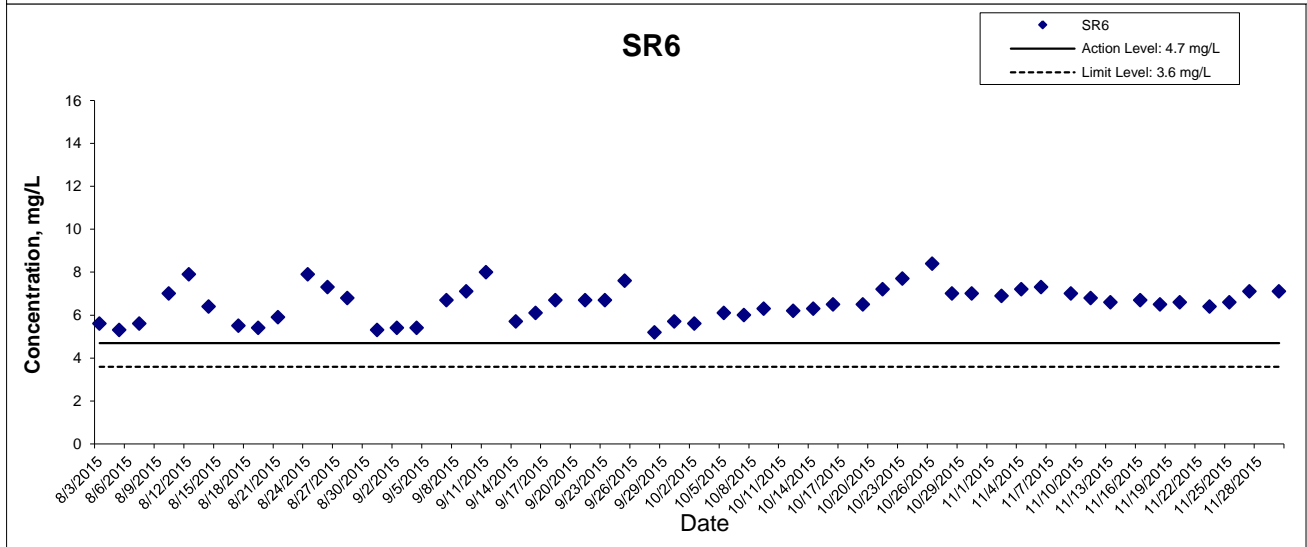
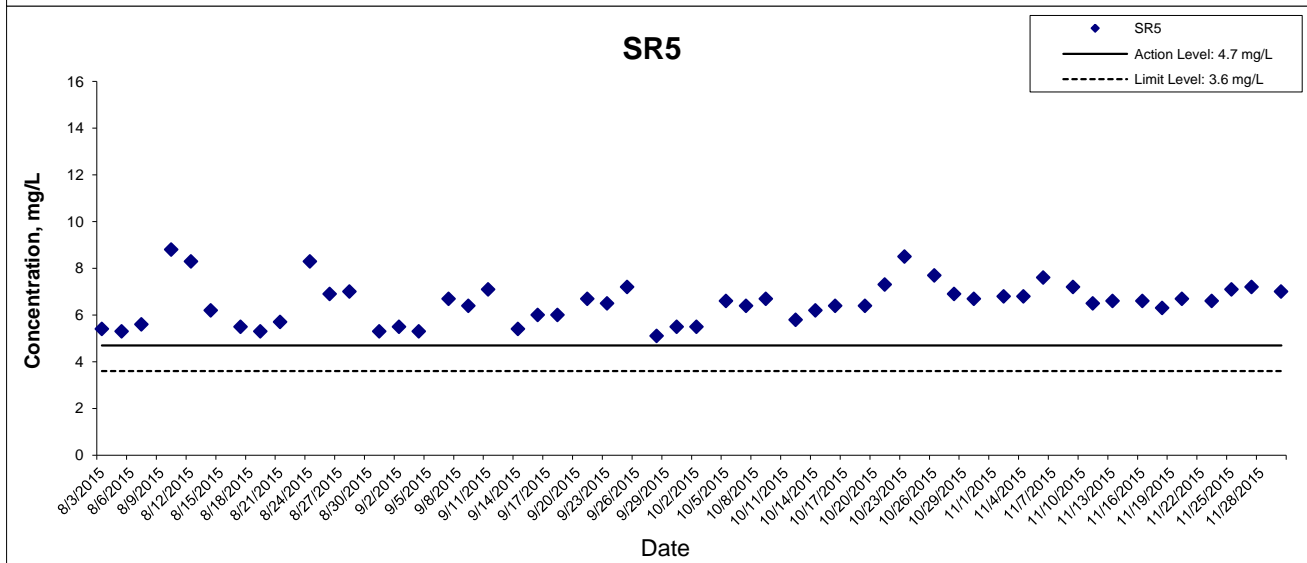
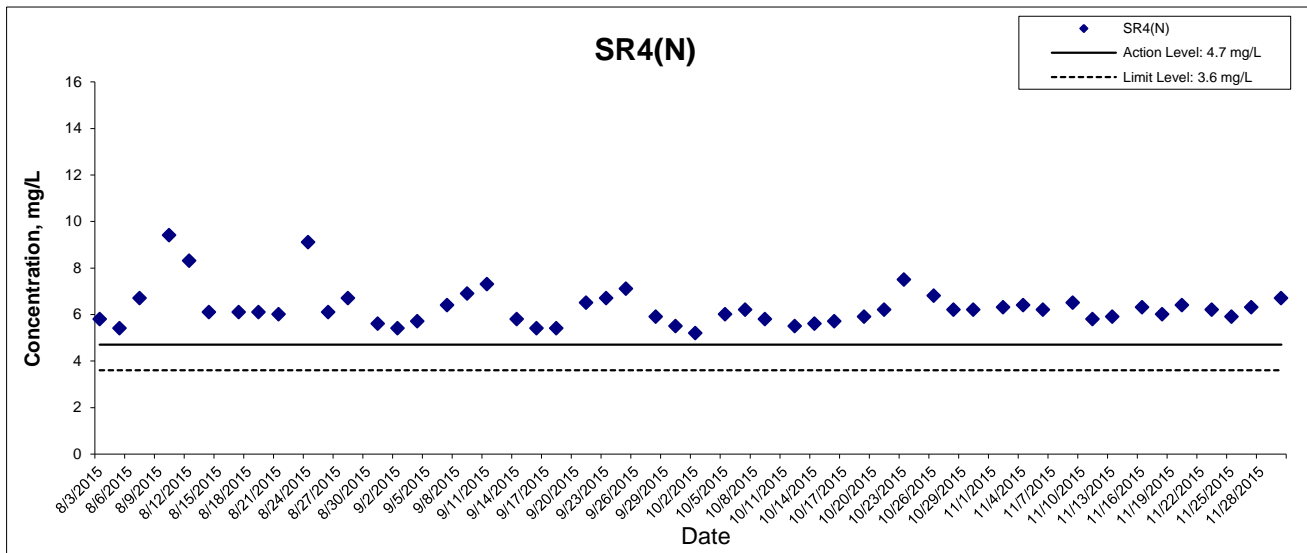
Dissolved Oxygen (Bottom) at Mid-Flood Tide



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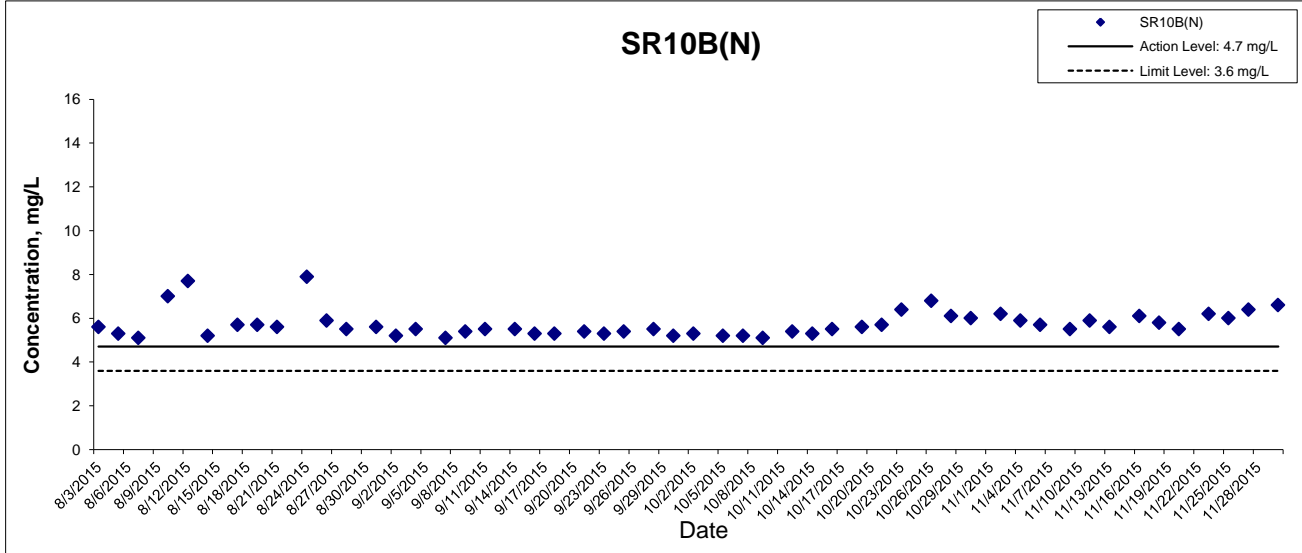
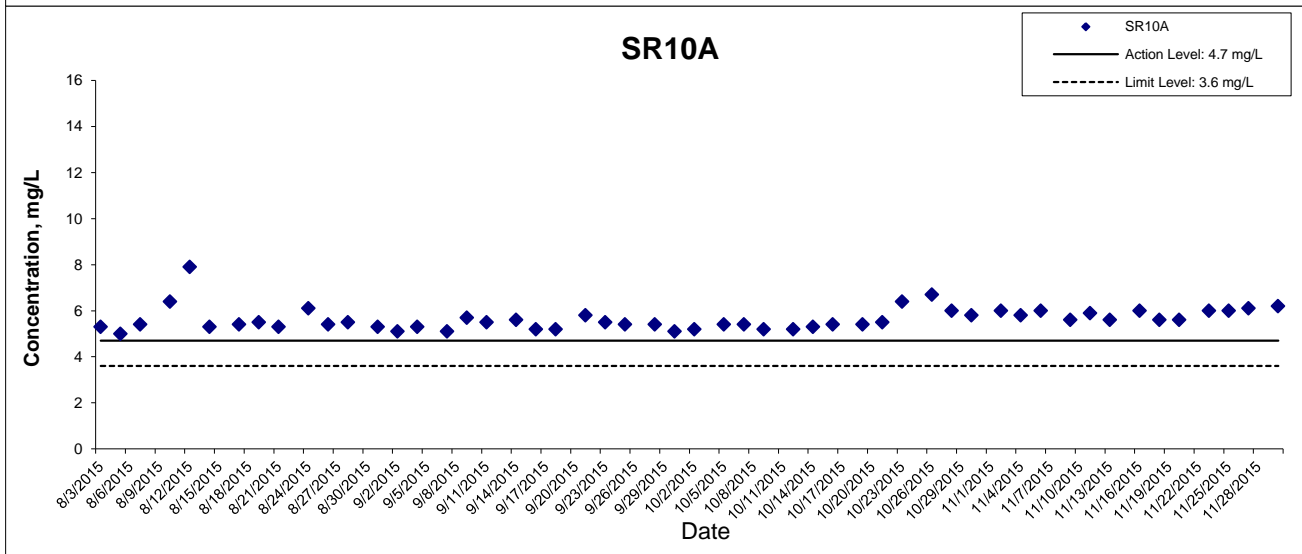
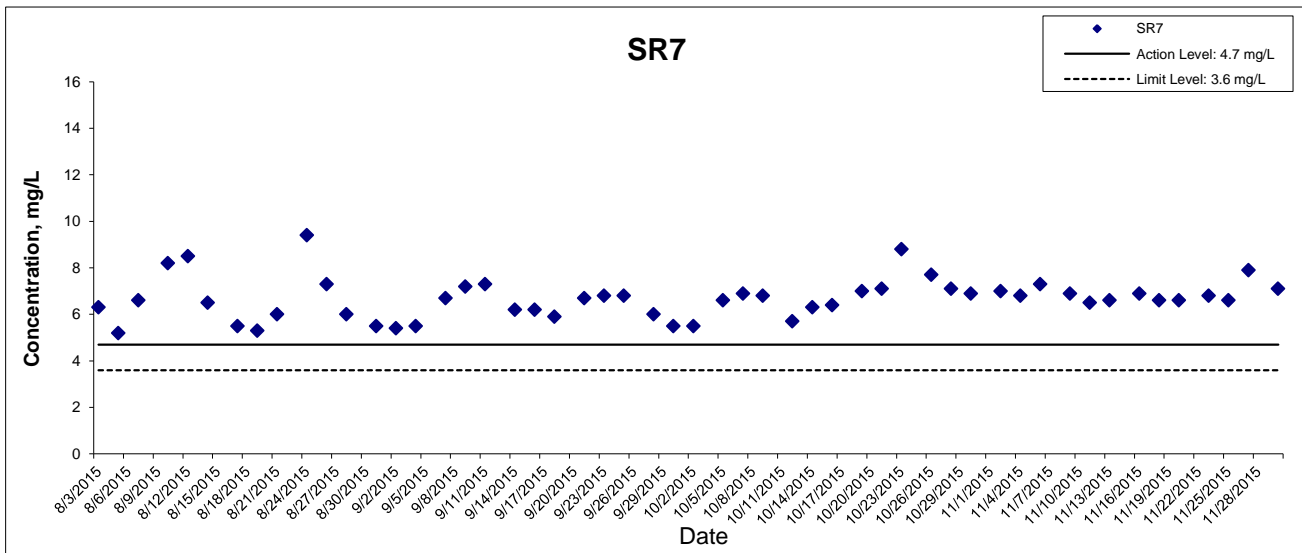
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Dissolved Oxygen (Bottom) at Mid-Flood Tide



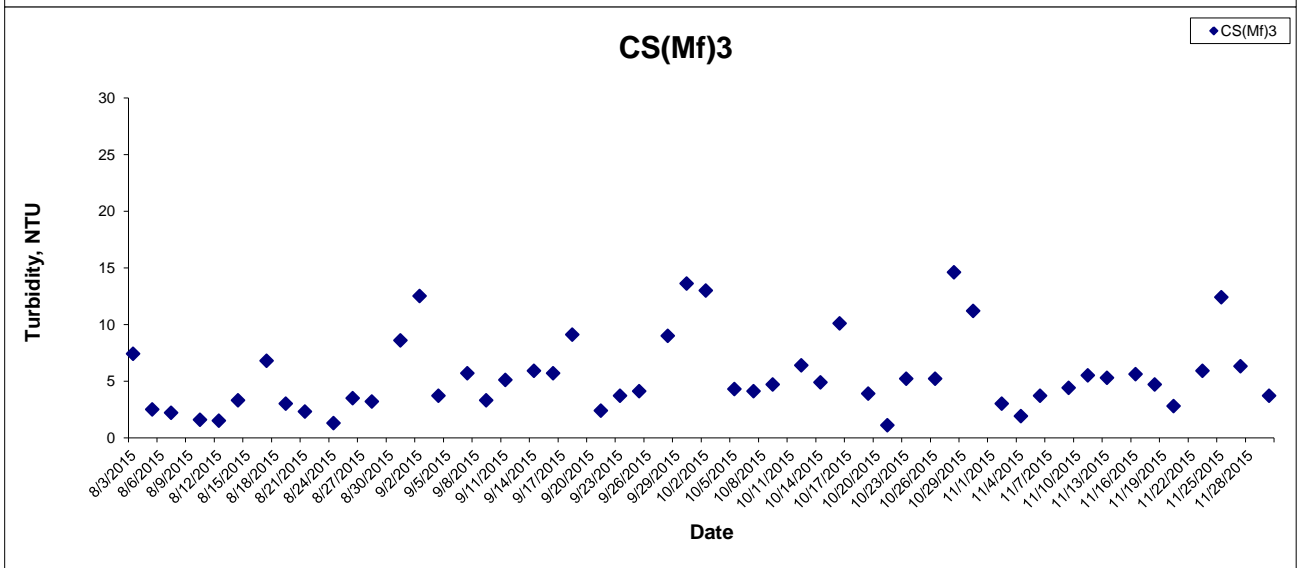
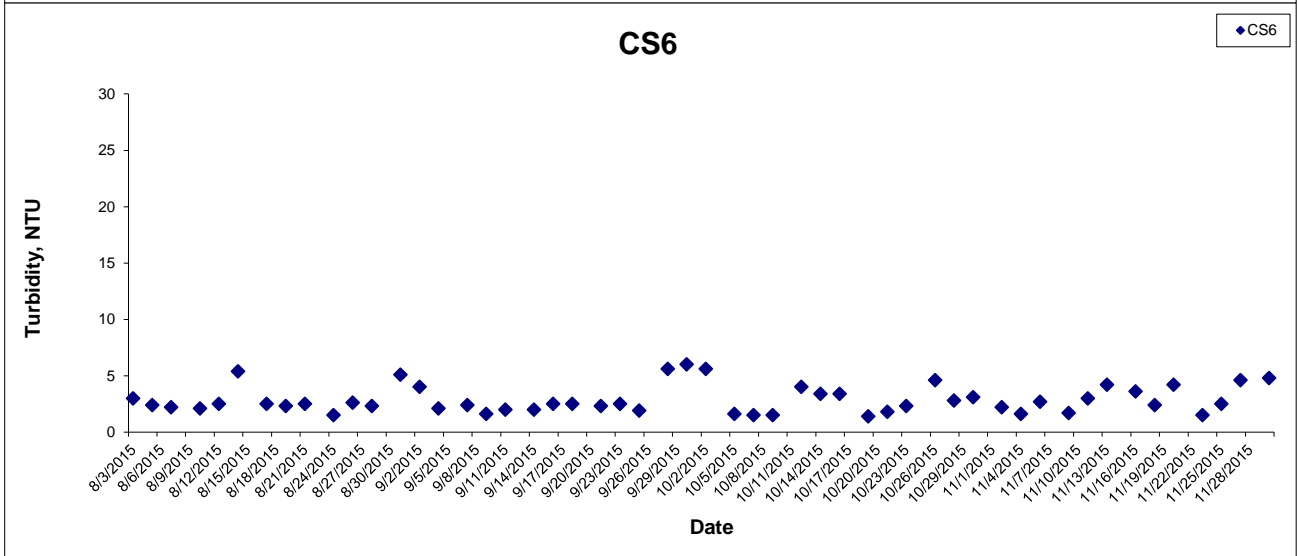
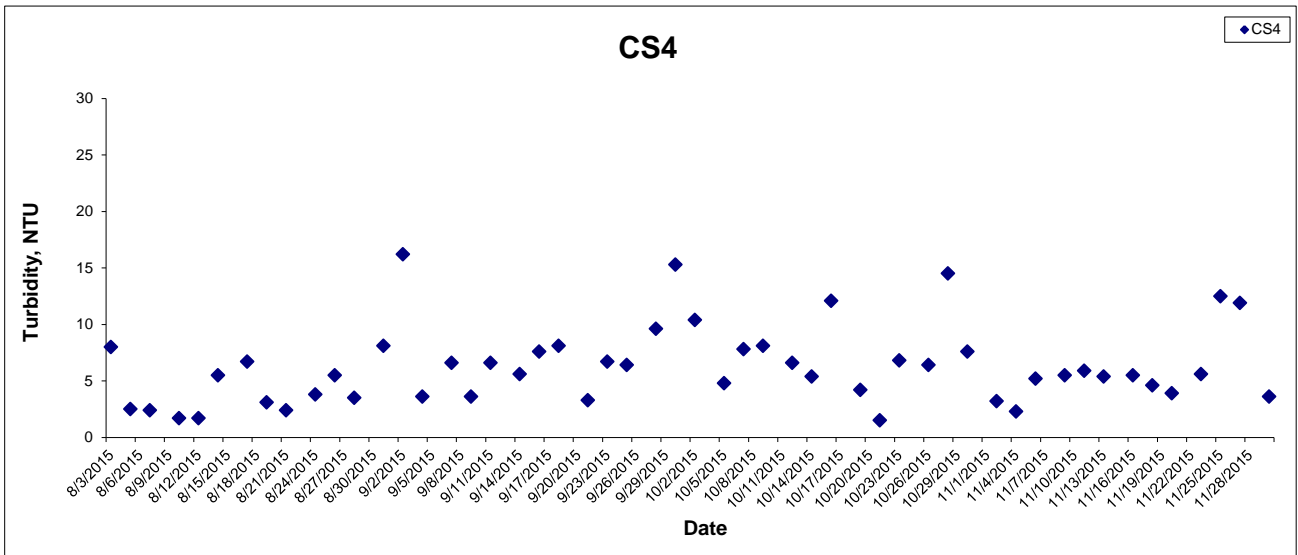
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Dissolved Oxygen (Bottom) at Mid-Flood Tide



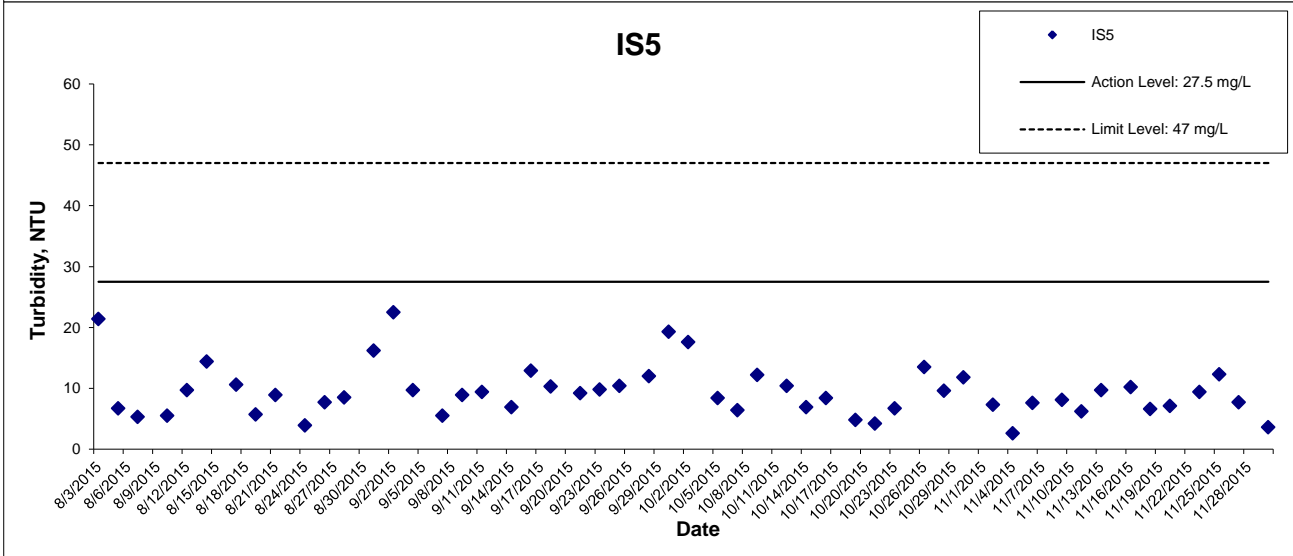
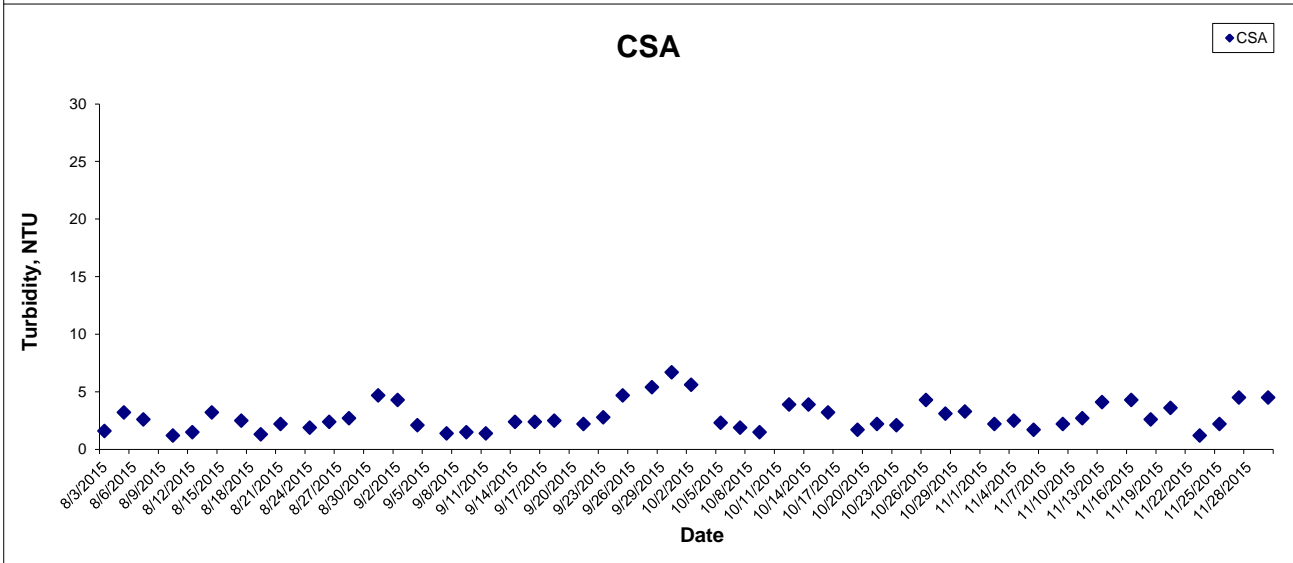
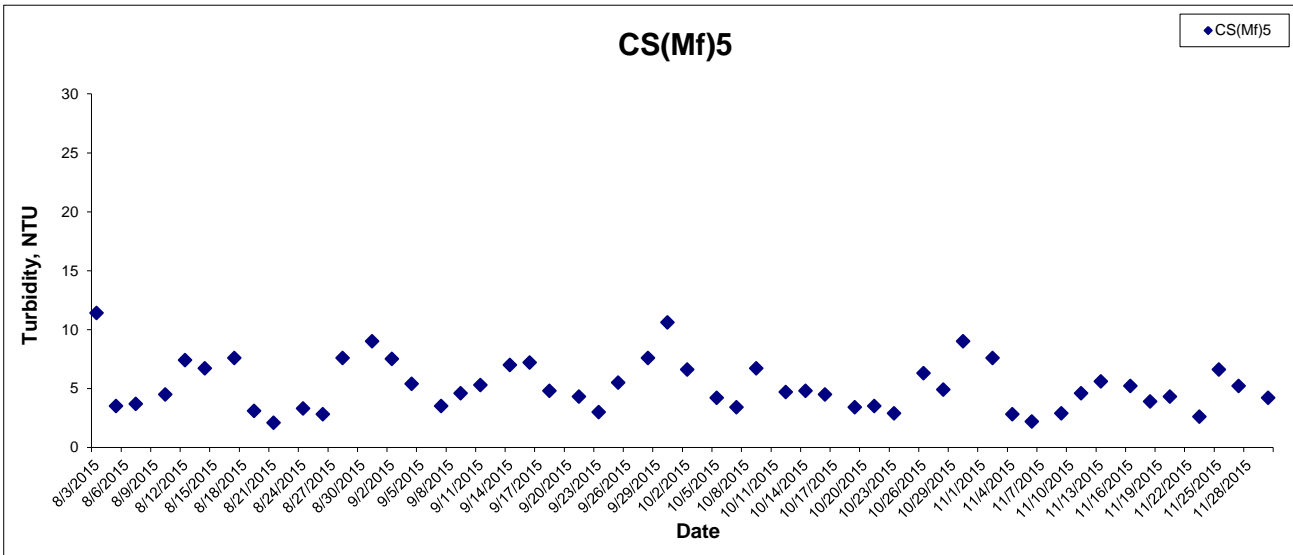
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Turbidity at Mid-Ebb Tide



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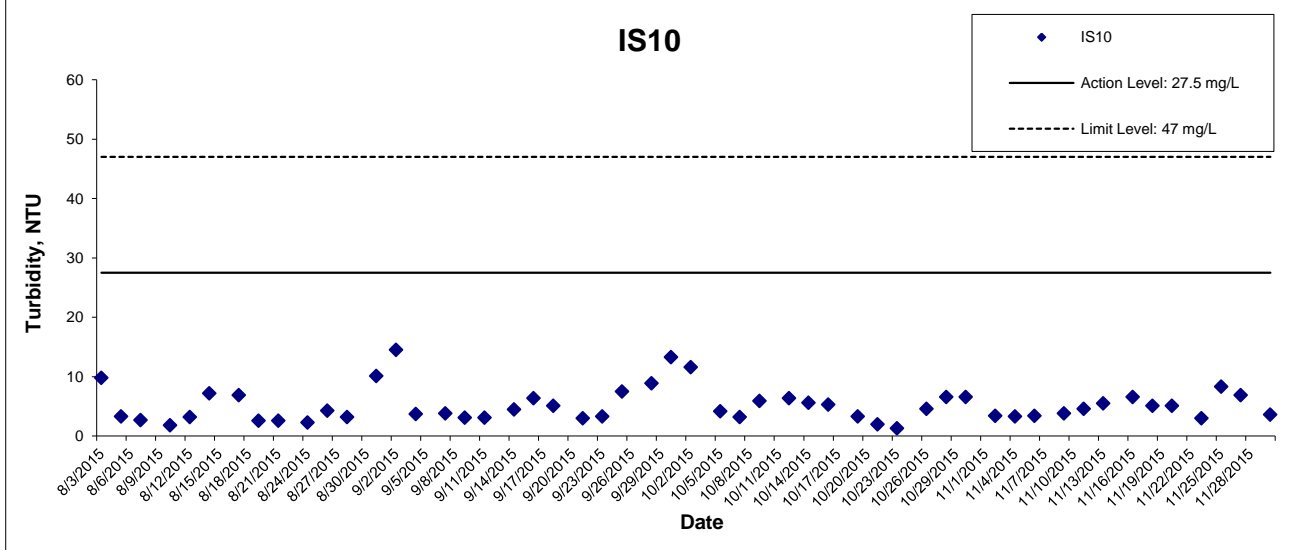
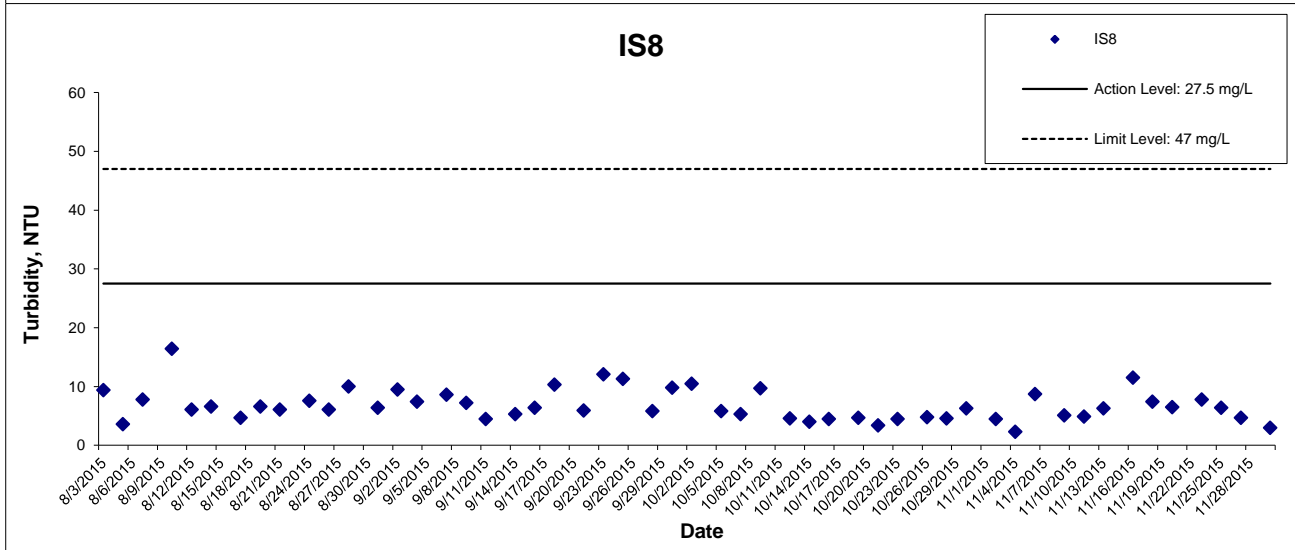
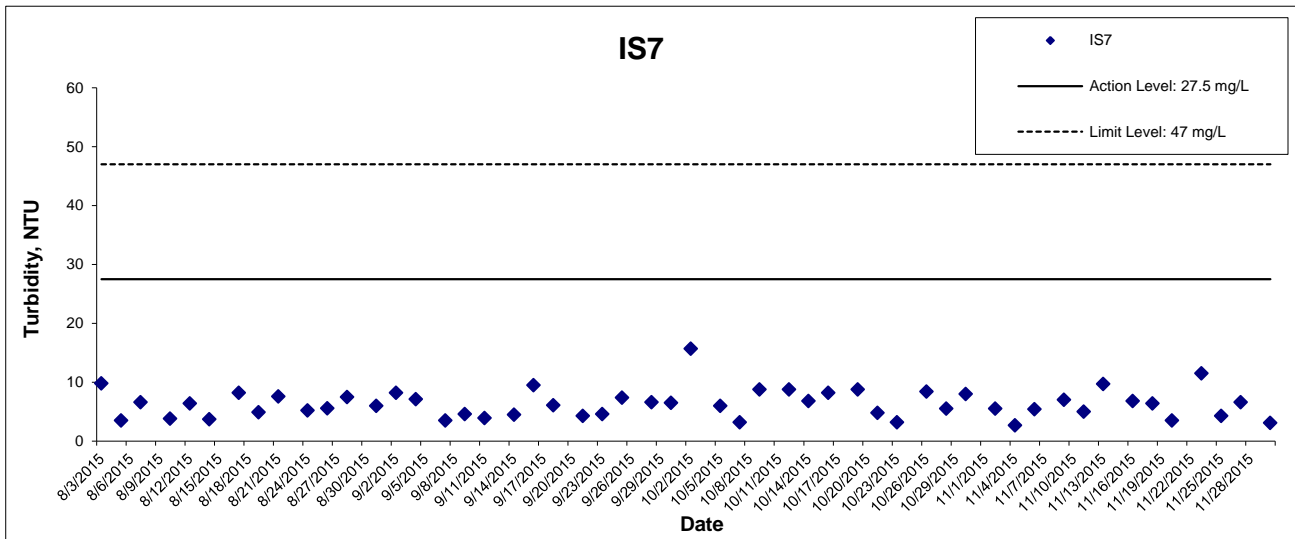
Turbidity at Mid-Ebb Tide



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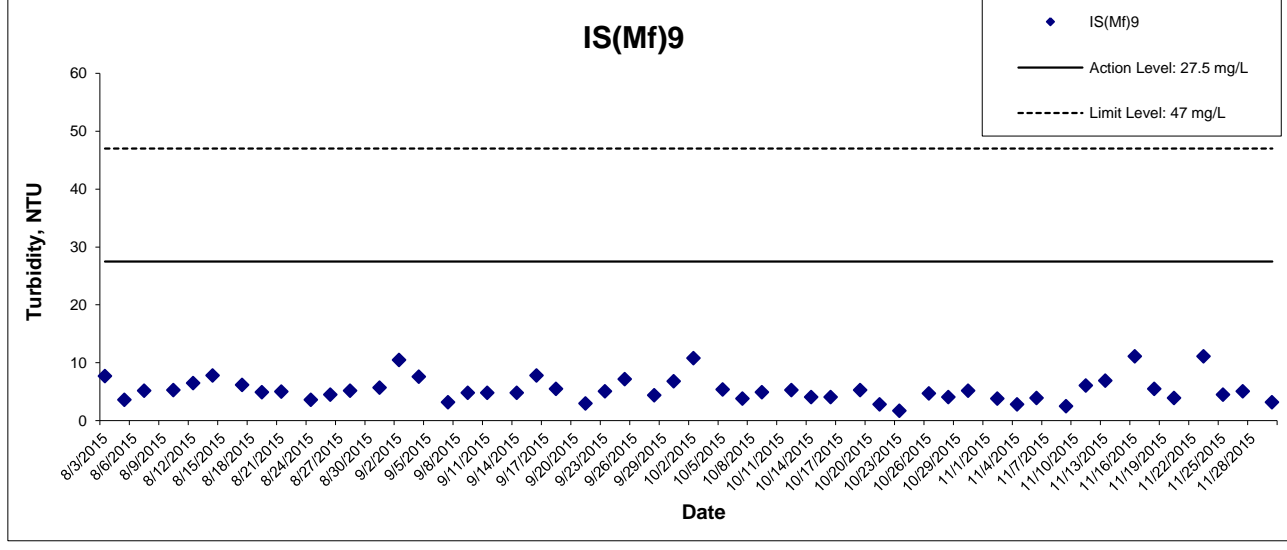
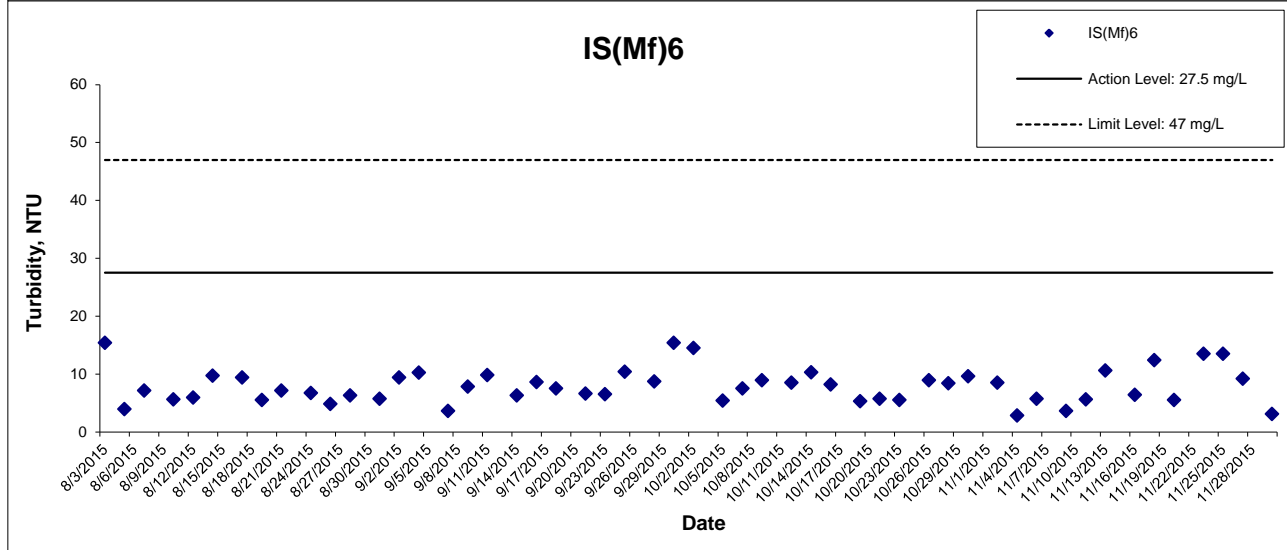
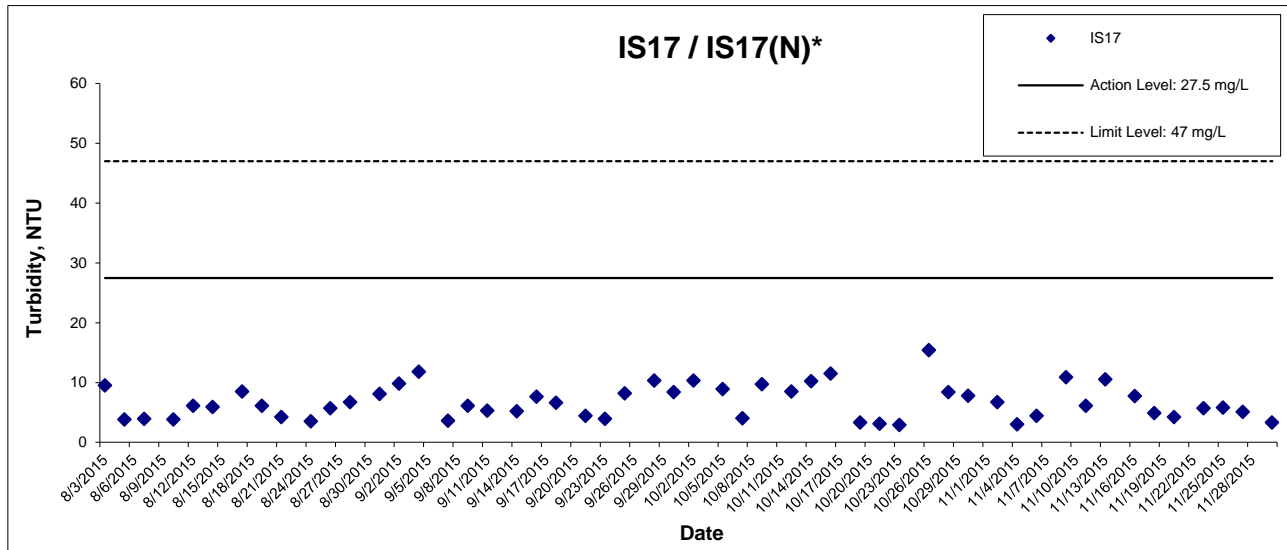
Turbidity at Mid-Ebb Tide



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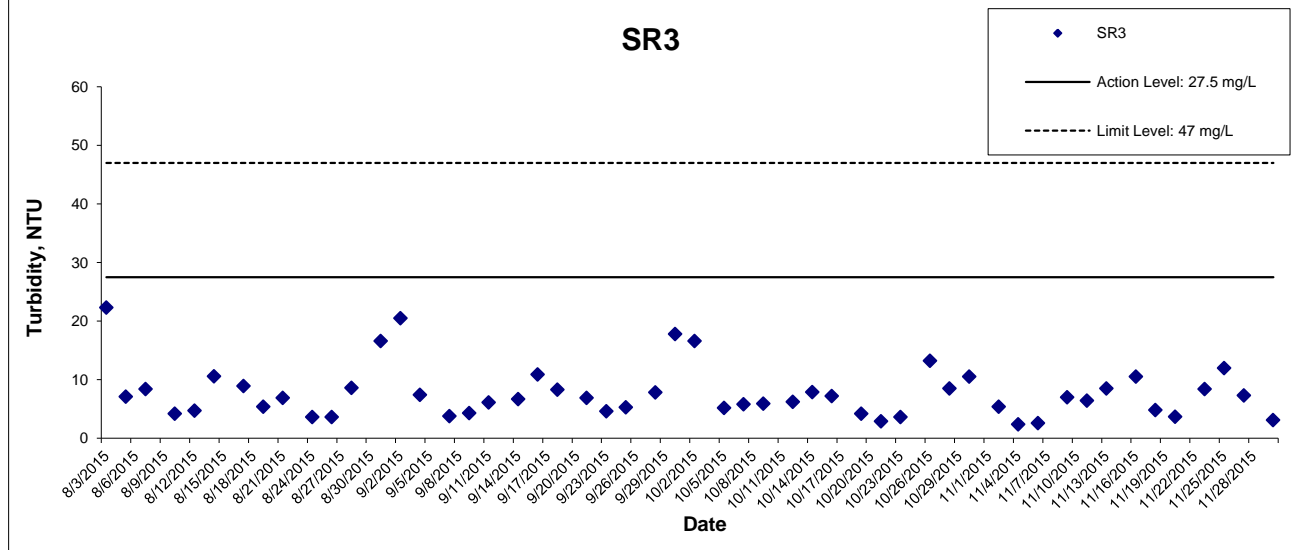
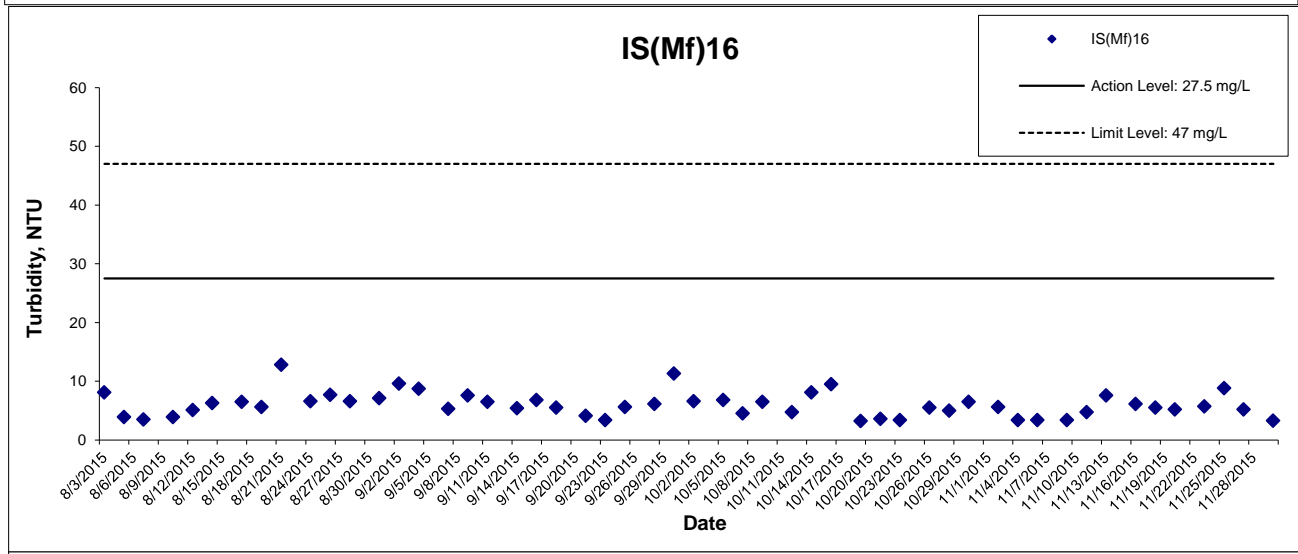
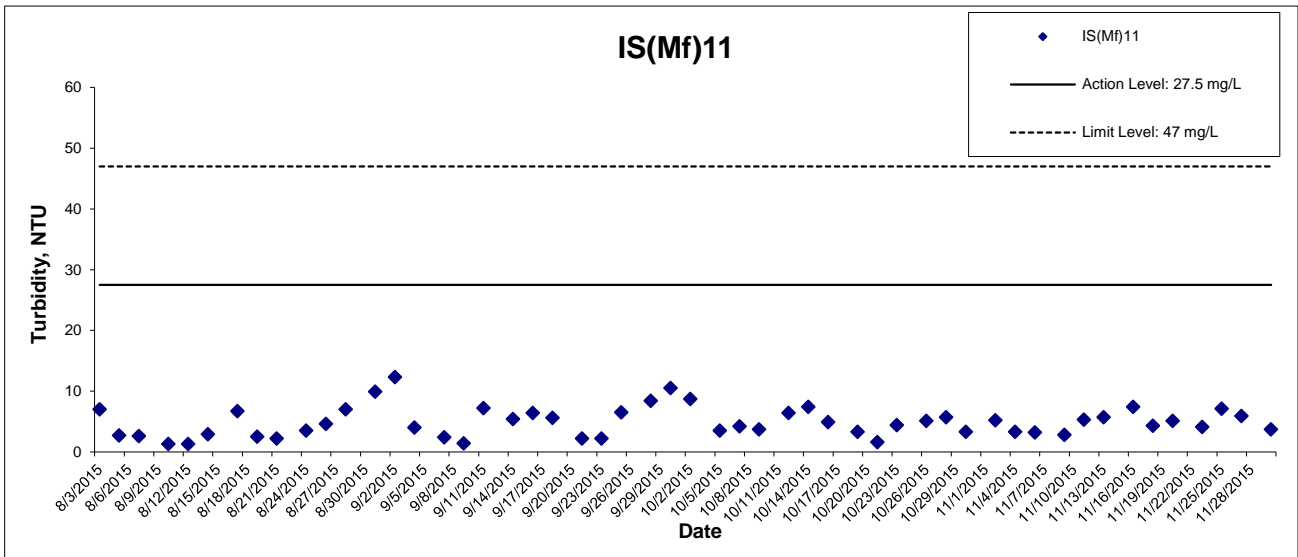
Turbidity at Mid-Ebb Tide



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Turbidity at Mid-Ebb Tide



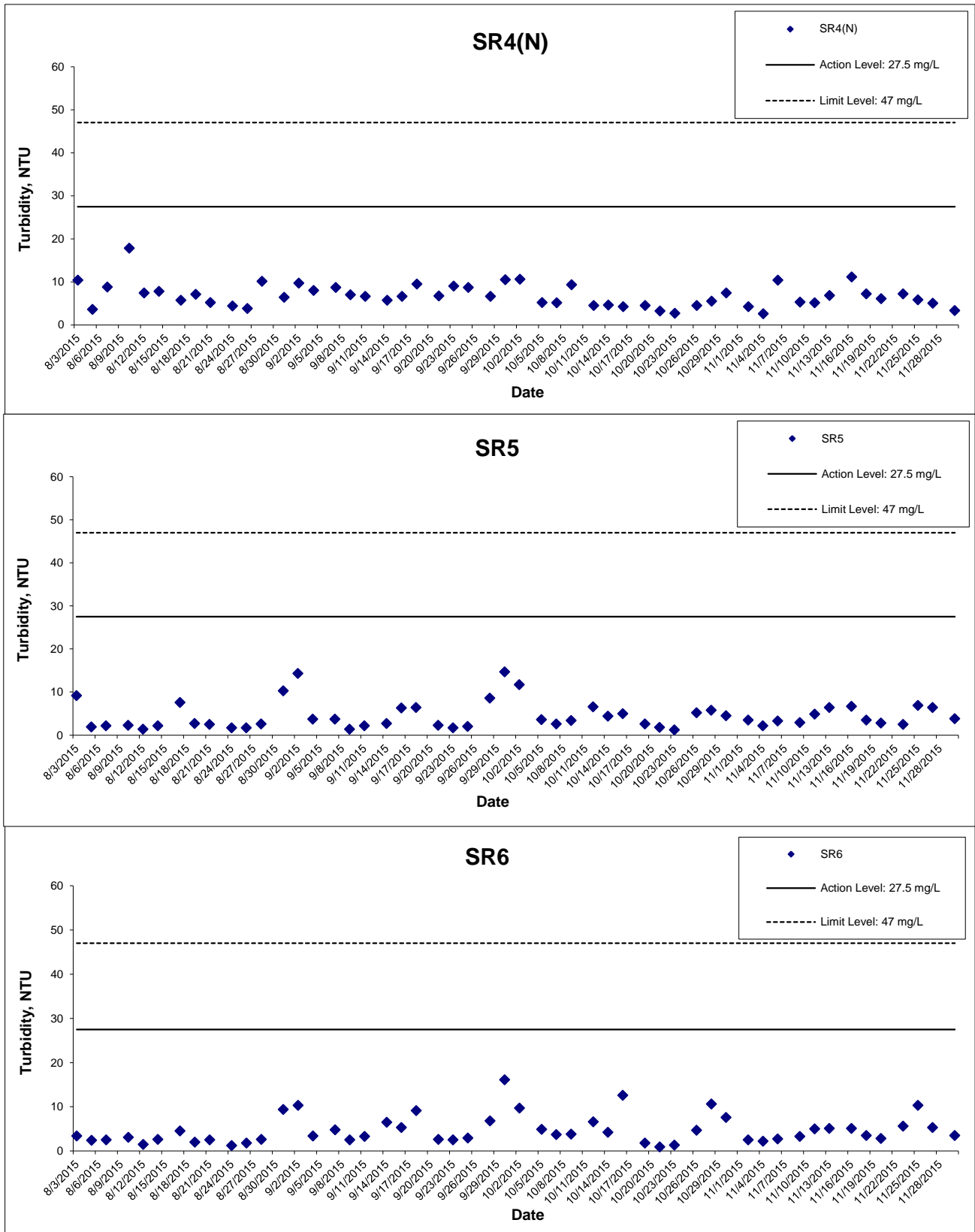
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HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
Monitoring Results

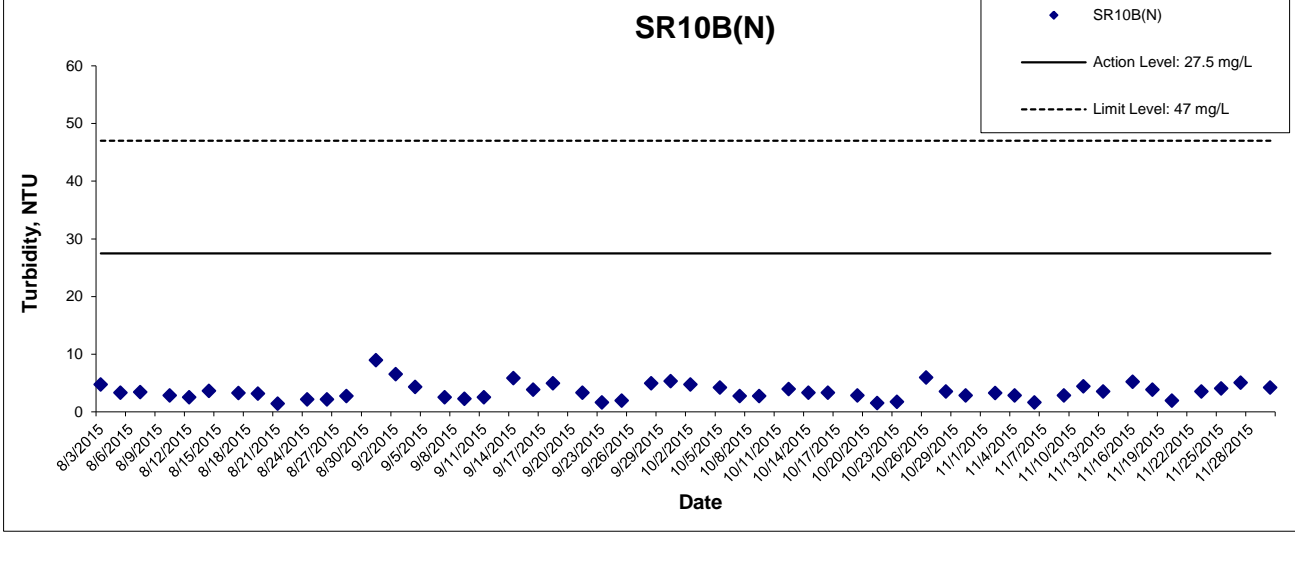
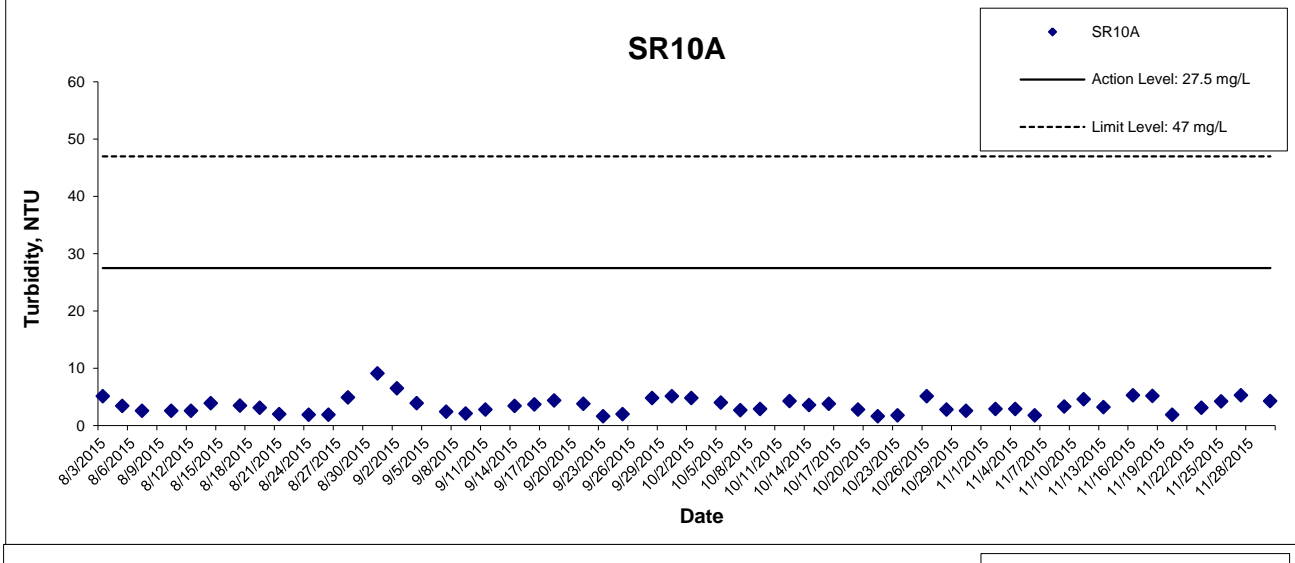
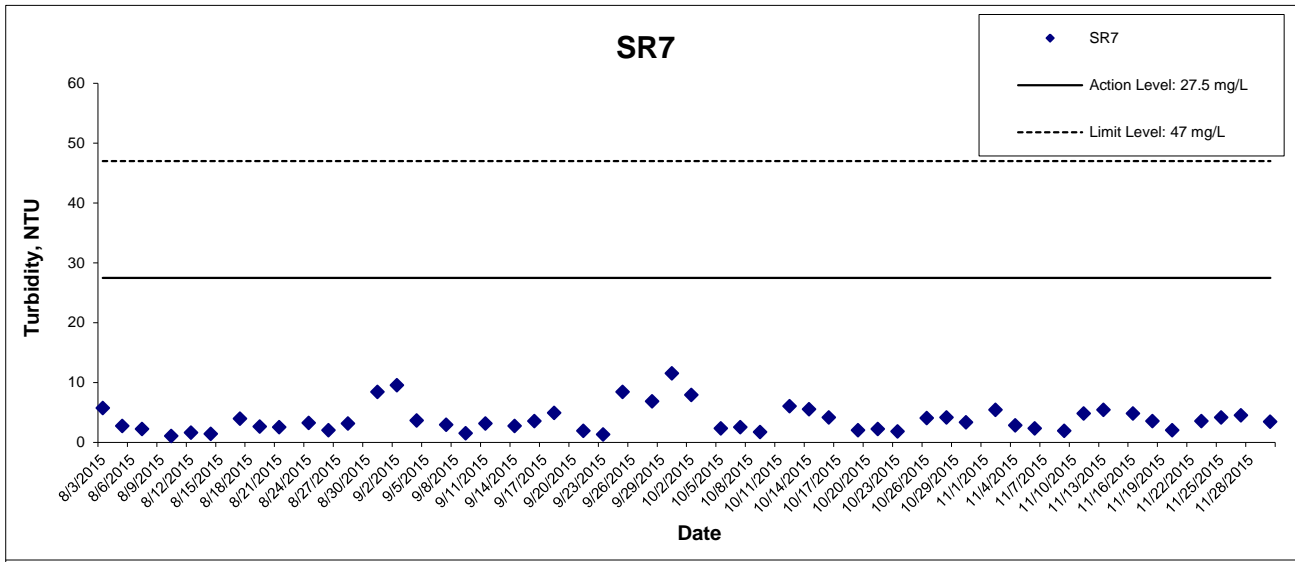


Turbidity at Mid-Ebb Tide



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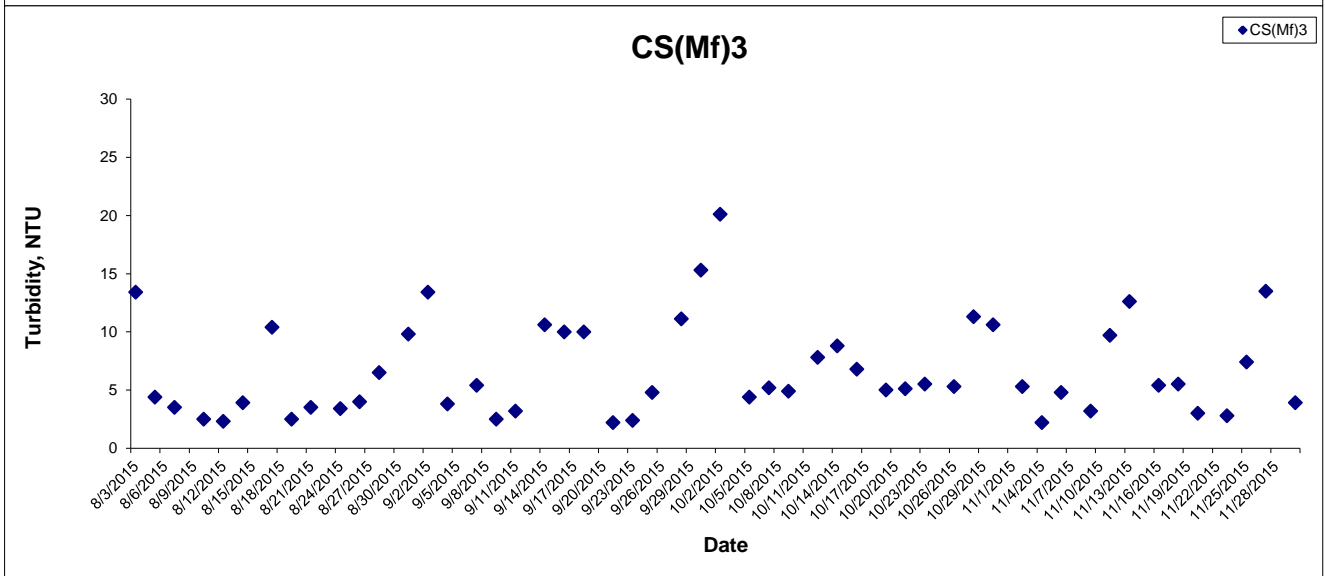
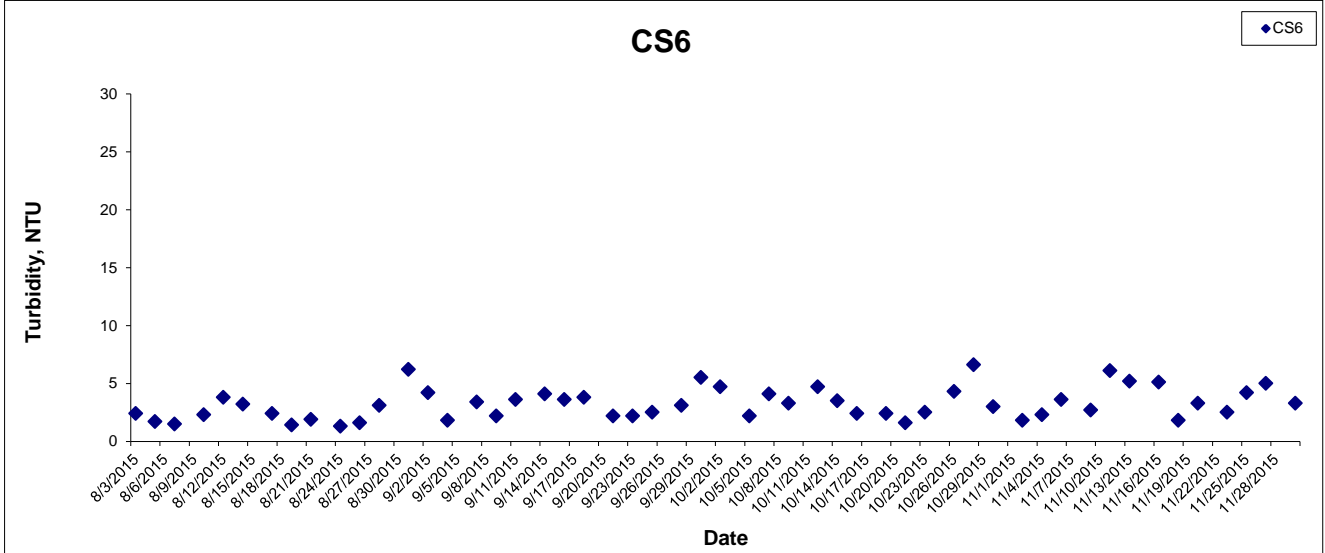
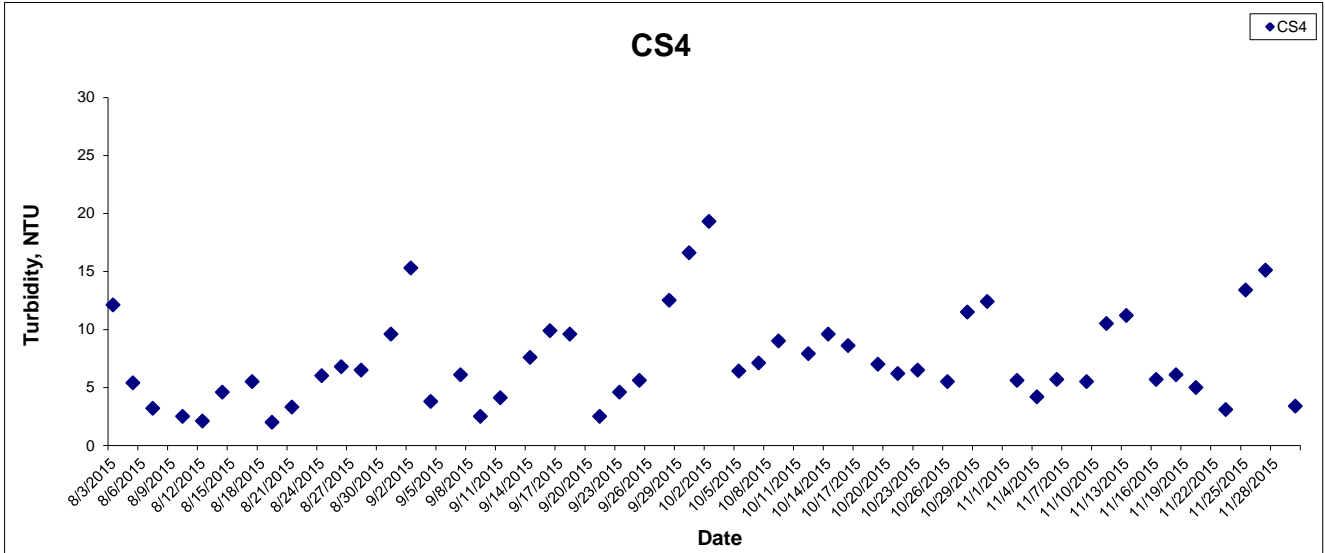
Turbidity at Mid-Ebb Tide



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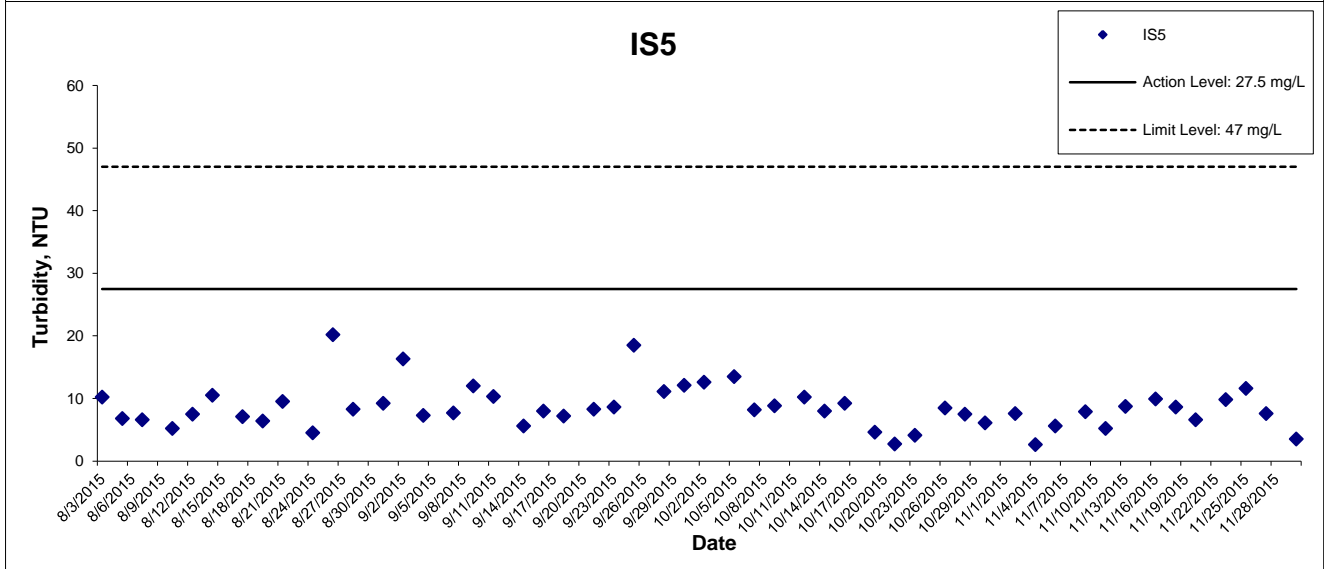
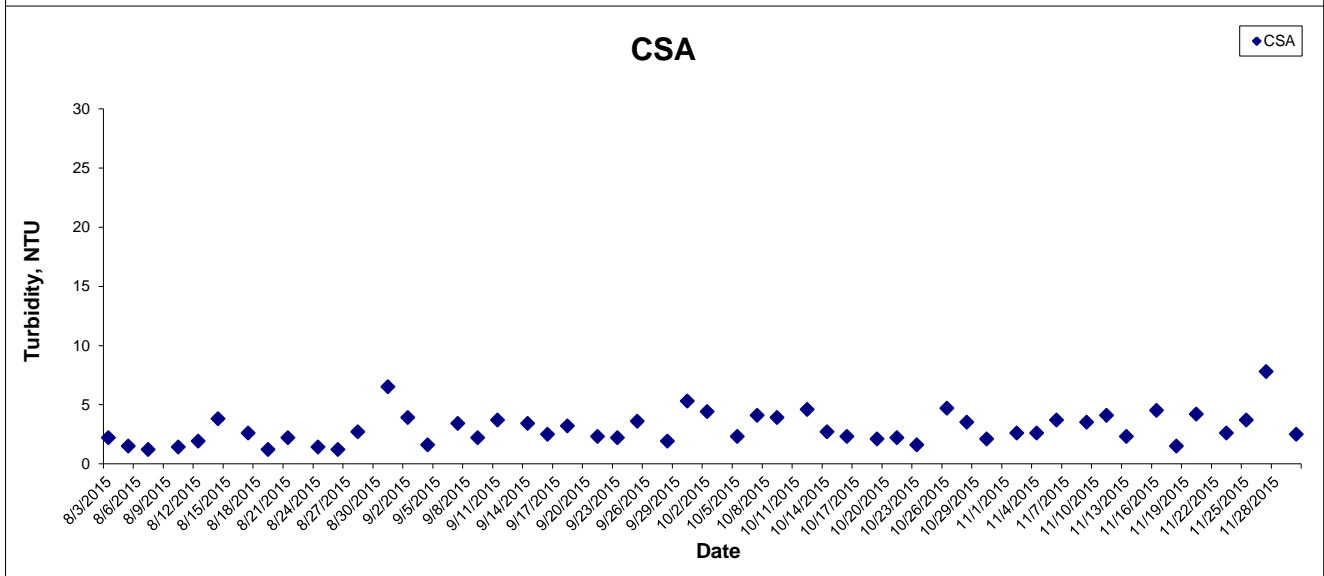
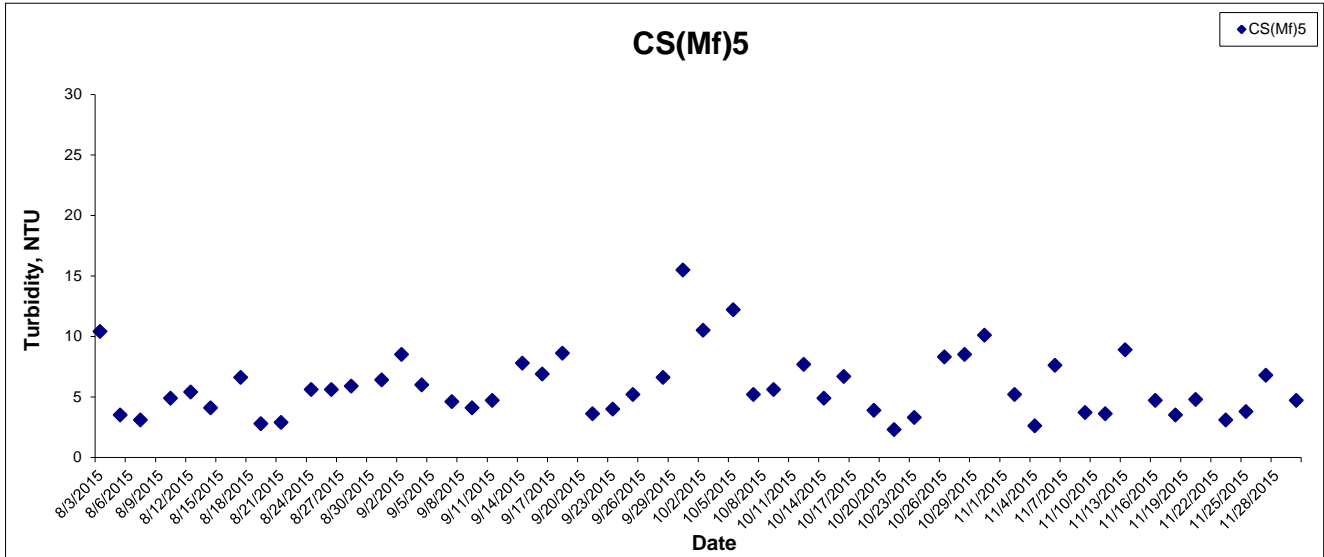


Turbidity at Mid-Flood Tide



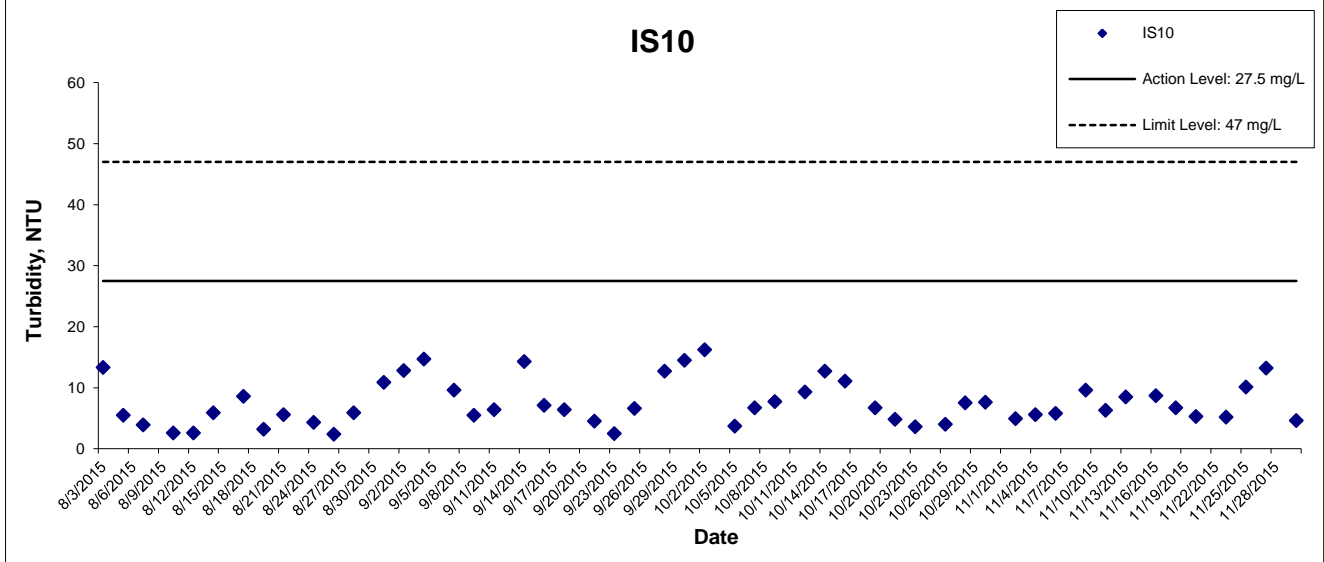
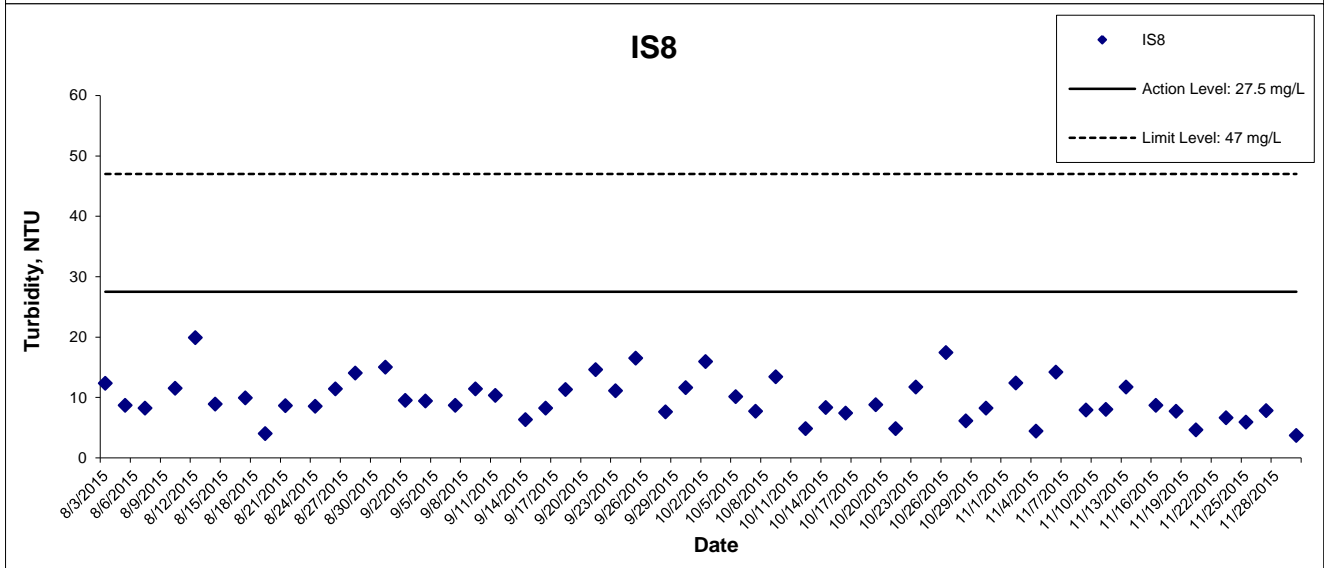
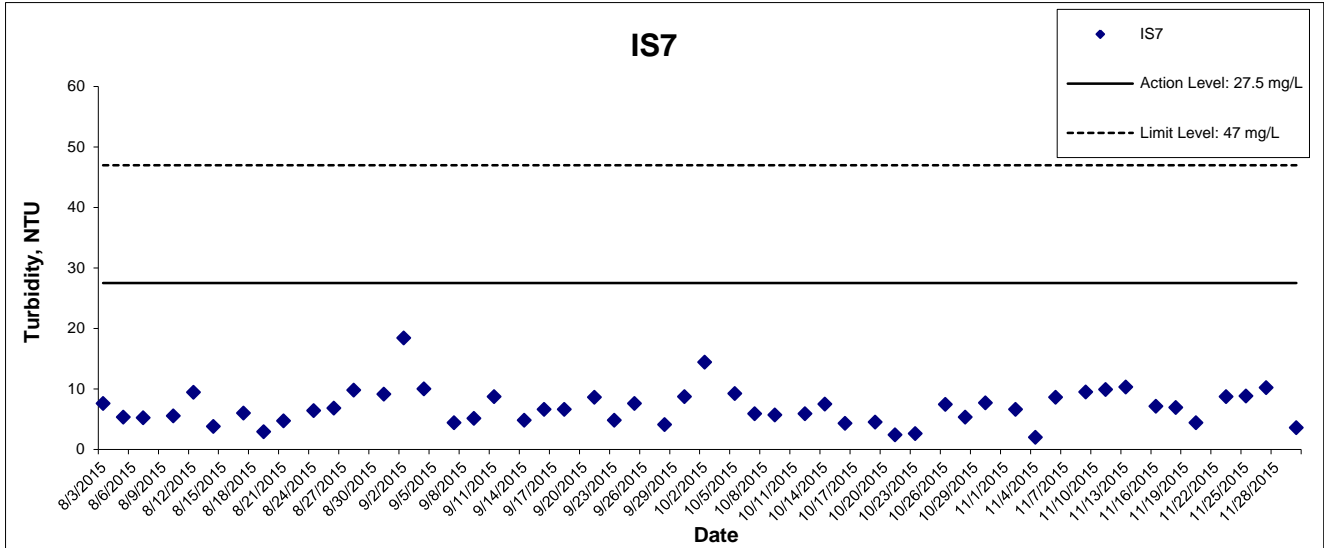
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Turbidity at Mid-Flood Tide



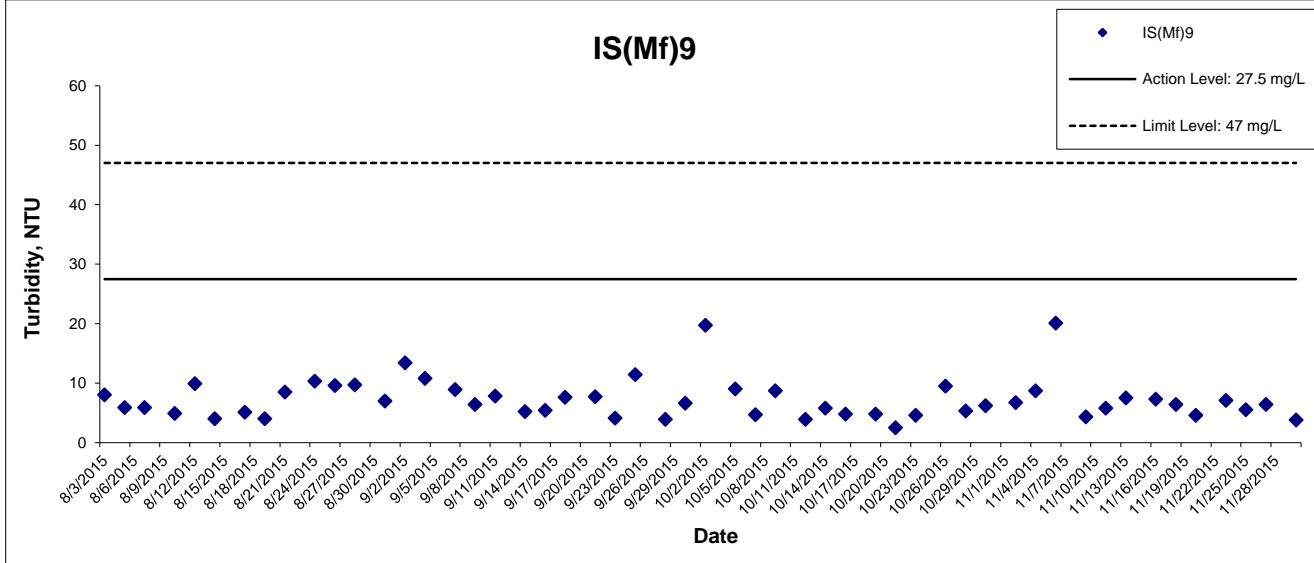
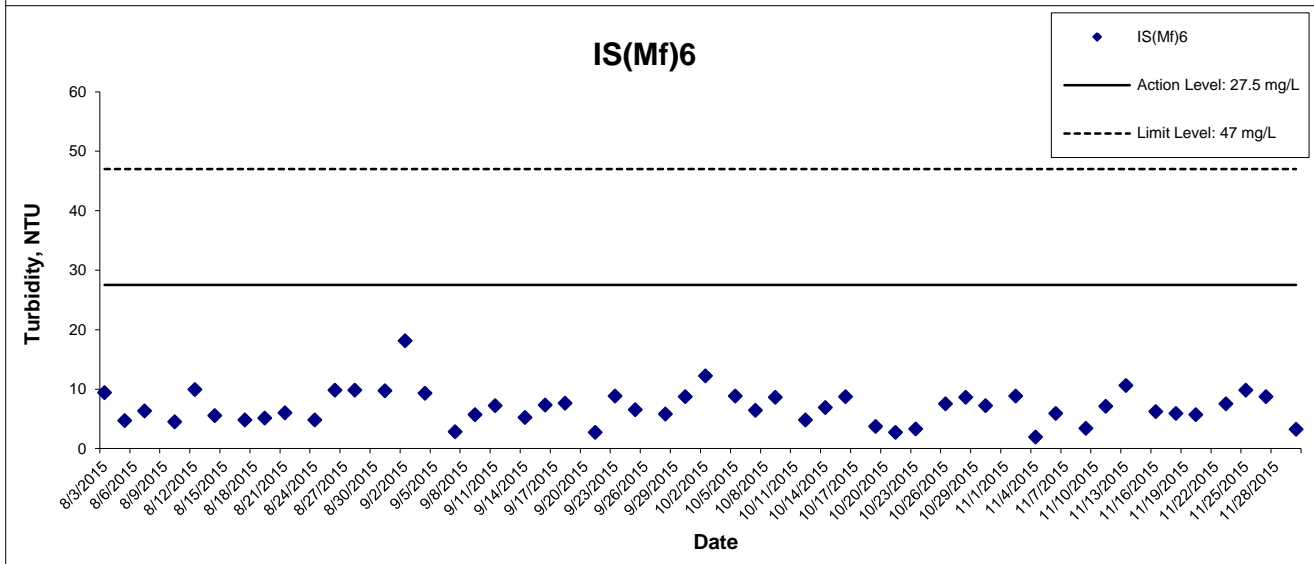
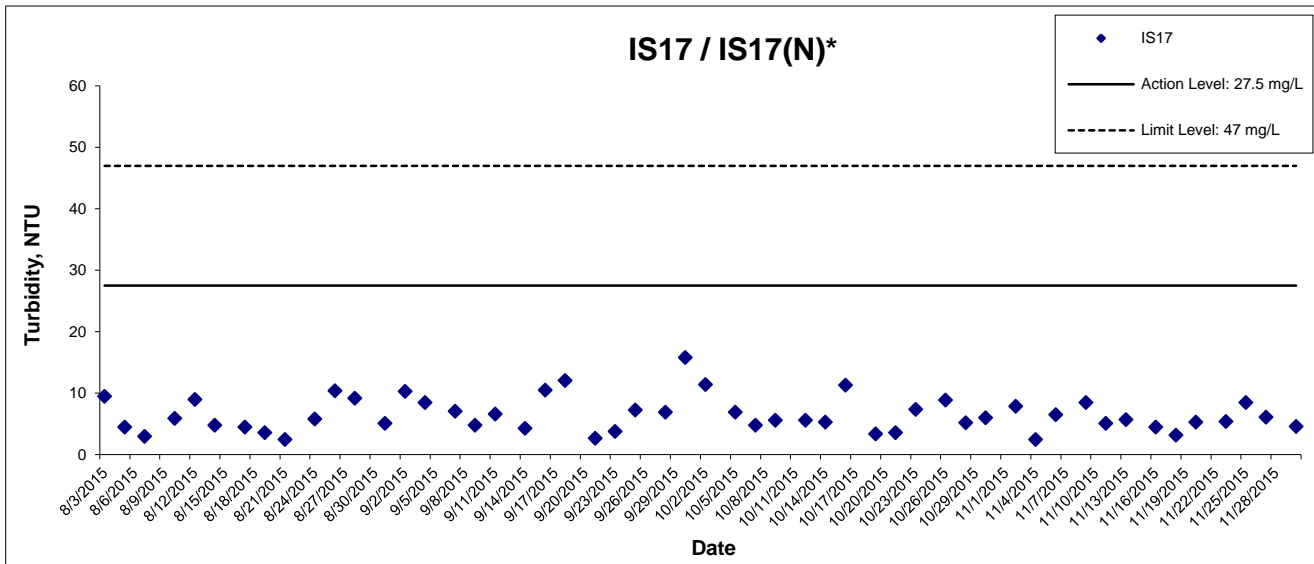
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Turbidity at Mid-Flood Tide



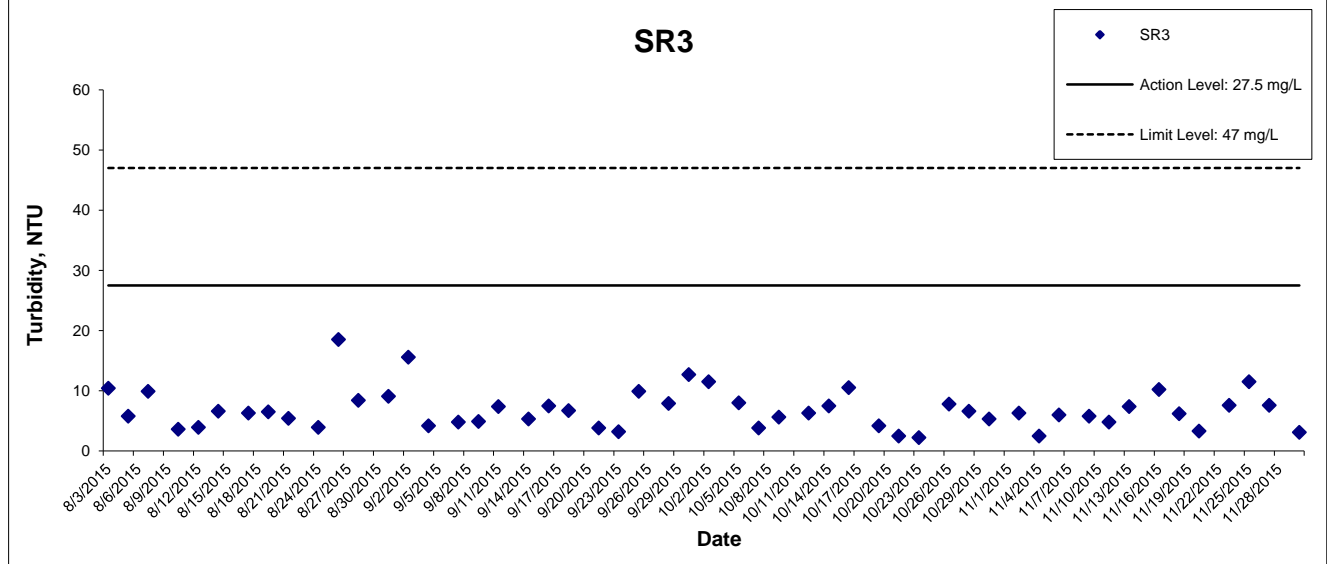
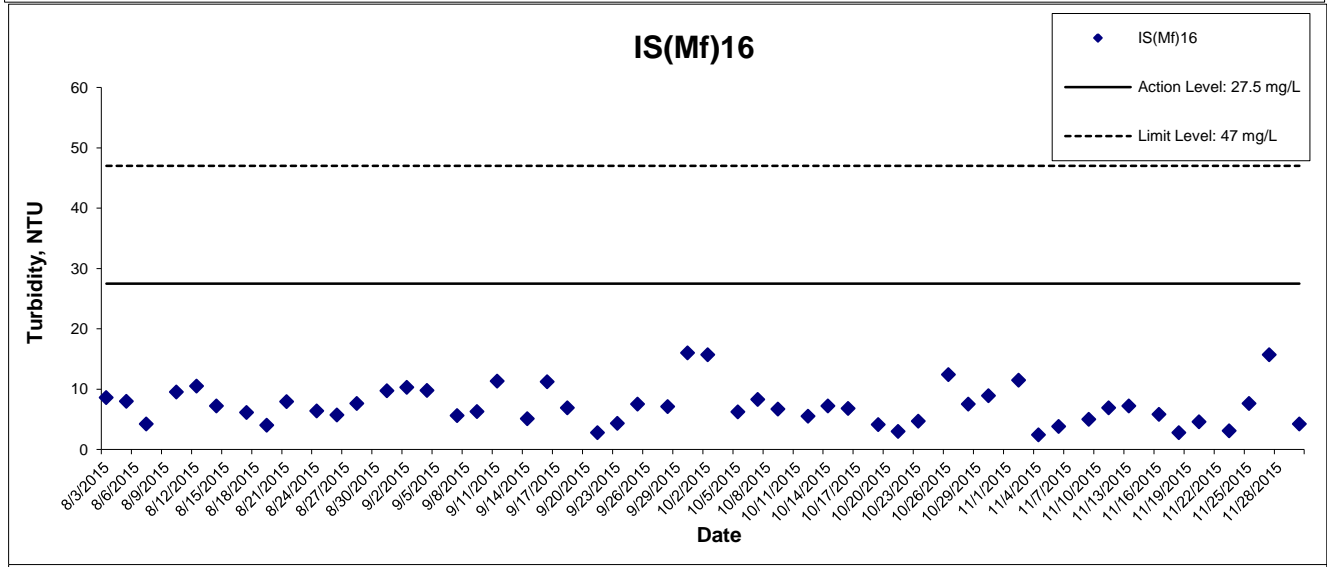
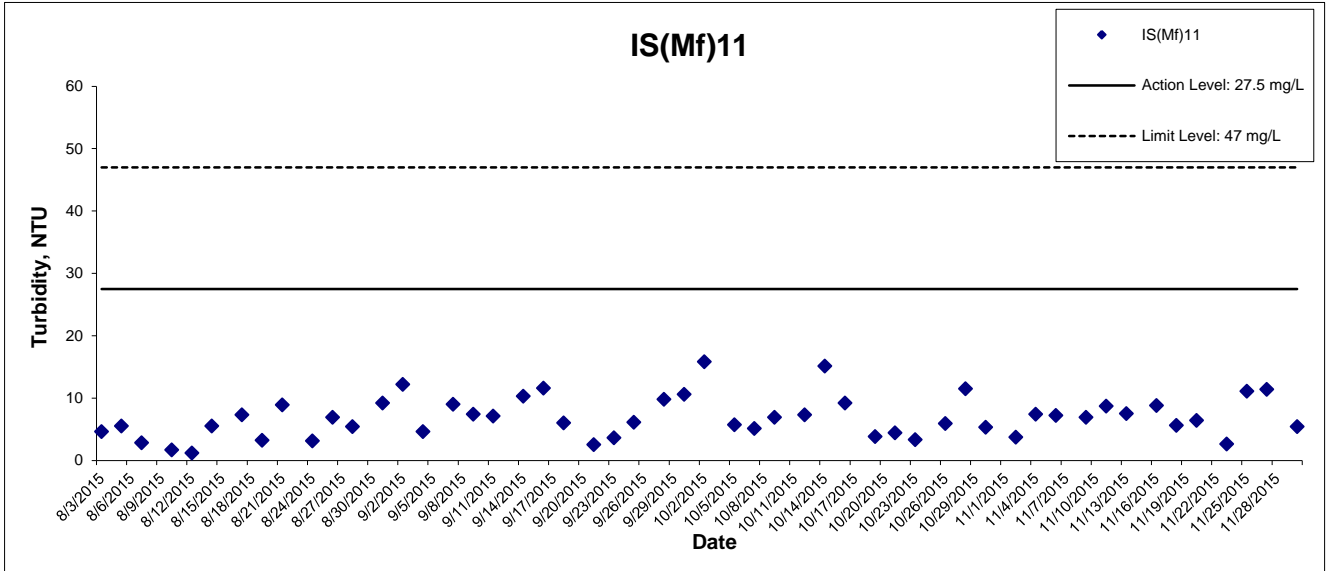
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Turbidity at Mid-Flood Tide



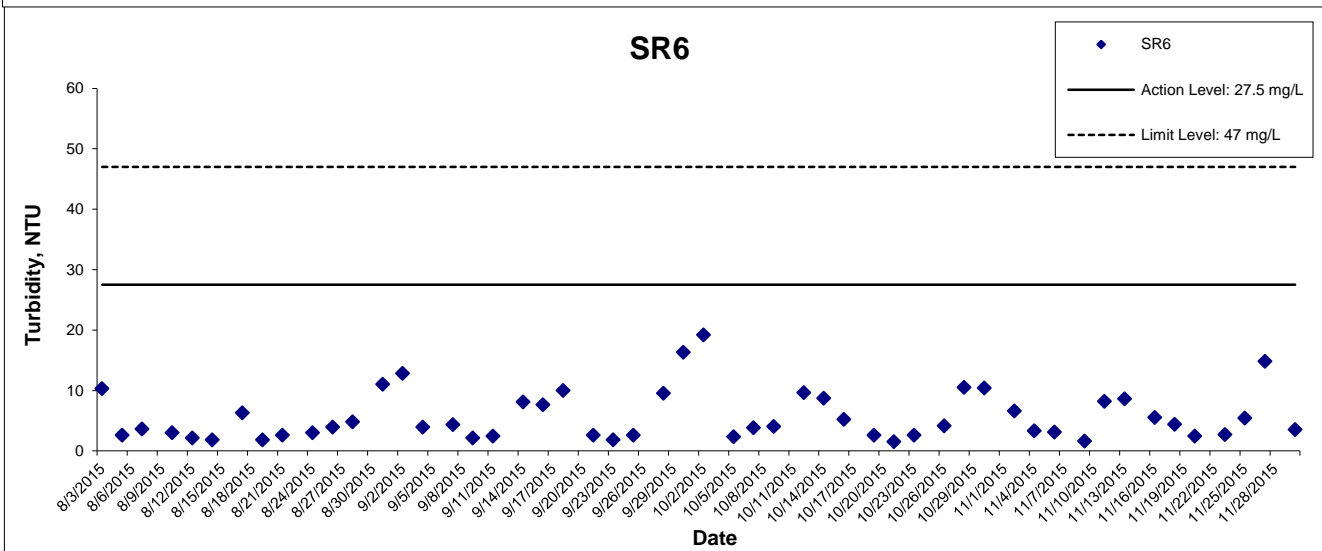
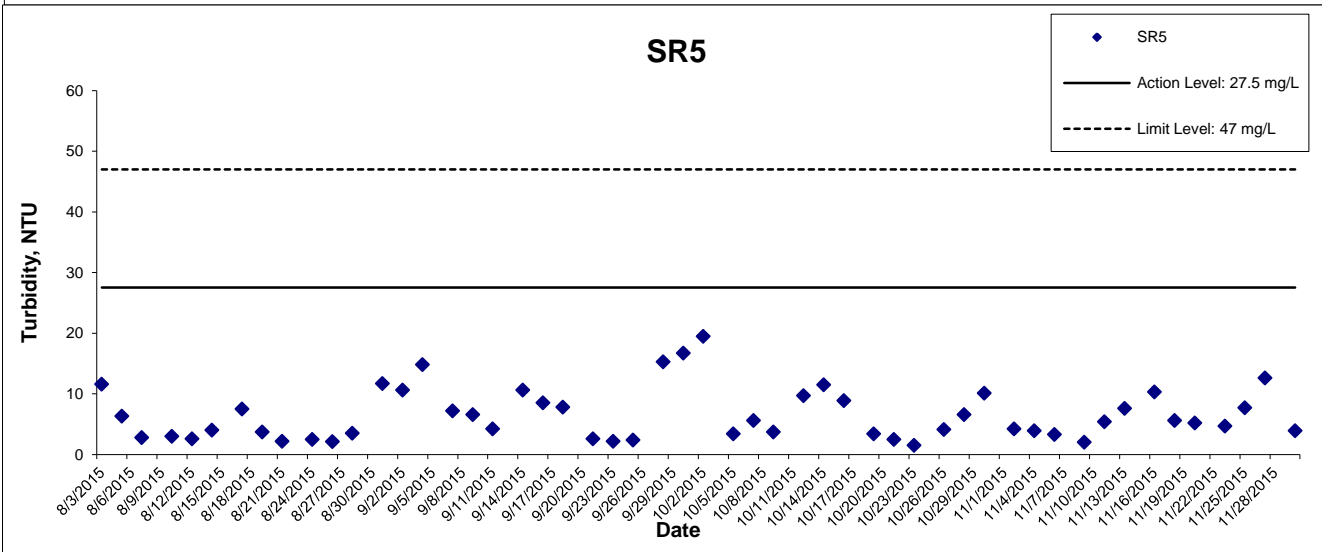
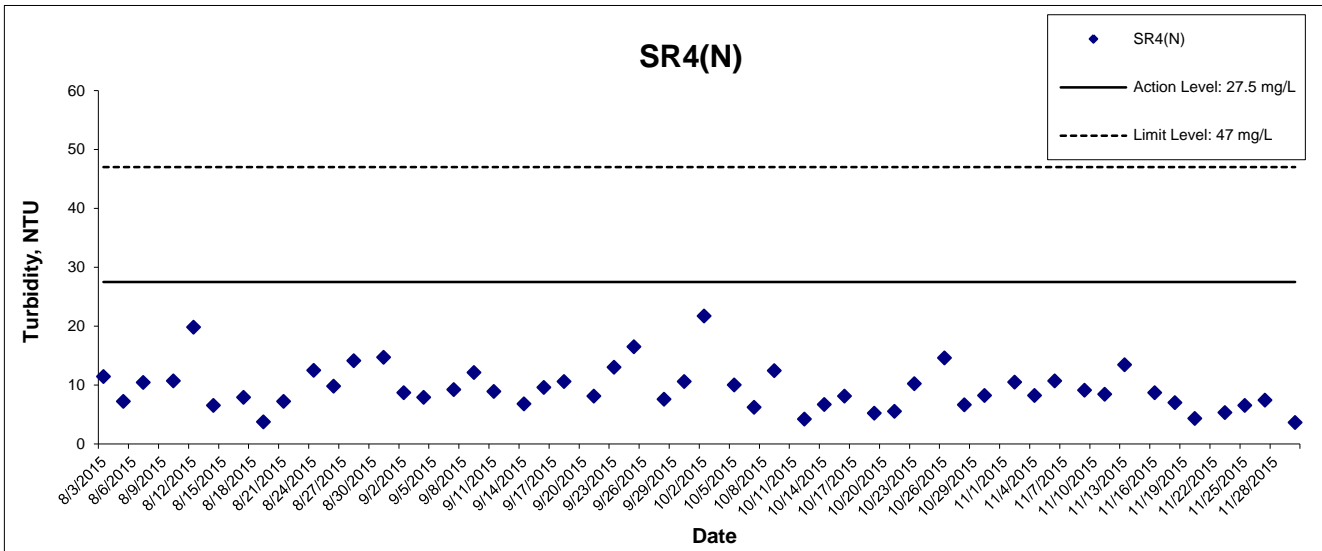
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Turbidity at Mid-Flood Tide



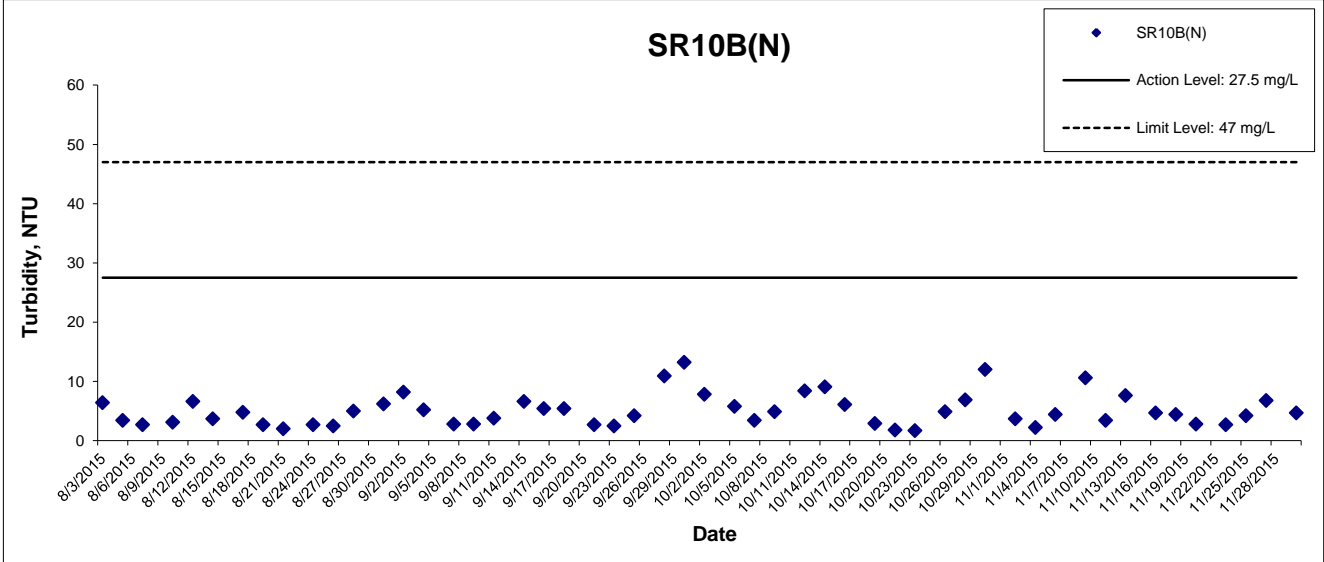
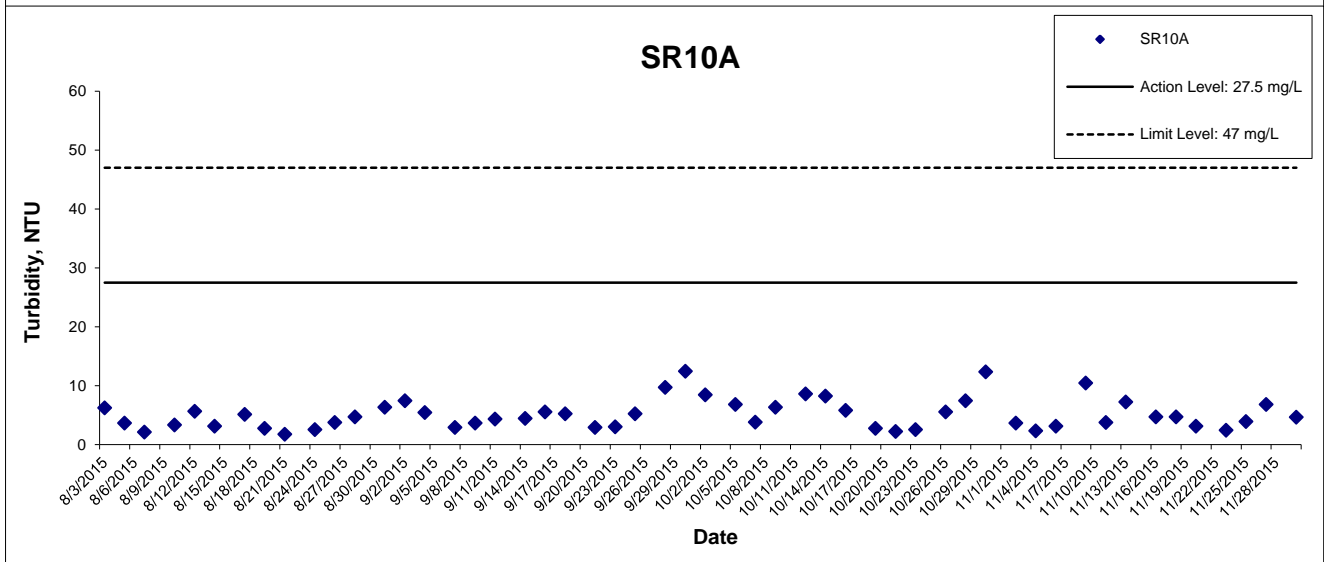
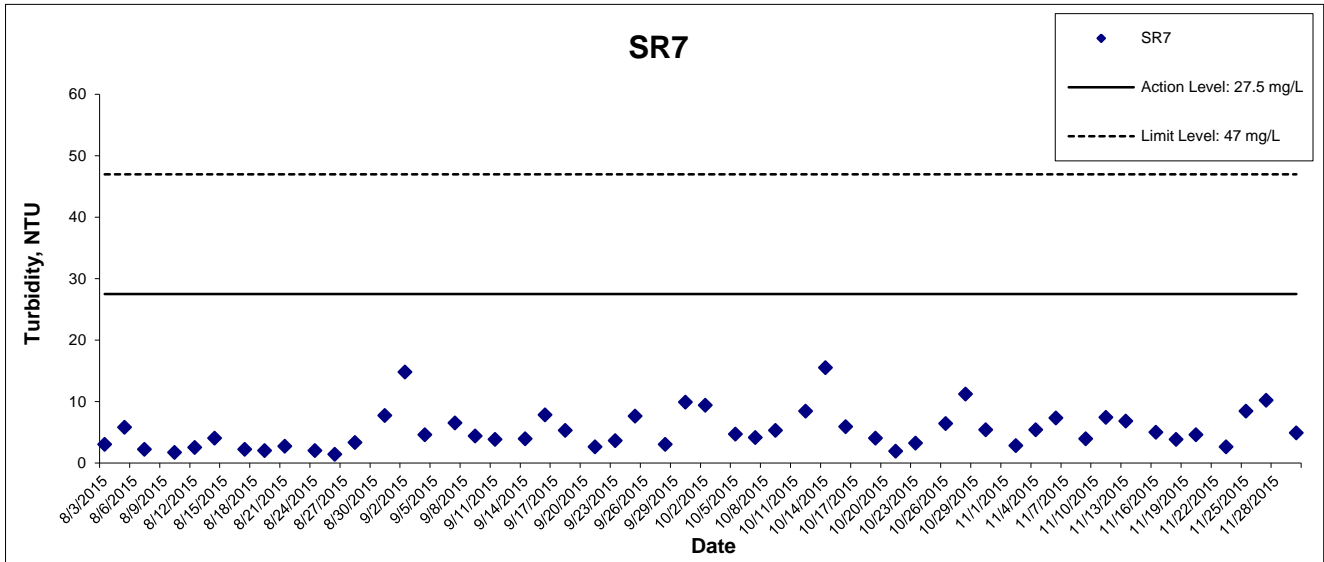
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Turbidity at Mid-Flood Tide



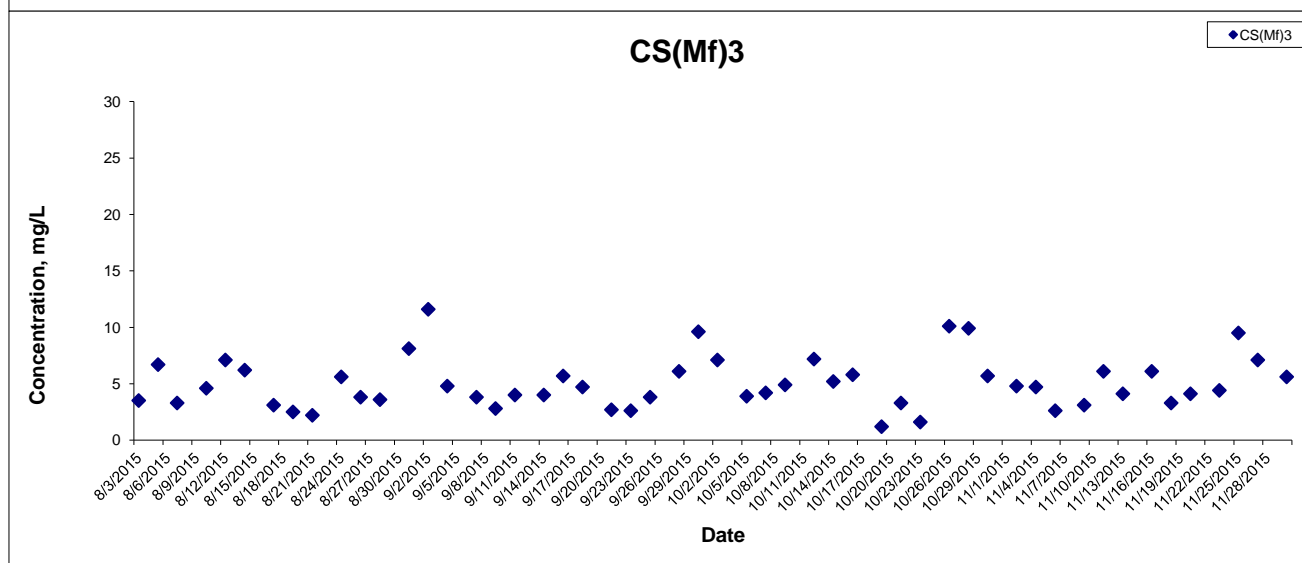
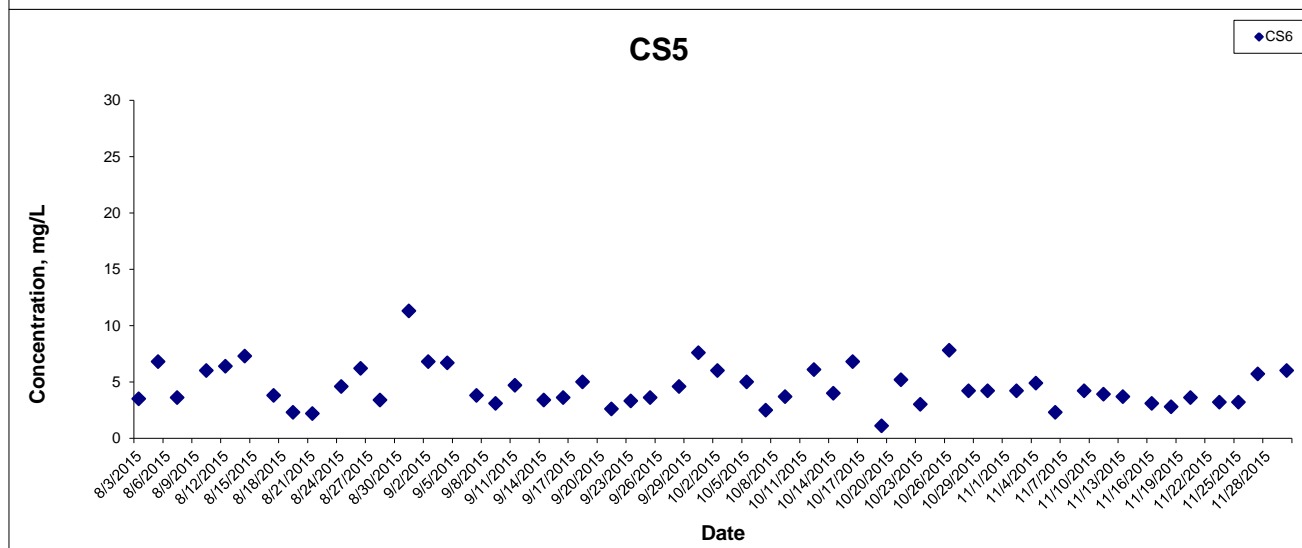
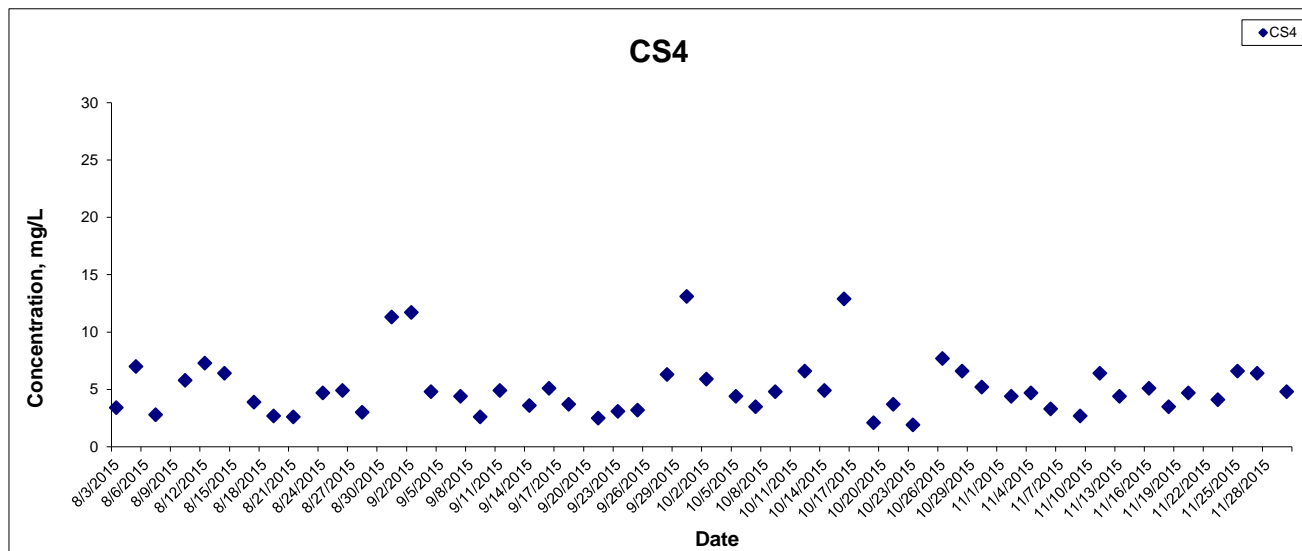
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Turbidity at Mid-Flood Tide



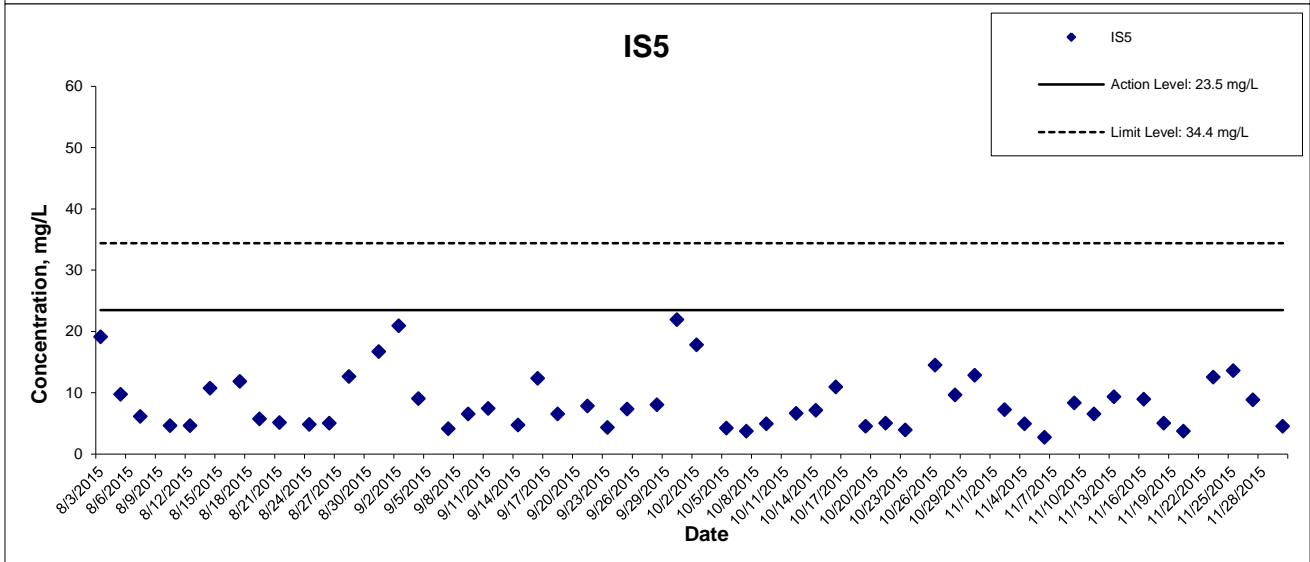
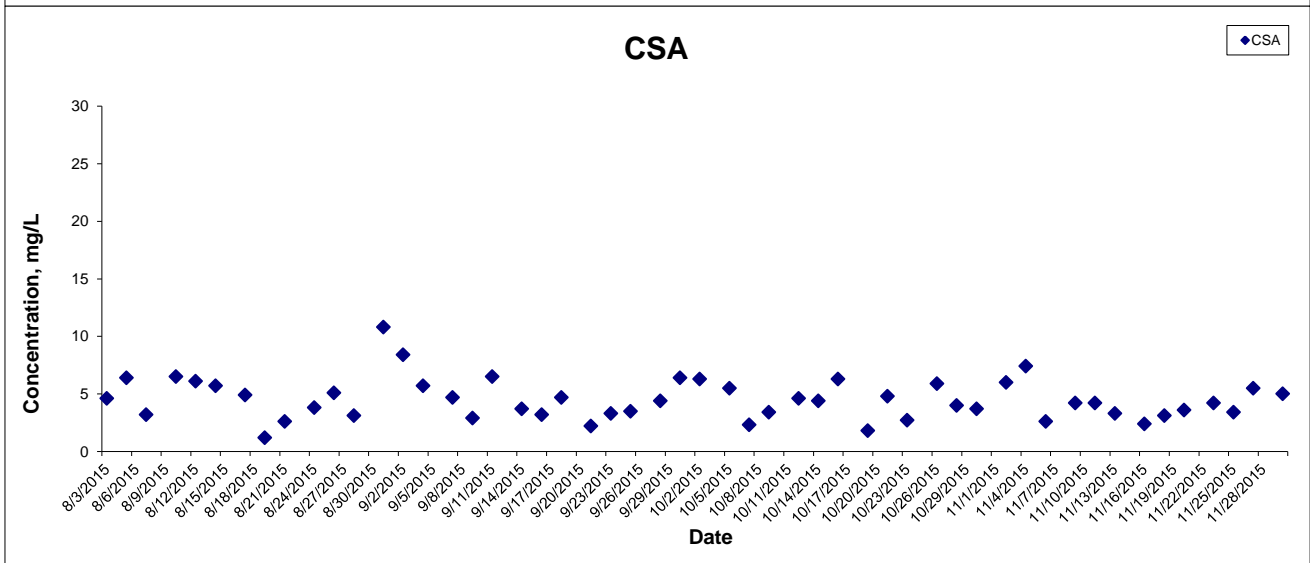
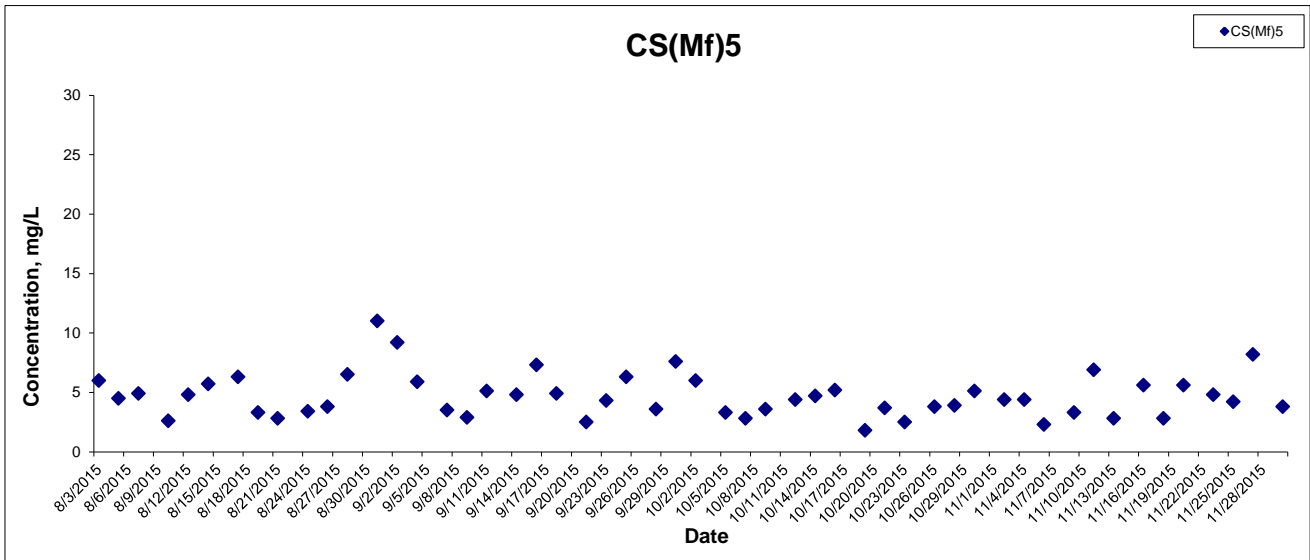
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Suspended Solids at Mid-Ebb Tide



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Suspended Solids at Mid-Ebb Tide



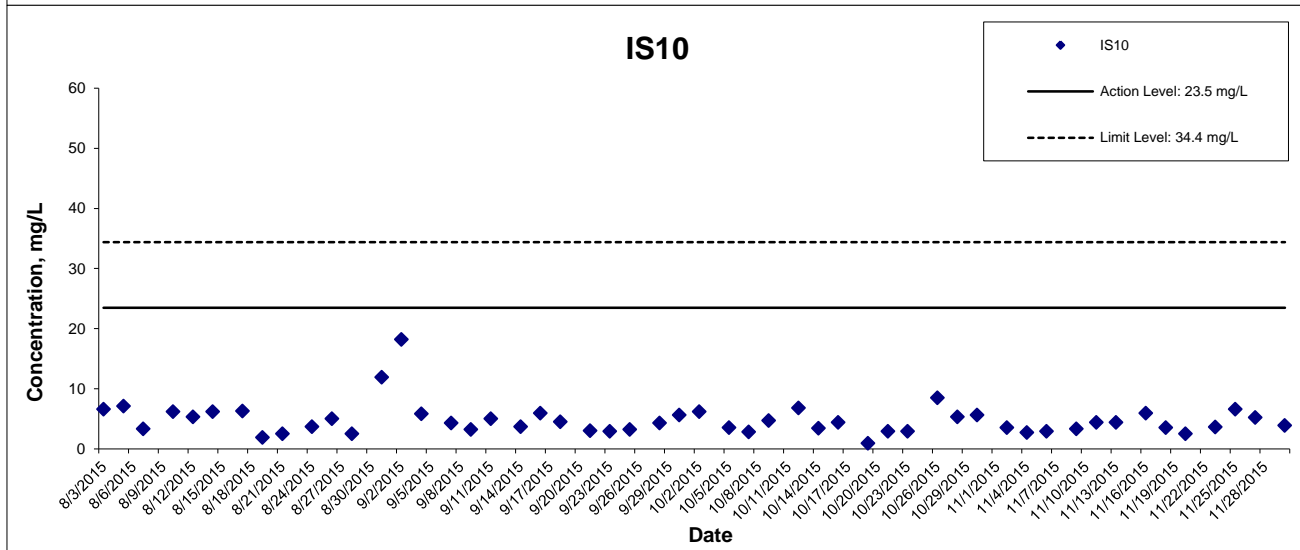
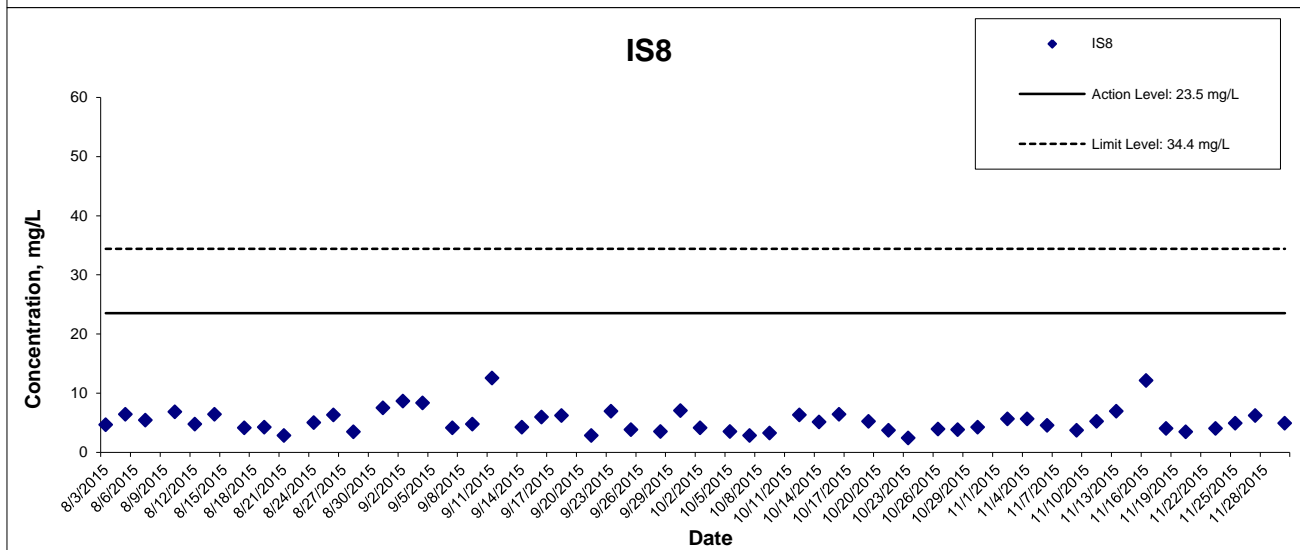
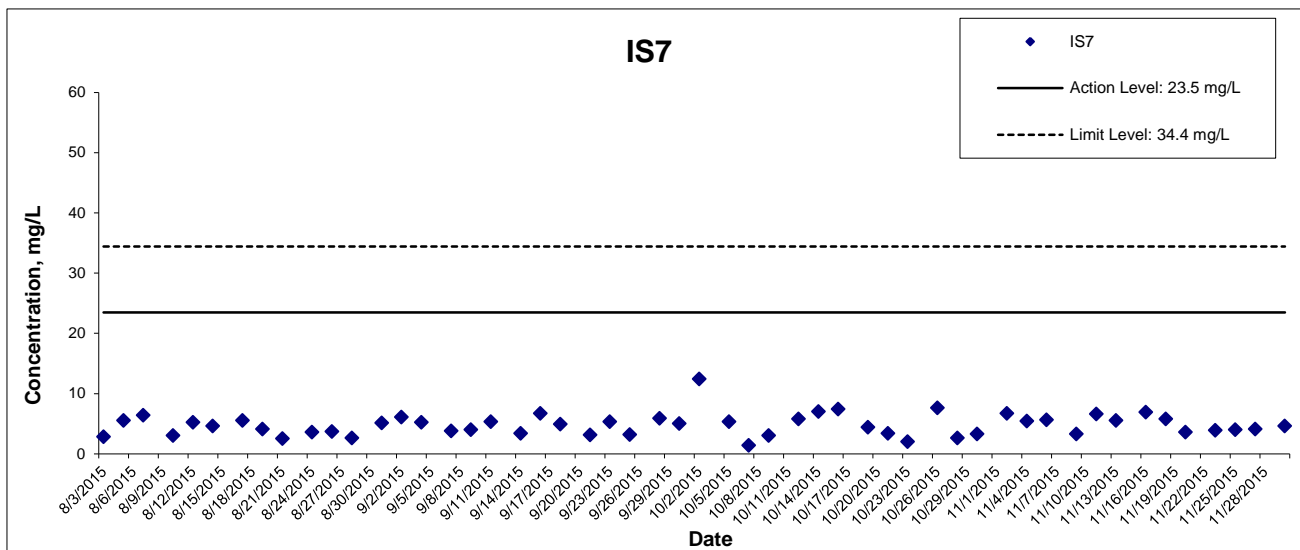
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HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
Monitoring Results



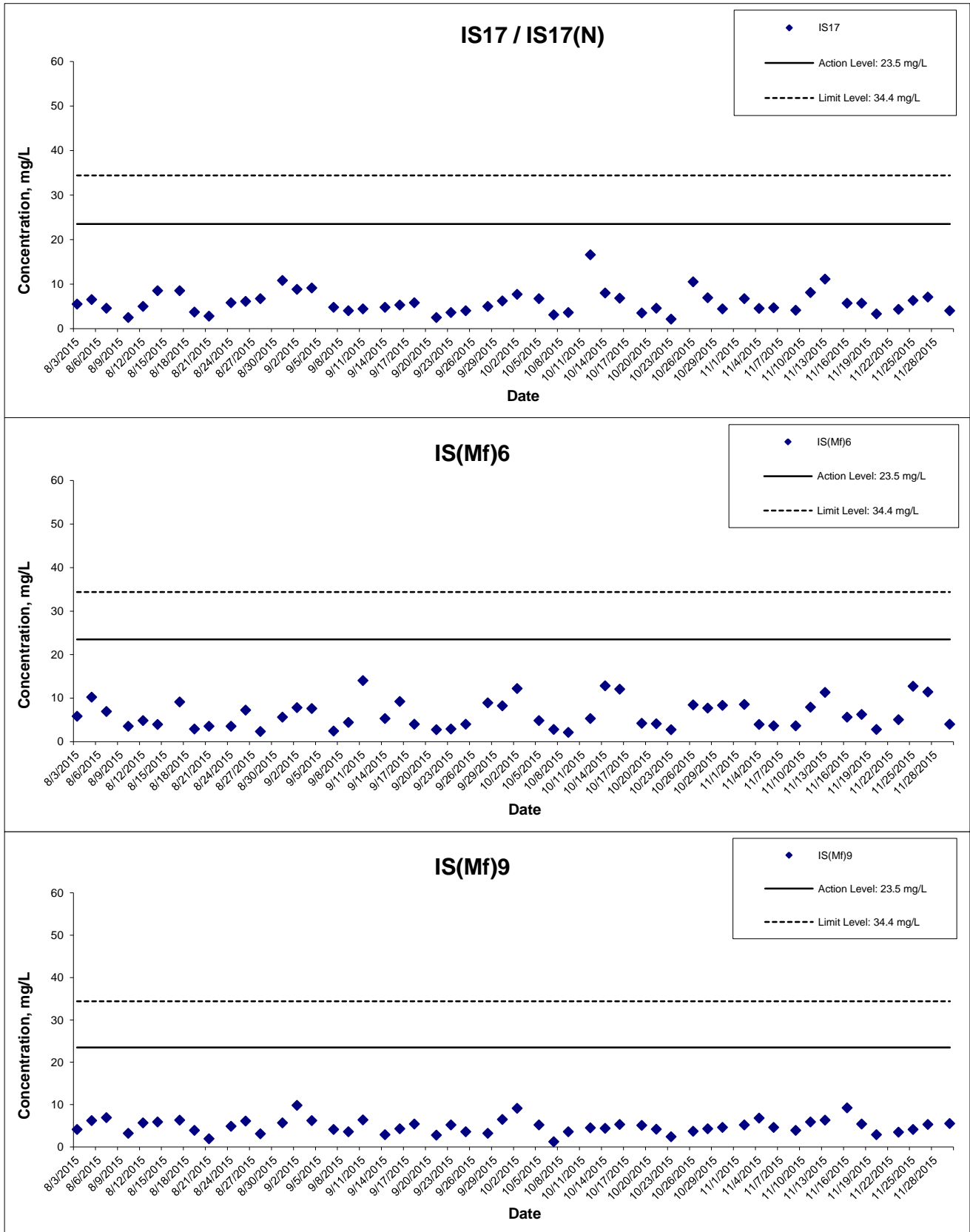
Suspended Solids at Mid-Ebb Tide



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Suspended Solids at Mid-Ebb Tide



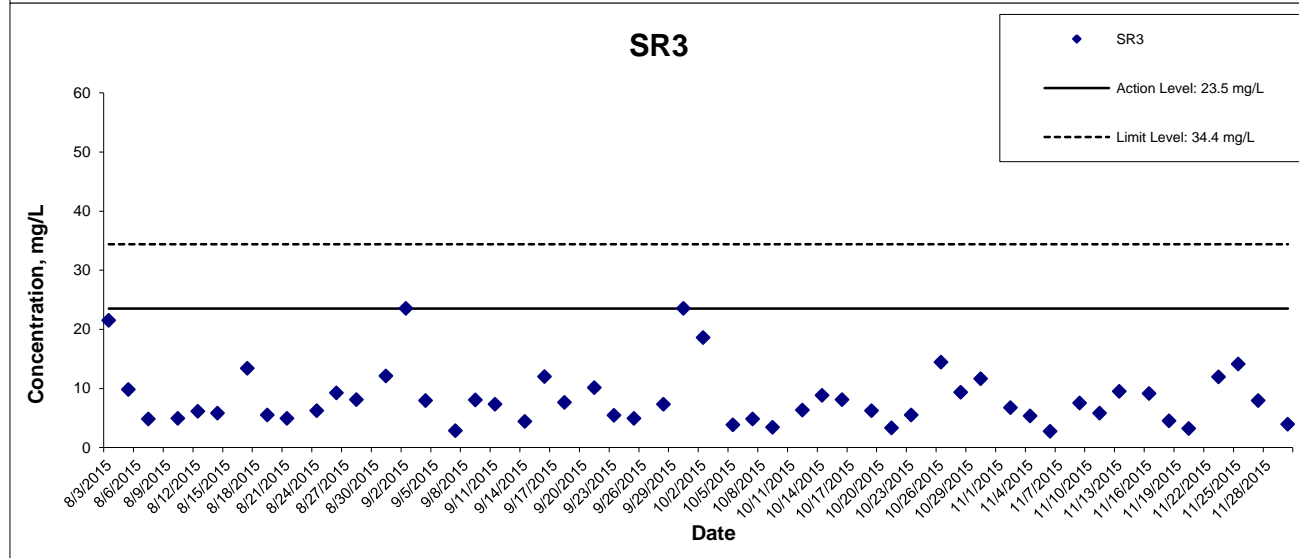
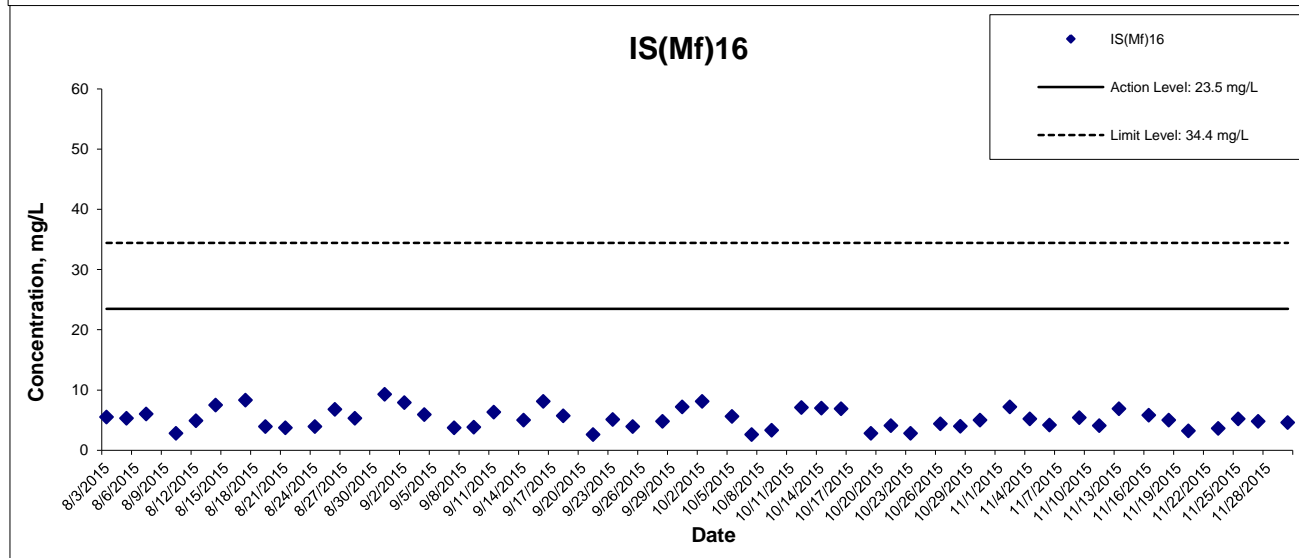
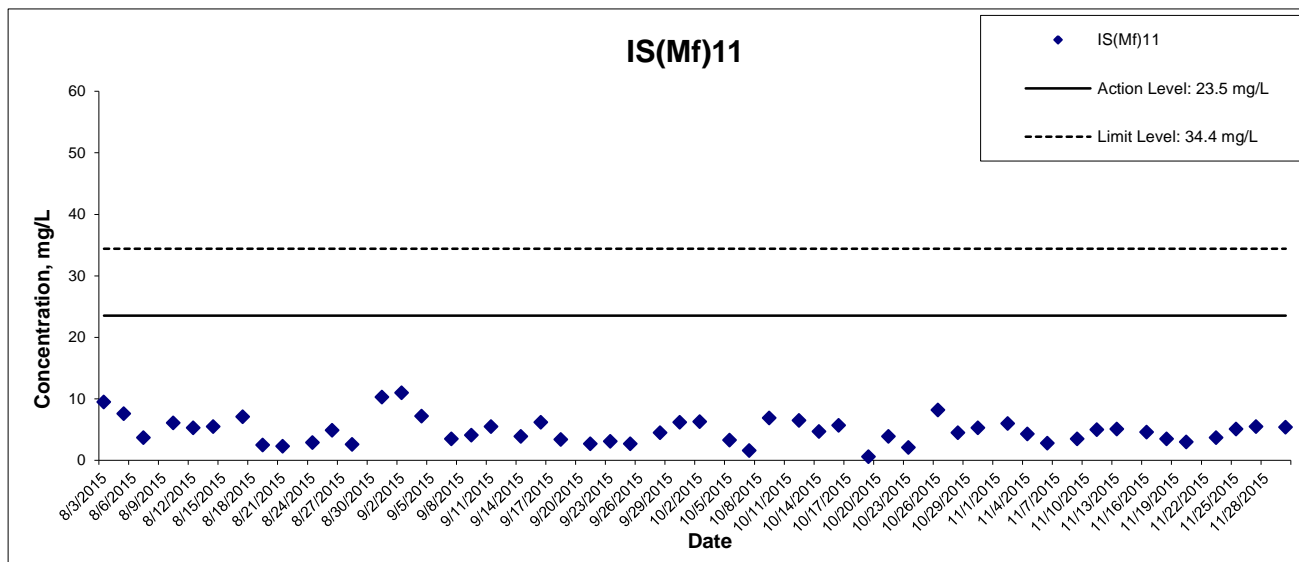
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 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality
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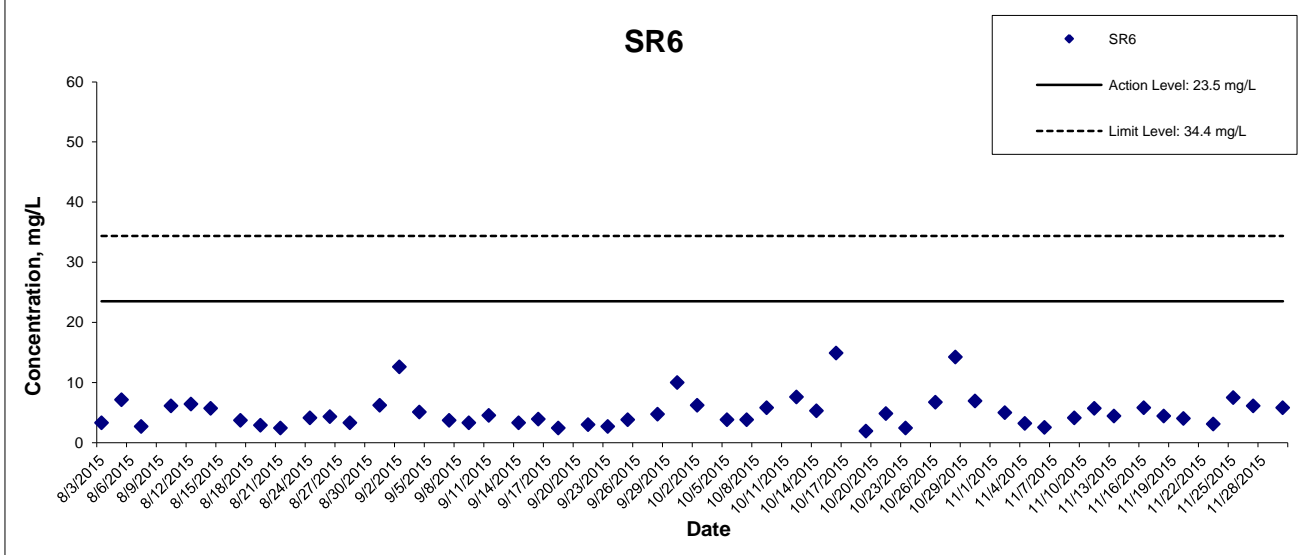
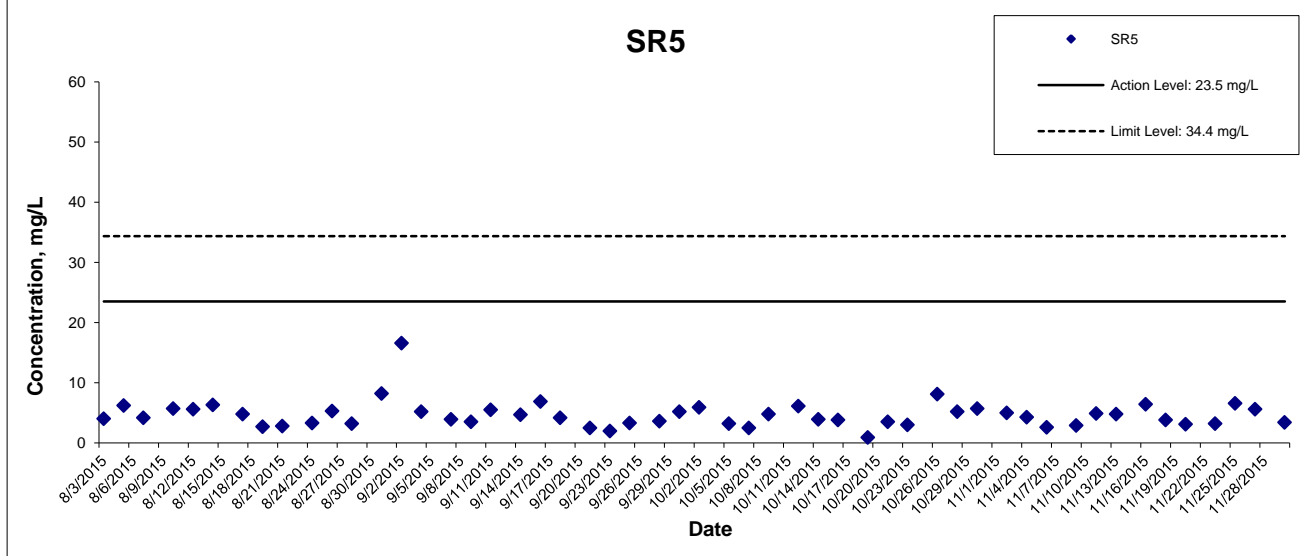
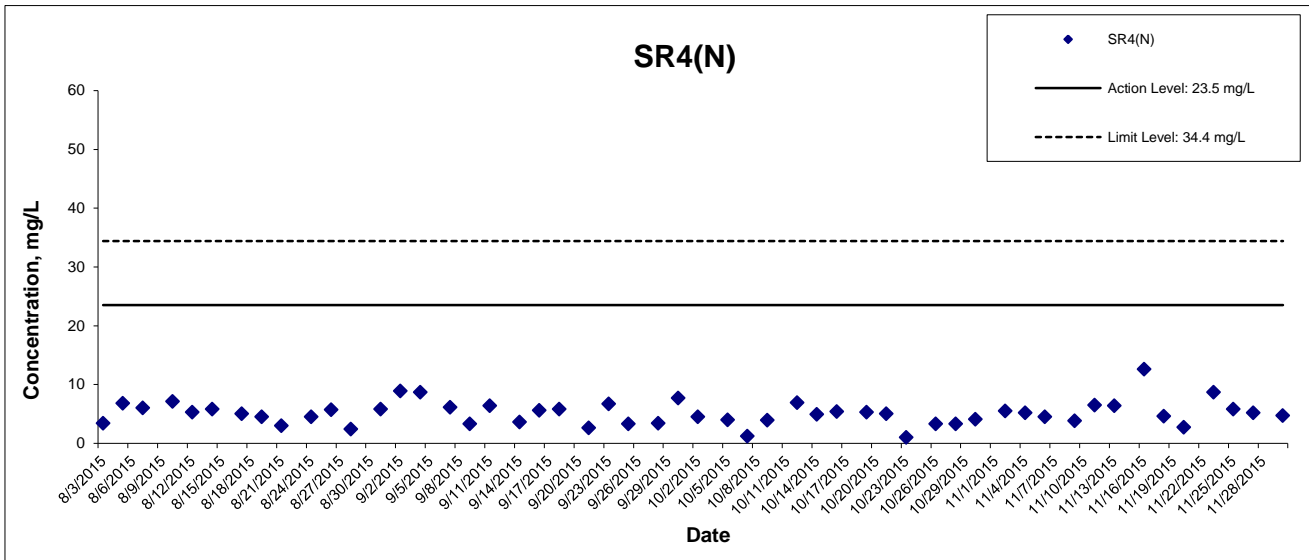


Suspended Solids at Mid-Ebb Tide



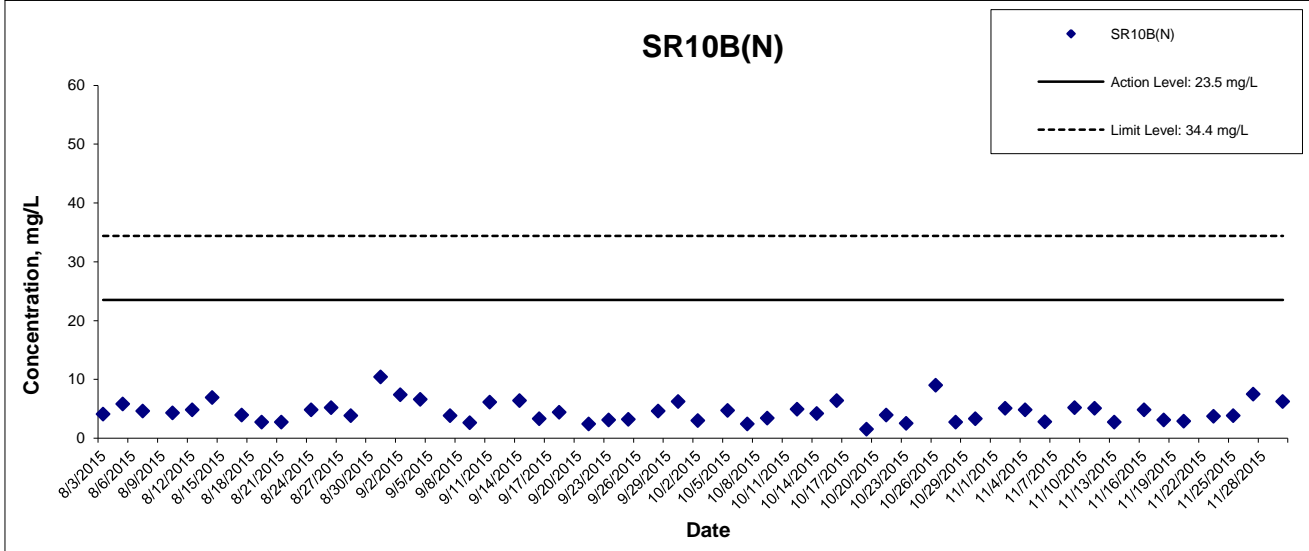
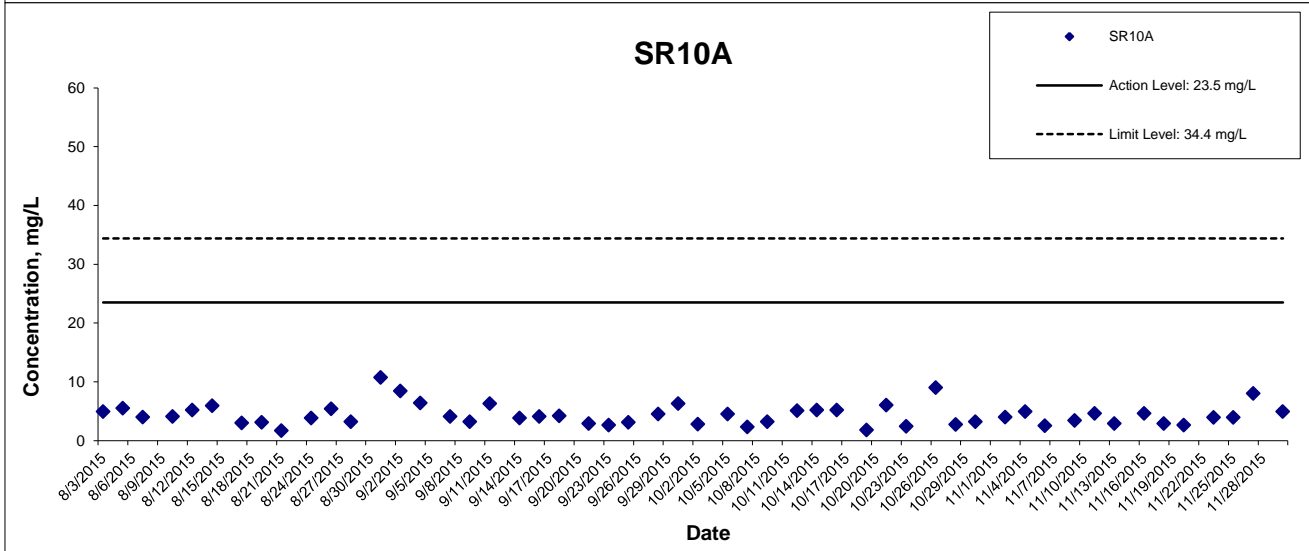
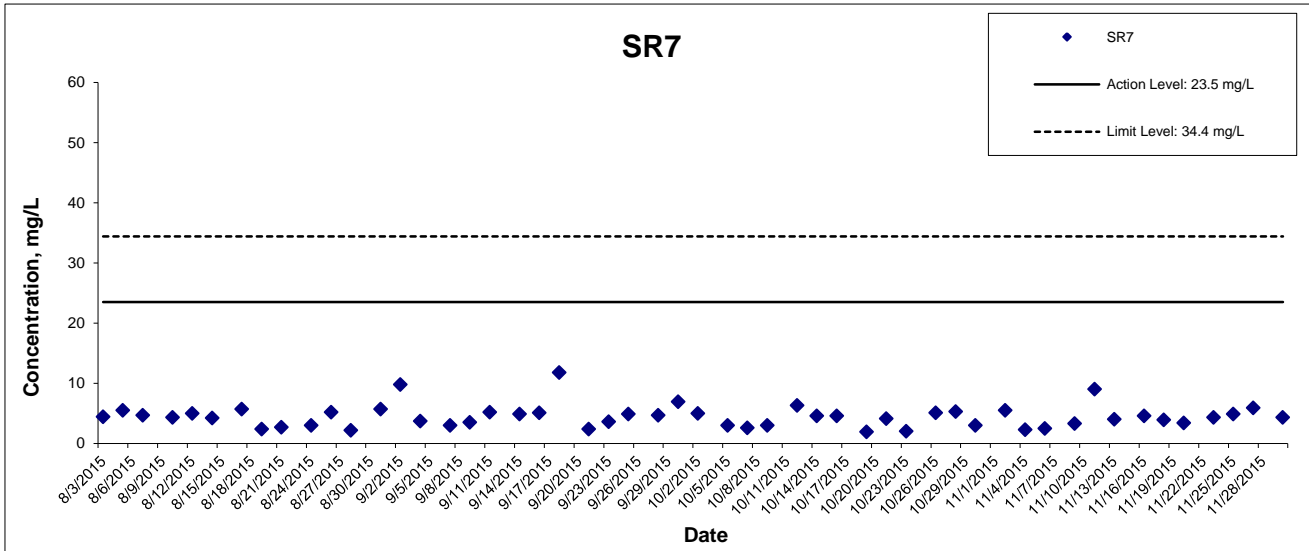
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Suspended Solids at Mid-Ebb Tide



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Suspended Solids at Mid-Ebb Tide



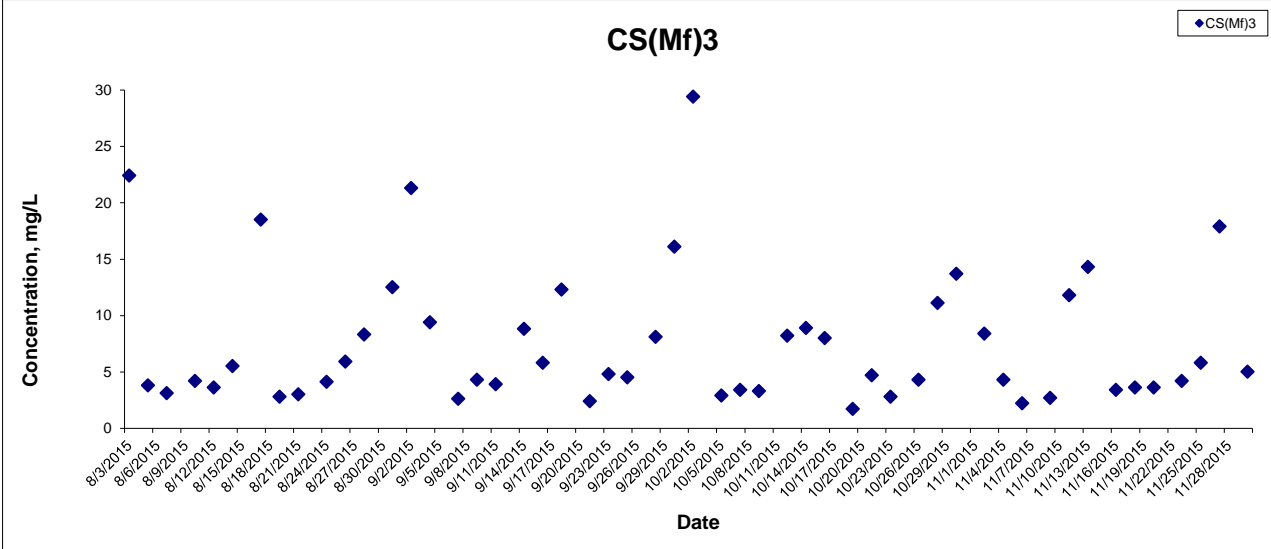
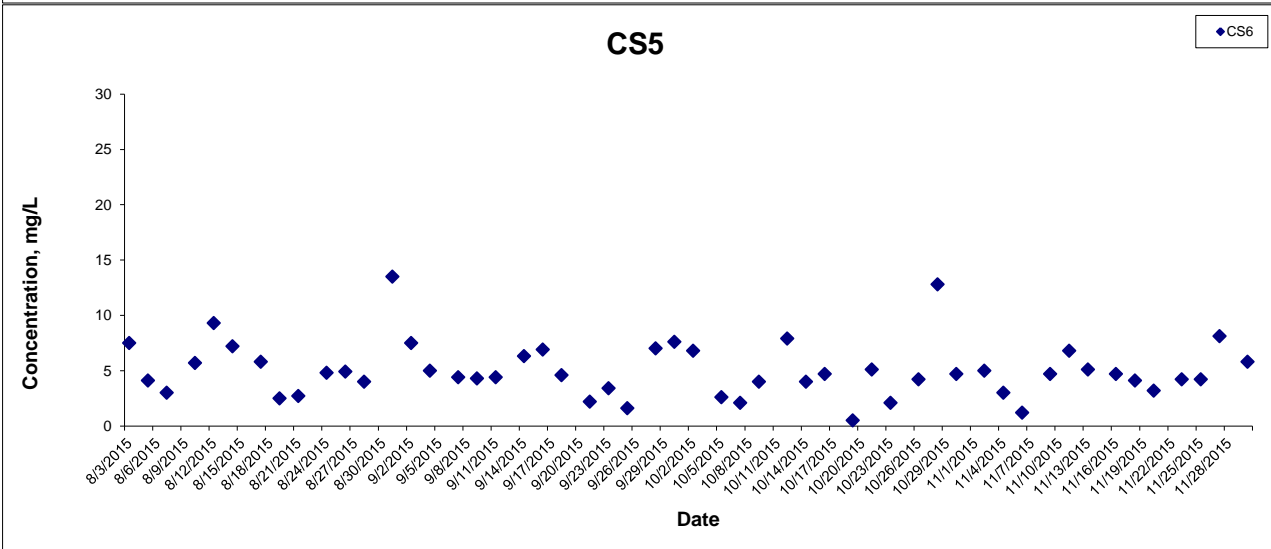
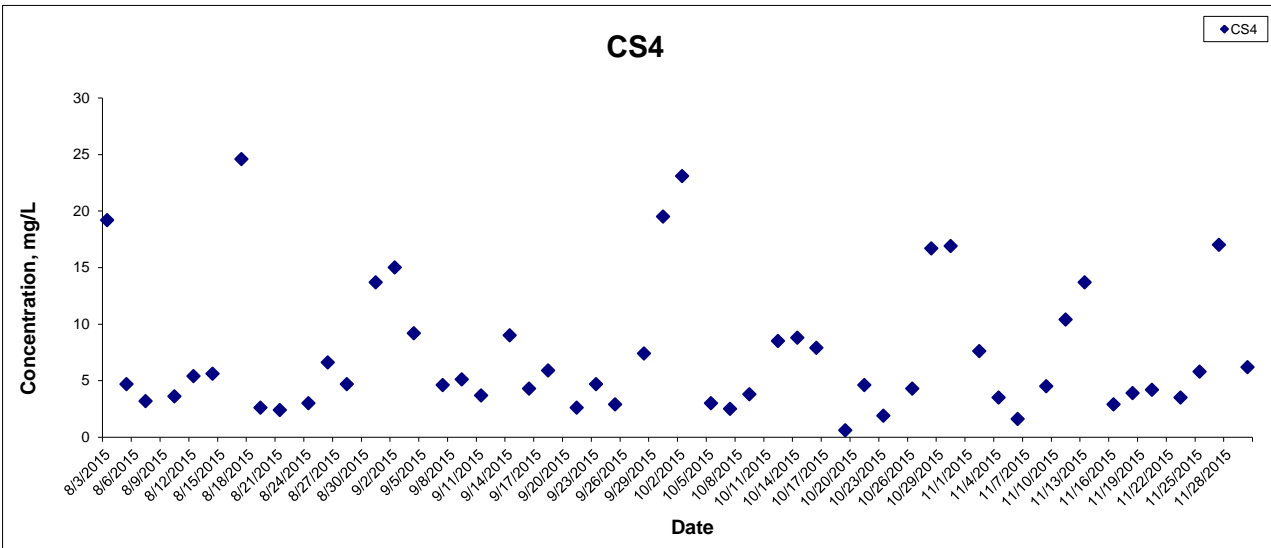
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**HONG KONG - ZHUHAI - MACAO BRIDGE
 HONG KONG BOUNDARY CROSSING FACILITIES
 - RECLAMATION WORKS**

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

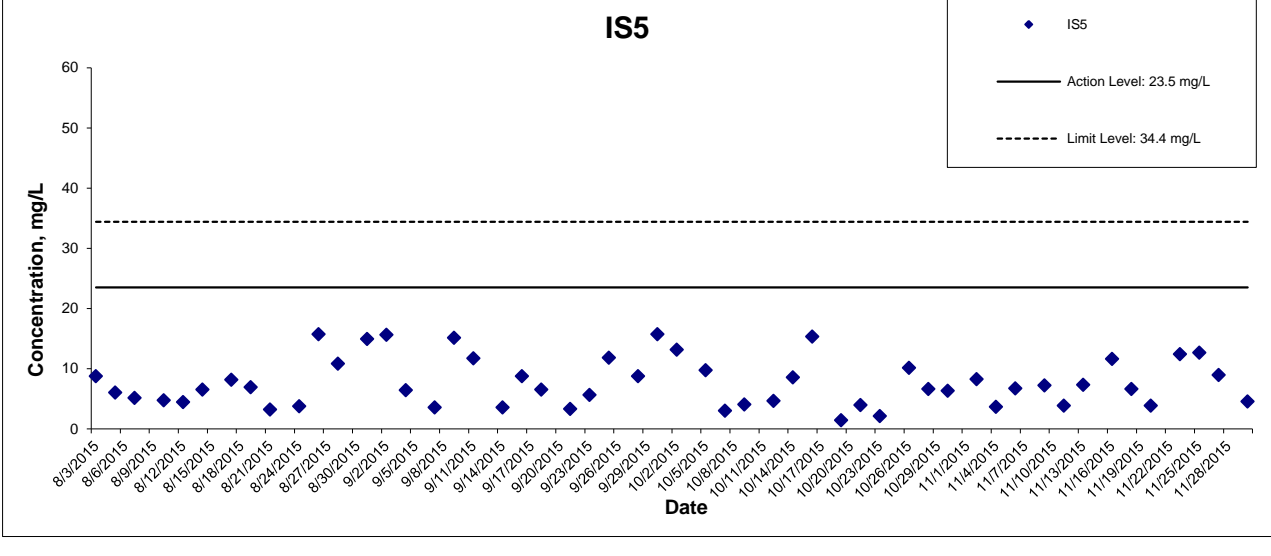
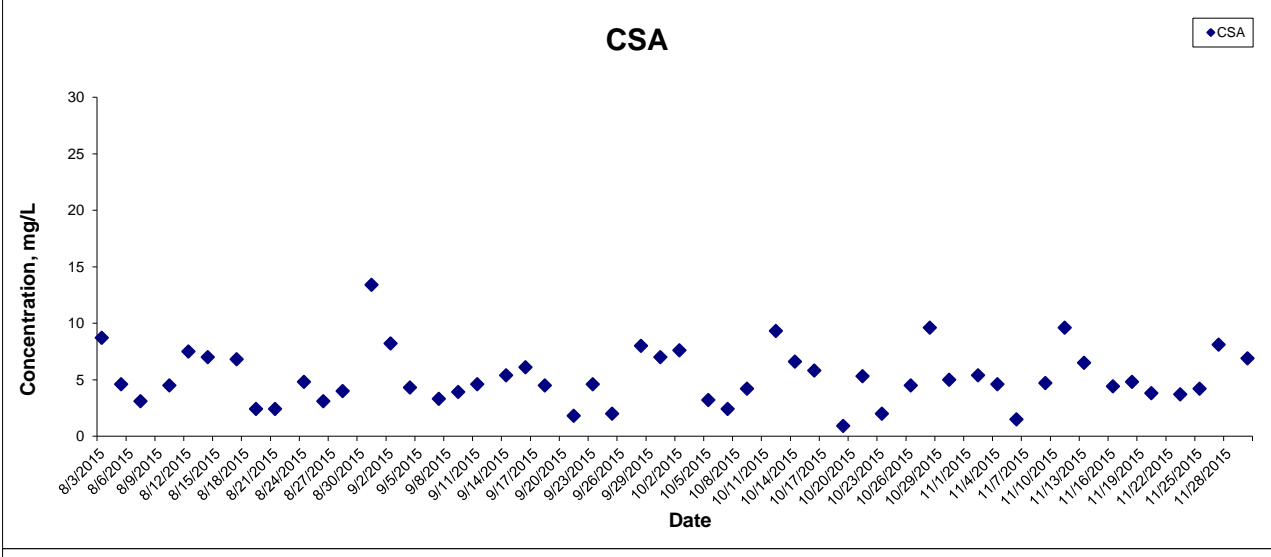
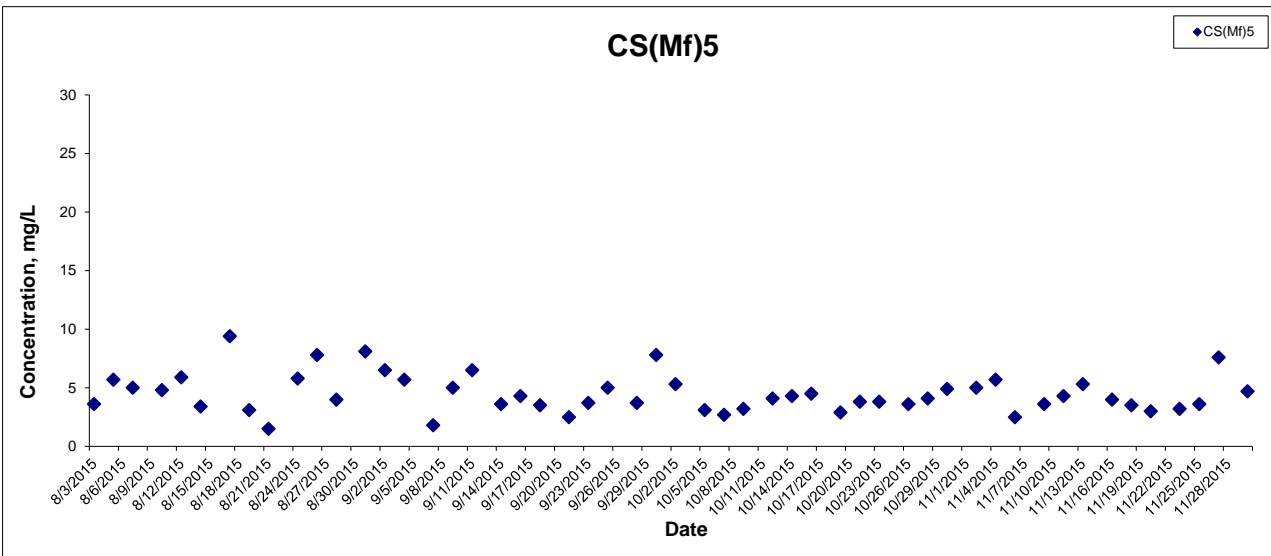


Suspended Solids at Mid-Flood Tide



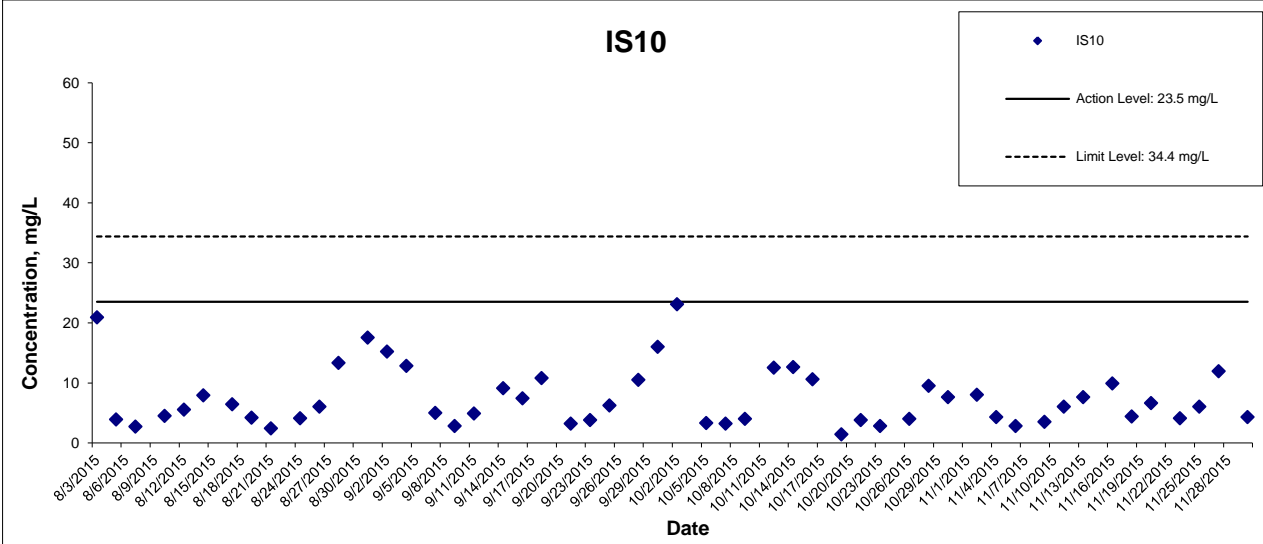
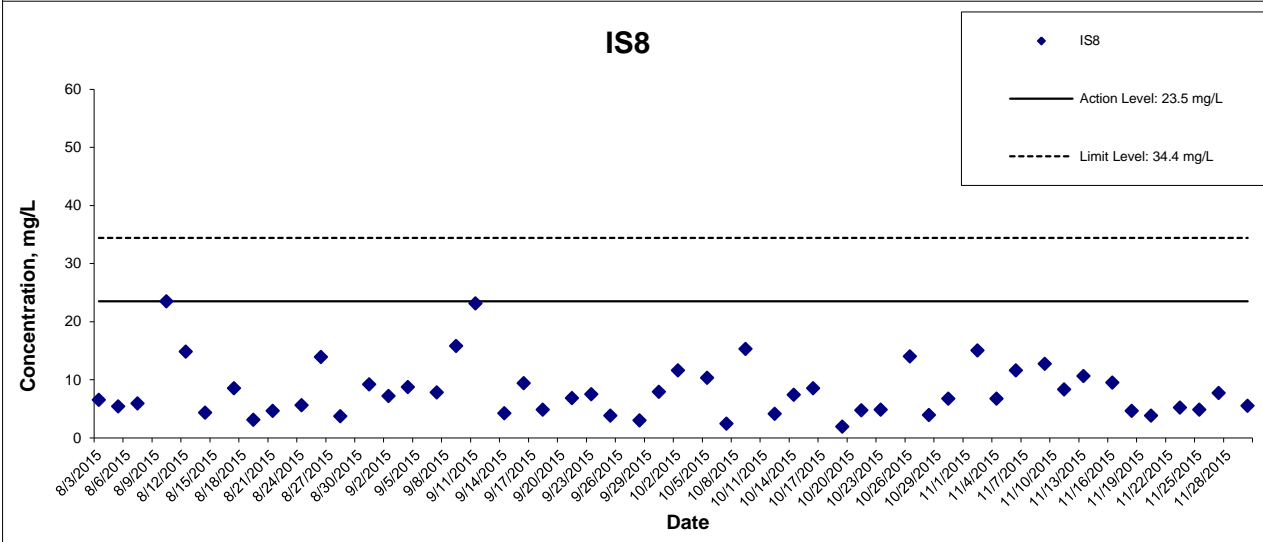
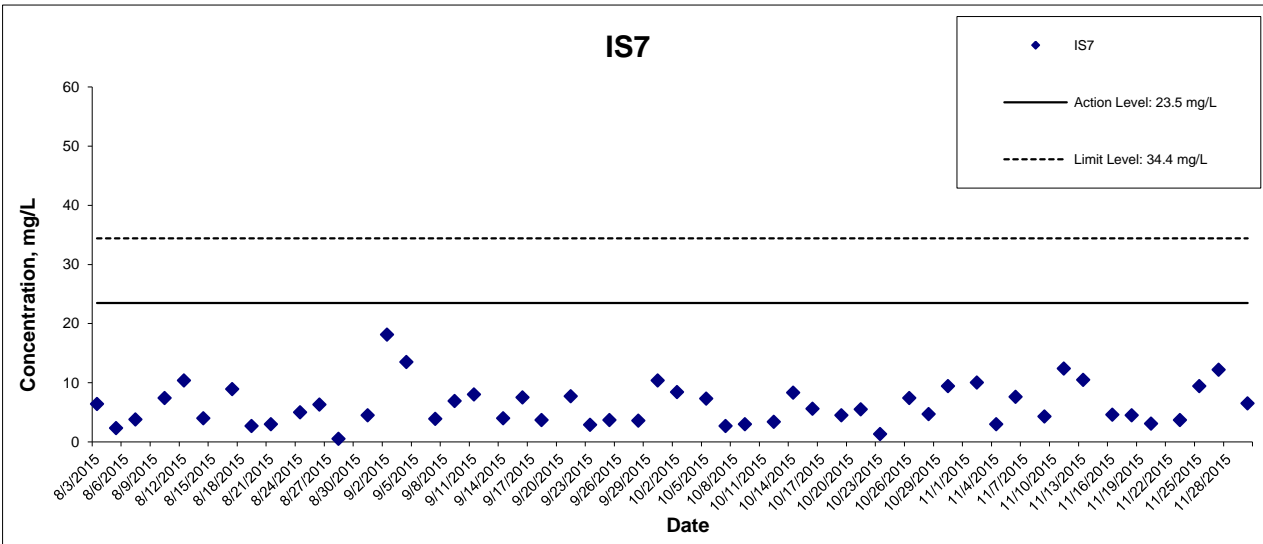
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Suspended Solids at Mid-Flood Tide



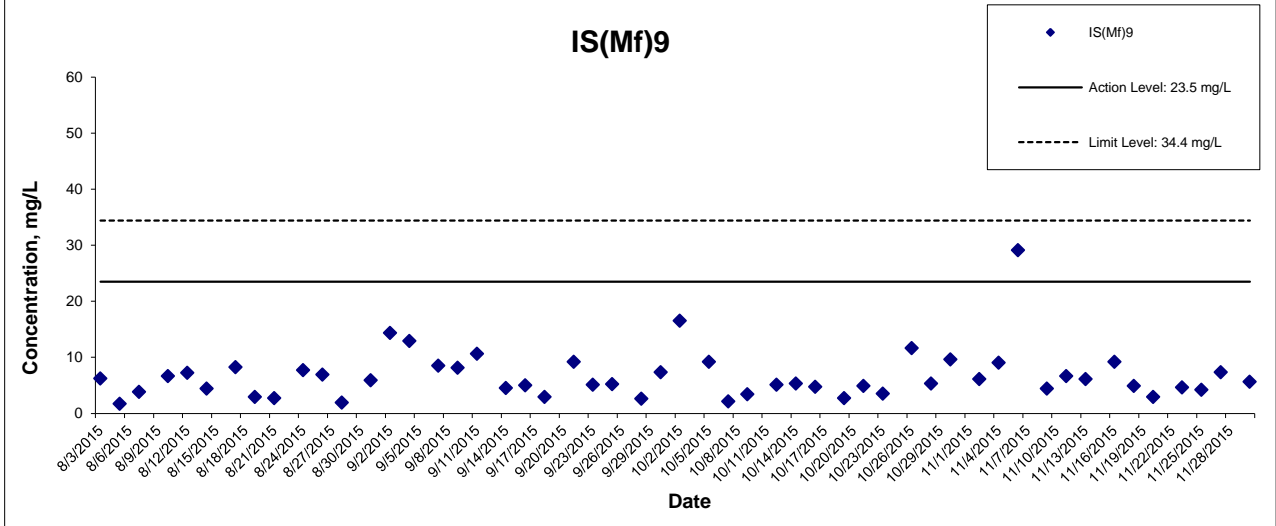
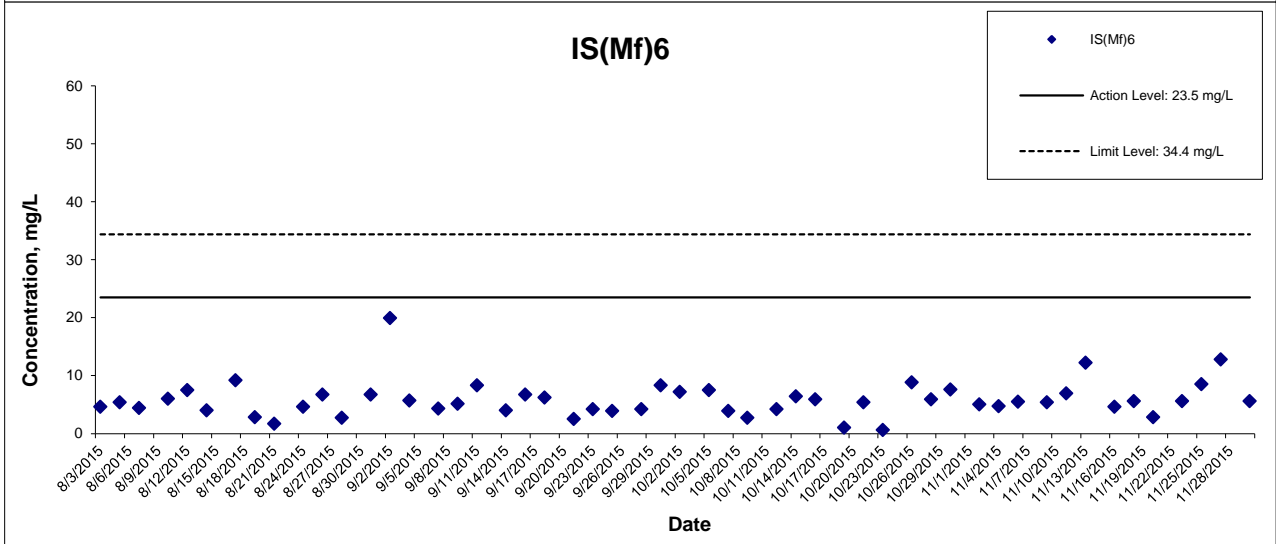
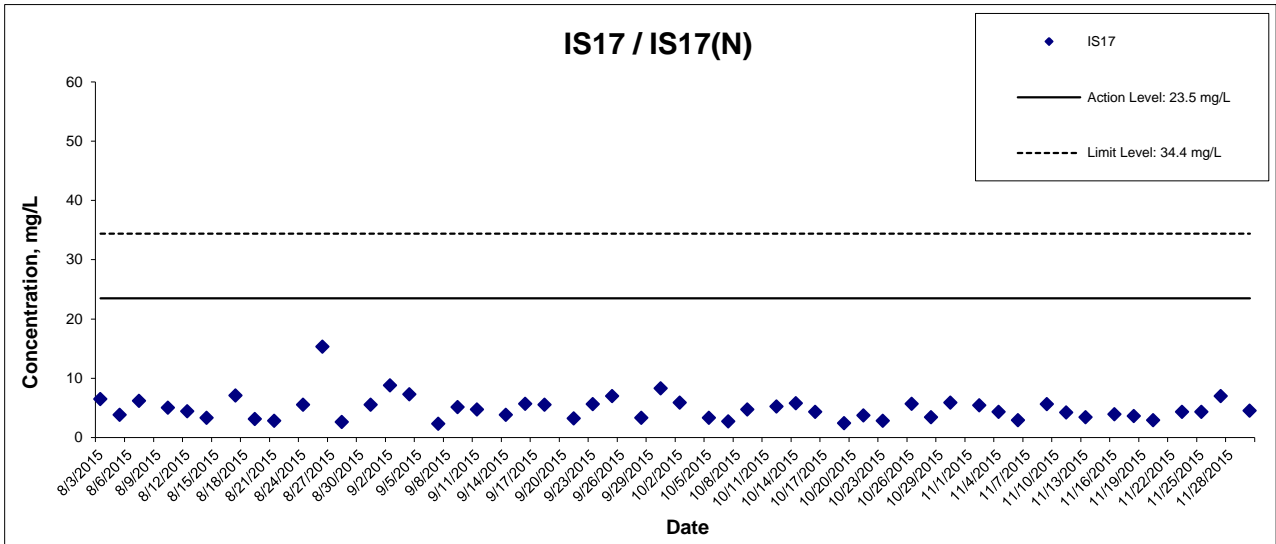
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Suspended Solids at Mid-Flood Tide



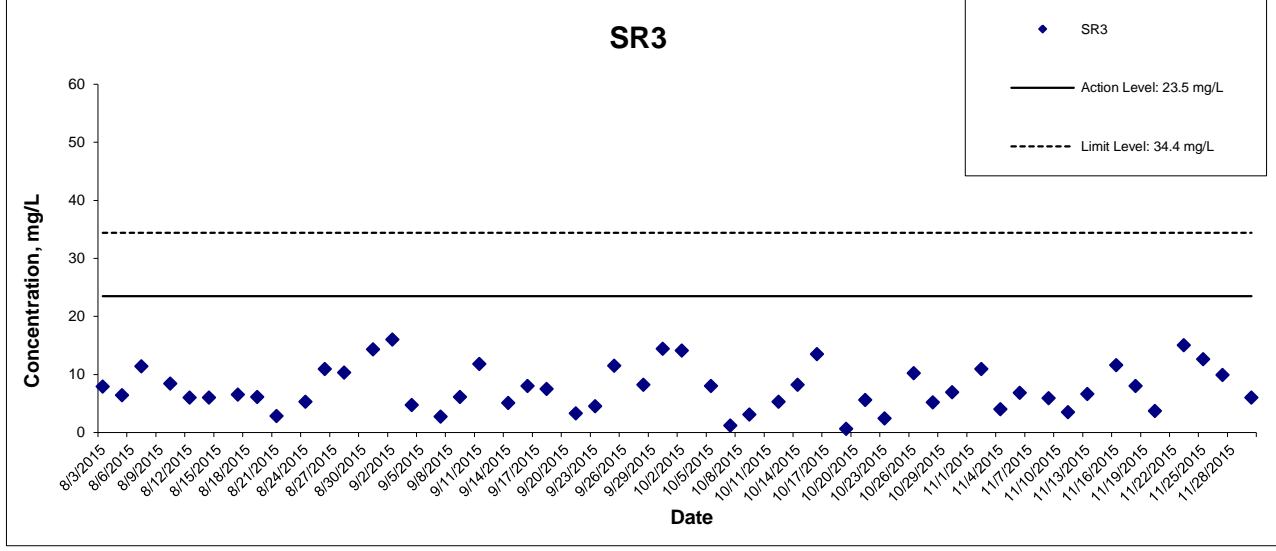
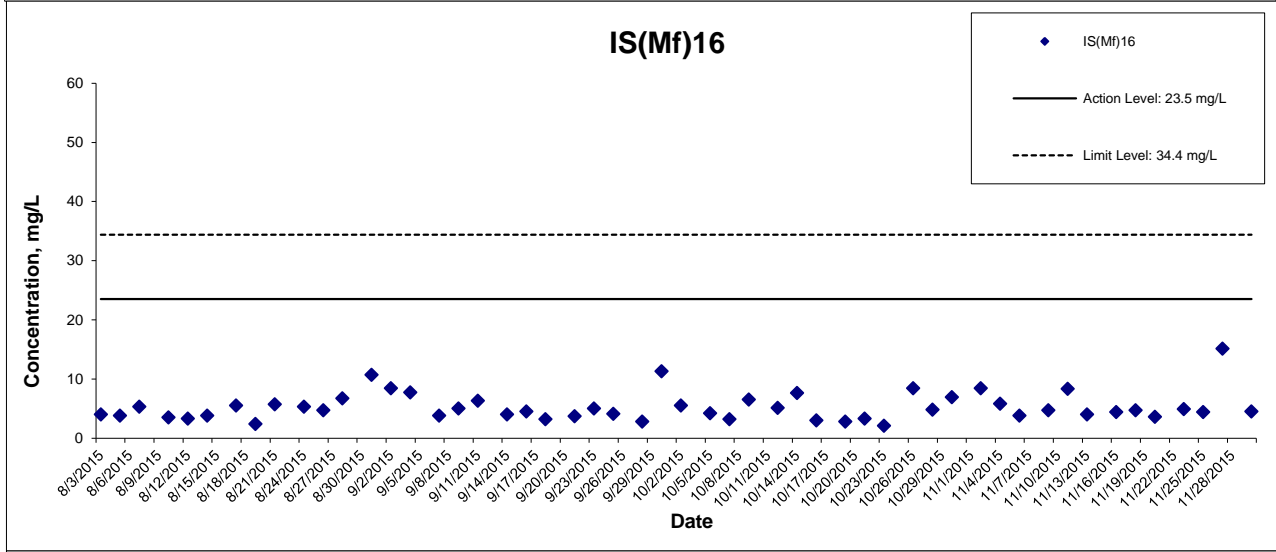
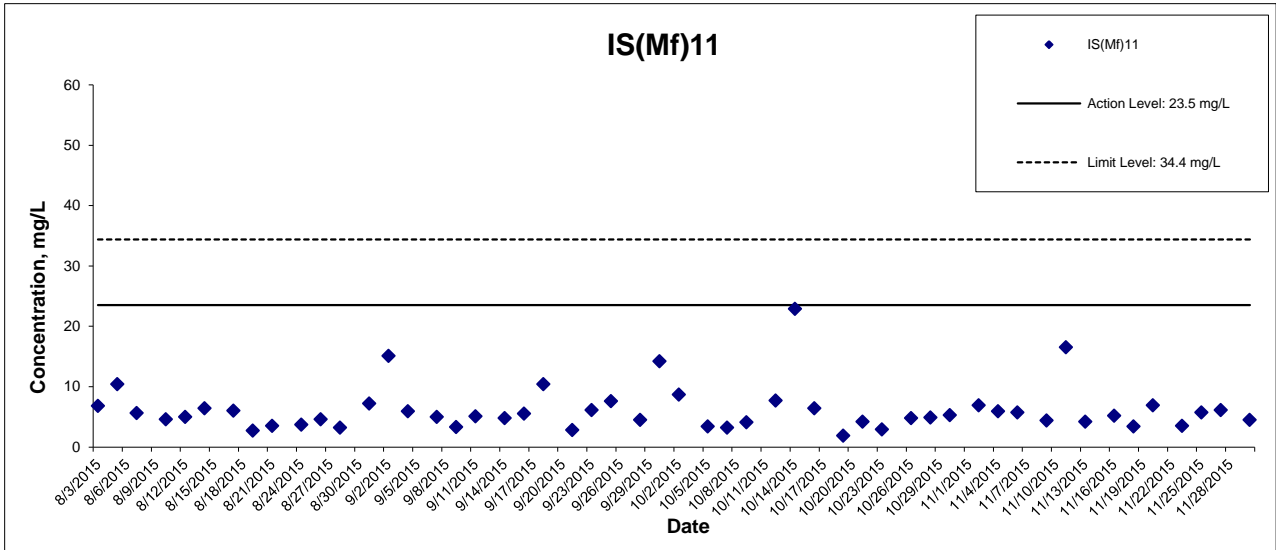
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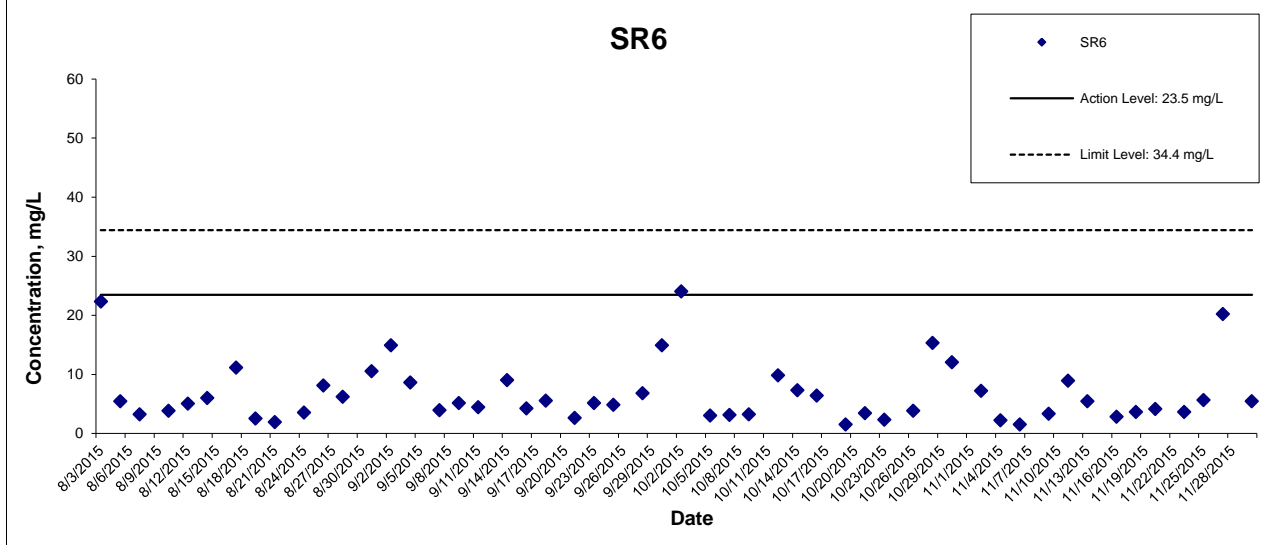
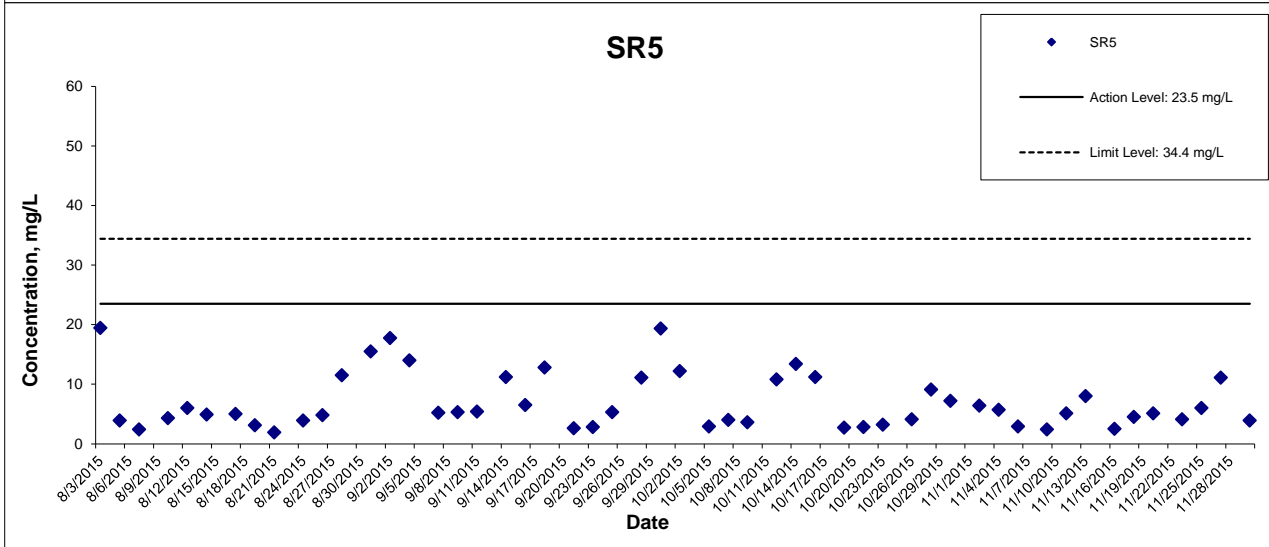
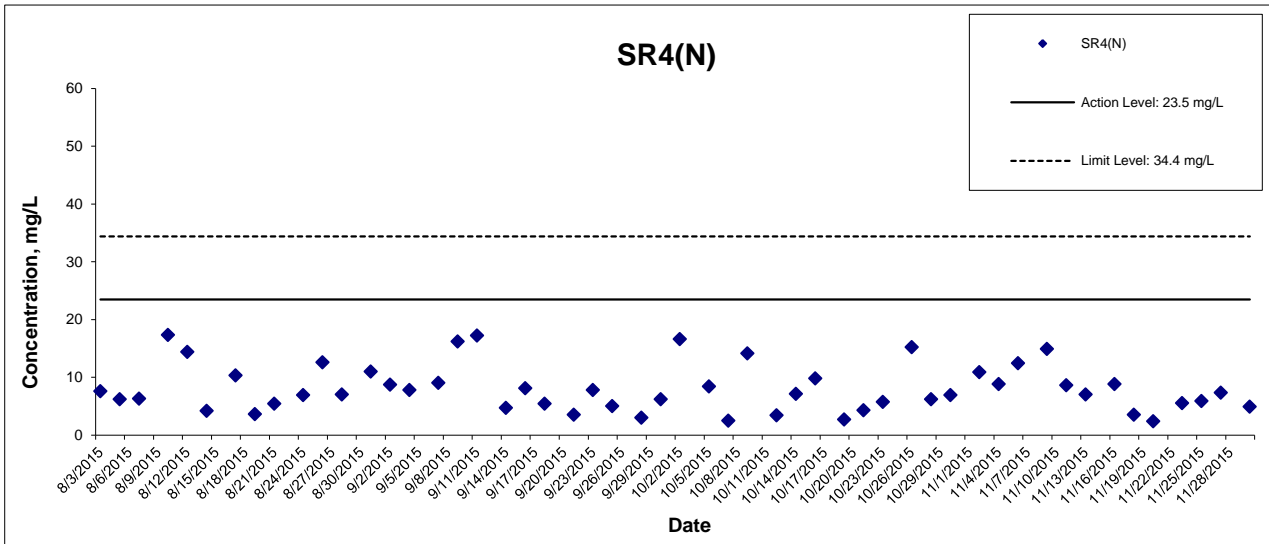
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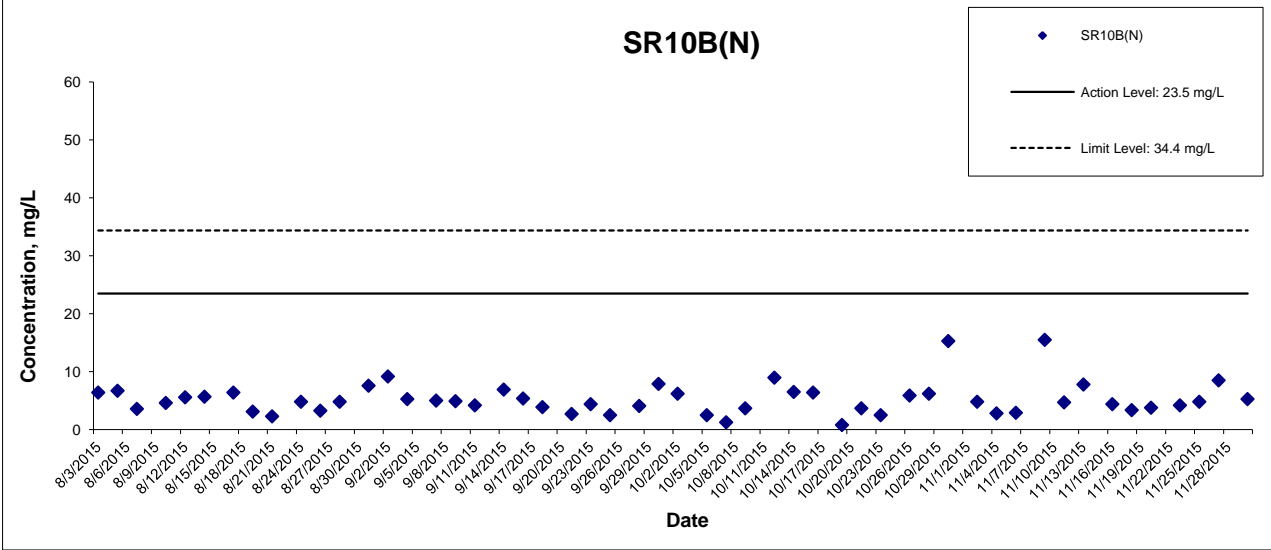
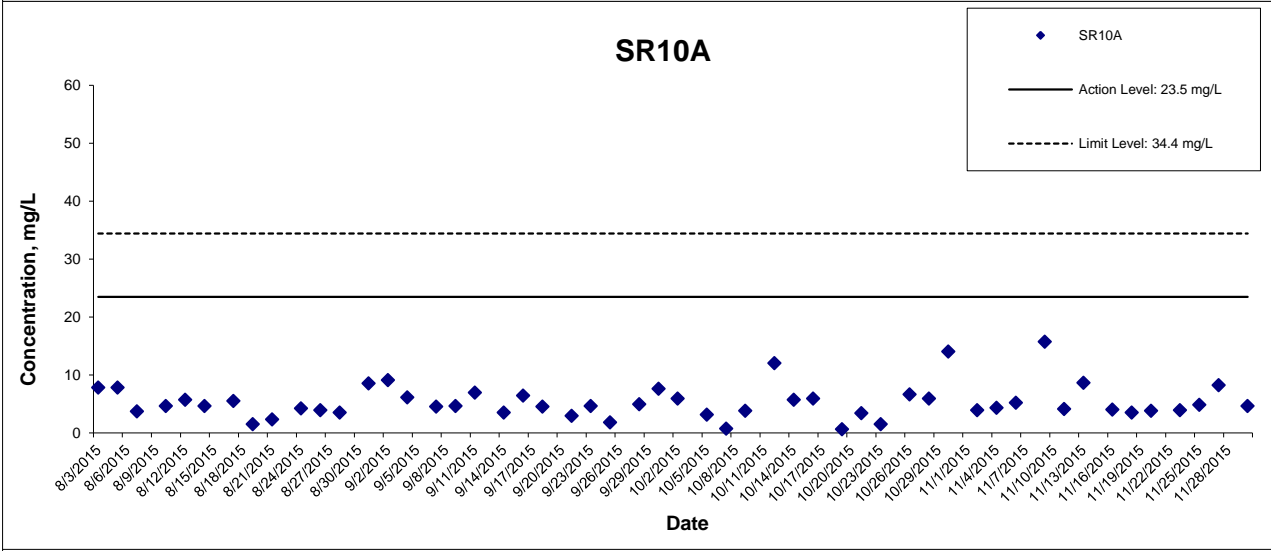
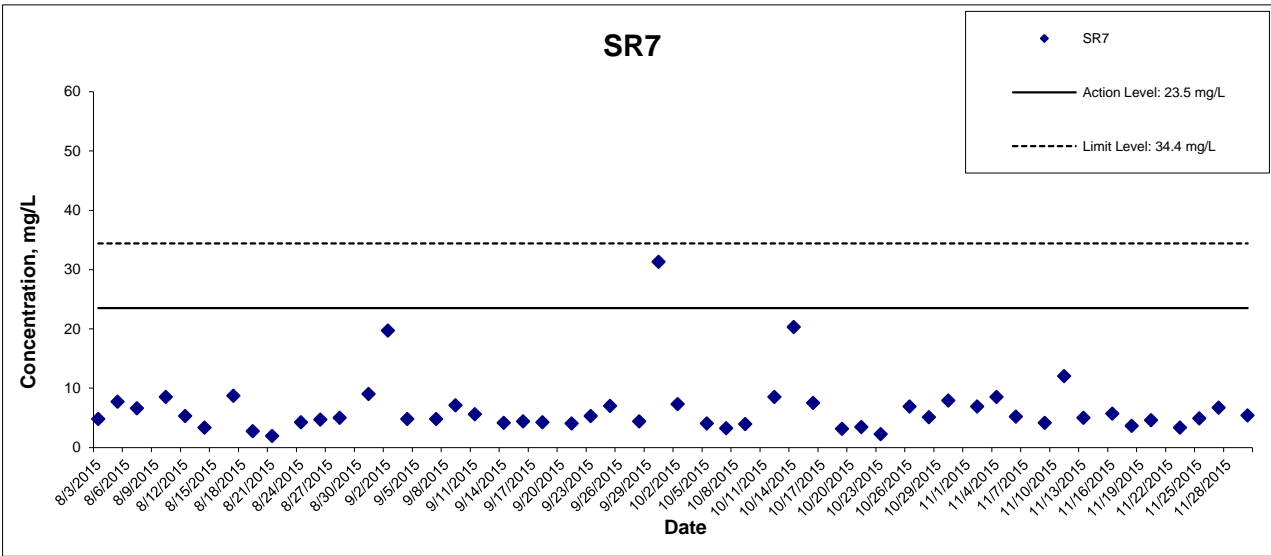
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Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities-Reclamation Works



September –
November 2015
Quarterly Report

Dolphin Impact Monitoring

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1. Introduction

In March 2012, construction for the Hong Kong-Zhuhai-Macao Bridge (HZMB) began in Hong Kong territorial waters. In Hong Kong, the HZMB comprises three projects; the Hong Kong Boundary Crossing Facilities (HKBCF) Project; the Hong Kong Link Road (HKLR) Project and; the Tuen Mun-Chek Lap Kok Link (TM-CLKL) Project. The HKBCF, the first of the HZMB projects to commence in Hong Kong, requires the total reclamation of approximately 149 hectares (ha); which consists of 130 ha for the HKBCF artificial island and 19 ha for the TM-CLKL southern landfall (Fig. 1).

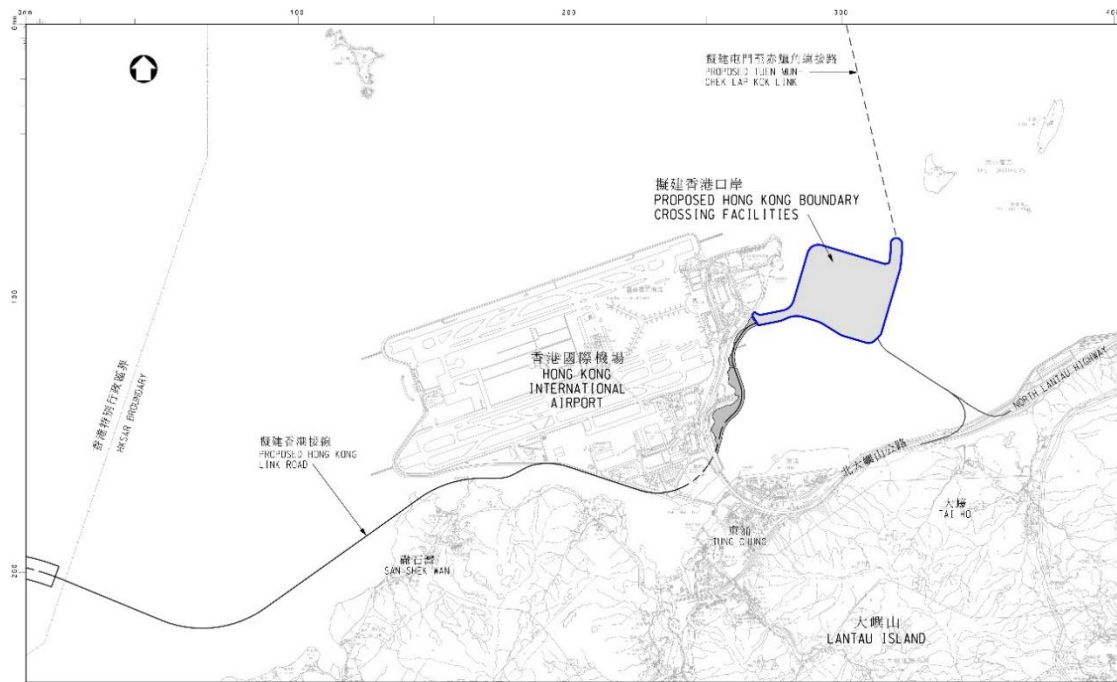


Figure 1. The Hong Kong Boundary Crossing (HKBCF) Reclamation Sites, North Lantau, Hong Kong (http://www.hzmb.hk/eng/img/overview/about_overview03_p01l.jpg)

The EM&A Manuals and Environmental Permits (EP) associated with all three projects have special provision for Chinese white dolphins (CWD) as they occur regularly in the waters which will be affected by the HZMB development. This report comprises the 15th quarterly (September – November 2015) summary of data associated with the impact monitoring conducted for contract HY/2010/02, HKBCF-Reclamation Works. The format of this report follows as closely as possible the outline provided for the Baseline Monitoring Report. The baseline monitoring was conducted during the same period as this quarterly report (in 2011) and is comparable to this reporting season. Where appropriate, information from previous reports, data provided by the Hong Kong Highways Department (HyD) and data from the Agriculture, Fisheries and Conservation Department (AFCD) Marine Mammal Annual Monitoring reports have also been incorporated¹

¹http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

2. OBJECTIVES AND METHODOLOGY

2.1. Objectives of the Present Study

The EM&A Manual for HZMB states that “A dolphin monitoring programme at North Lantau and West Lantau waters, in particular the dolphin sighting hotspots (e.g. Brothers Islands) and areas where juveniles have been sighted (e.g. West Lantau waters), should be set up to verify the predictions of impacts and to ensure that there are no unforeseen impacts on the dolphin population during construction phase”. For HKBCF the study area known as West Lantau was not included in the site specific EM&A Manual for construction phase survey work. As such, for HKBCF, vessel-based dolphin surveys to monitor impact are conducted in the areas known as Northeast Lantau (NEL) and Northwest Lantau (NWL). These surveys are conducted twice monthly and for the duration of the construction phase of HKBCF. The HZMB baseline study (incorporating HKBCF, TM-CLK and HKLR phases of the bridge development), indicates that the data gathered from these surveys are intended to monitor impacts by;

- providing ongoing assessment of the spatial and temporal distribution patterns and habitat use of CWD during the construction phase of the HKBCF project.
- identifying individual CWD by their natural marks, coloration and scars for comparison with the baseline data and to assess individual distribution patterns and habitat use.
- comparing impact survey data to that gathered during the baseline data period so that any changes deemed to be of a significant nature can be assessed and mitigated appropriately.

The baseline monitoring report includes distribution analysis, encounter rate analysis, behavioural analysis, quantitative grid analysis and ranging pattern analysis. Protocols for data interpretation and analyses methods were provided in the baseline monitoring report and are used herein solely for comparative purposes.

2.2. Line-transect Vessel Surveys

The co-ordinates for the transect lines and layout map were provided by AFCD, however, as HZMB construction works have progressed, some transect lines have been blocked, temporarily or permanently, either by the working vessels or the bridge structure itself. These are detailed in monthly submissions to ENPO. For this reporting quarter, the surveys were conducted over 23 transects (totalling ~108km) which were surveyed twice per month by boat (Table 1; Figure 2). Line transect surveys should be conducted systematically (Buckland *et al* 2001). When the start of a transect line is reached, “on effort” survey begins. When the vessel is travelling between transect lines and to and from the study area, it is deemed to be “off effort”. As per EM&A protocols, the boat travels at a speed of 7-8 knots (13-15 km/hr), except during some periods when tide and current flow exceeds 7 knots and thus the vessel travels at the same speed as the current. A minimum of four marine mammal observers (MMOs) are present on each survey, rotating through four positions; observers (2), data recorder (1) and rest (1). Rotations occur every 30 minutes or at the end of dolphin sightings. The data recorder enters vessel effort, observer effort, weather and sightings information directly onto the programme Logger² and is not part of the observer team. This is not ideal line transect survey procedure, however, the baseline study was conducted this way thus it has been requested that only two observers be used for impact surveys.

When the boat is travelling along the transect line (“on effort”), observers search the area in front of the boat between 90° and 270° abeam (bow being 0°). When a

² Logger is purpose built software which automatically collects and stores GPS data and contains a user configurable interface for the manual entry of the data required for line transect and other cetacean research studies (Gillespie *et al* 2010).

group of dolphins is sighted, position, bearing and distance data are recorded immediately onto Logger and, after a short observation, an estimate is made of group size³. This is an “on effort” sighting. These input parameters are linked to the time-GPS-ships data which are automatically stored in Logger throughout the survey period. In this manner, information on heading, position, speed, weather, effort and sightings are stored in an interlinked database which can be subsequently used in a variety of analytical software packages.

Once the vessel leaves the transect line, it is deemed to be “off-effort”. The dolphins are approached with the purpose of taking high resolution images. Then the vessel returns to the transect line at the point of departure and is again “on effort”. If another group of dolphins is seen while travelling back to the transect line, or when with the first group of dolphins, the sightings are considered as “opportunistic” and noted accordingly.

2.2.1 Baseline Survey Data and Data from Impact Monitoring

Data from the baseline was provided by the Highways Department (January 2013). These data were extracted from the original baseline survey as the baseline survey encompassed a wider area than that stipulated in the EM&A Manual for the HKBCF Project, as such, a subset of the baseline data set was provided and appropriate rates and densities recalculated from the data provided. For impact monitoring, detailed datasets are available online via the ENPO website. A summary of the survey schedule and transects completed is referenced in Annex I.

³ Group size is defined as an aggregation of dolphins within 100m of each other involved in similar behaviour (Connor *et al* 1998).

Table 1. The Dolphin Monitoring Transect Co-Ordinates for HKBCF Monthly Monitoring

ID	X	Y	Long	Lat	ID	X	Y	Long	Lat
1	804671	815456	113.87029	22.2777	12	815542	824882	113.97565	22.3630
1	804671	831404	113.86998	22.4217	13	816506	819480	113.98507	22.3142
2	805475	815913	113.87808	22.2818	13	816506	824859	113.98501	22.3628
2	805477	826654	113.87790	22.3788	14	817537	820220	113.99507	22.3209
3	806464	819435	113.88762	22.3136	14	817537	824613	113.99502	22.3606
3	806464	822911	113.88755	22.3450	15	818568	820735	114.00507	22.3256
4	807518	819771	113.89783	22.3167	15	818568	824433	114.00503	22.3589
4	807518	829230	113.89766	22.4021	16	819532	821420	114.01442	22.3317
5	808504	820220	113.90740	22.3208	16	819532	824209	114.01439	22.3569
5	808504	828602	113.90725	22.3965	17	820451	822125	114.02333	22.3381
6	809490	820466	113.91697	22.3230	17	820451	823671	114.02332	22.3521
6	809490	825352	113.91688	22.3671	18	821504	822371	114.03356	22.3404
7	810499	820880	113.92675	22.3268	18	821504	823761	114.03354	22.3529
7	810499	824613	113.92669	22.3605	19	822513	823268	114.04334	22.3485
8	811508	821123	113.93654	22.3290	19	822513	824321	114.04333	22.3580
8	811508	824254	113.93649	22.3572	20	823477	823402	114.05270	22.3497
9	812516	821303	113.94632	22.3306	20	823477	824613	114.05269	22.3606
9	812516	824254	113.94628	22.3573	21	805476	827081	113.87788	22.3827
10	813525	820827	113.95611	22.3263	21	805476	830562	113.87781	22.4141
10	813525	824657	113.95607	22.3609	22	806464	824033	113.88752	22.3552
11	814556	818853	113.96616	22.3049	22	806464	829598	113.88742	22.4054
11	814556	820992	113.96613	22.3278	23	814559	821739	113.96614	22.3346
12	815542	818807	113.97573	22.3081	23	814559	824768	113.96610	22.3619

The total transect length for NEL and NWL combined is 108km (approved 19-08-2015)

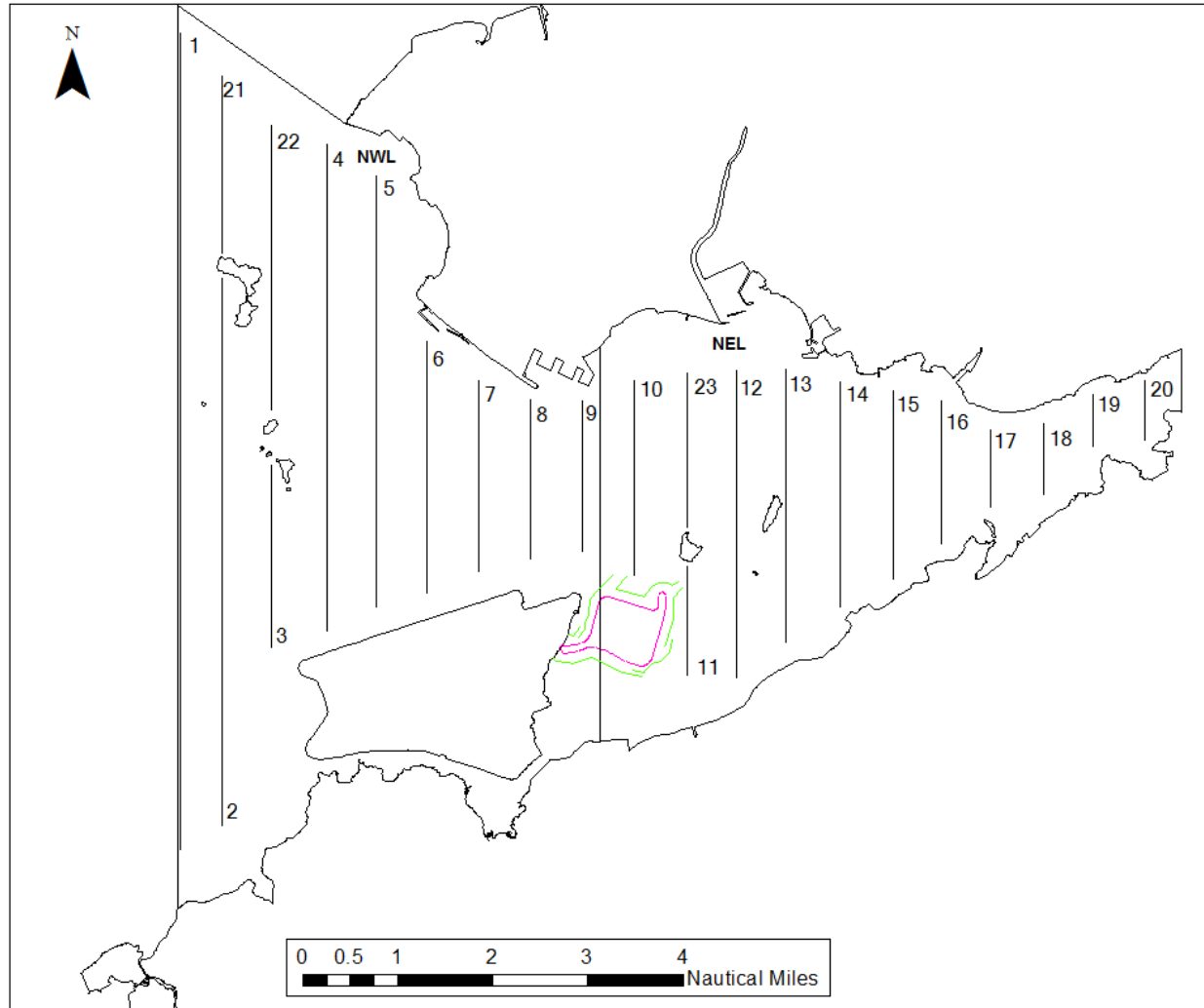


Figure 2 Location of Transect Lines for Impact Monitoring during HKBCF (modification approved 19-08-2015)

2.3. Photo-identification

When a dolphin(s) is sighted, the vessel leaves the transect line and slowly approaches the group or individual. Attempts are made to photograph every individual sighted although close approaches to mother and calf pairs are not attempted. Digital SLR cameras (Nikon D90; D7100) using long lenses (Nikor 80-400mm and fixed length 300mm) are used to obtain high resolution images. Effort is made to ensure consistency of image quality, e.g., no shadow and at an angle perpendicular to the dorsal fin. Polarising filters are used to minimise glare. In this manner, the best image clarity is achieved and image sorting and matching is more consistent. Images are sorted according to clarity and presence/absence of identifying features (nicks /cuts/deformities/injury/pigmentation). Only images deemed to be of suitable quality and as containing sufficient markings for unambiguous identification are included in the photo-identification catalogue. A recent review of photo identification techniques was referred to ensure that current protocols for this monitoring conform to internationally recognised best practises. Recommendations from this review will be considered for future analyses (Urian *et al* 2014).

2.4. Data Analyses

2.4.1. Distribution pattern analysis

Dolphin sightings data are mapped in the Geographic Information System (GIS) ArcView© 10.3.

2.4.2. Encounter rate analysis

For this report, the baseline encounter rates were re-calculated using the revised data provided rather than quoting directly from the baseline report. Calculation followed the EM&A Manuel methodology (“on-effort” sightings made during favourable weather and good visibility conditions).

2.4.3. Quantitative grid analysis of habitat use

Quantitative grid analysis is performed by mapping both sighting and dolphin densities plotted onto 1kmx1km grid squares. Only “on effort” sightings made while on a transect line and under favourable conditions should be included in grid analyses. These densities are standardised by effort by calculating survey coverage in each line transect survey to determine the number of times the grid has been surveyed. Densities are calculated using the following formulae;

SPSE and DPSE:

$$SPSE = (S/E \times 100)/SA\%$$

$$DPSE = (D/E \times 100)/SA\%$$

Where;

S= total number “on effort” sightings

D = total number dolphins from “on effort” sightings

E = total number units survey effort

SA% = percentage of sea area

2.4.4. Behavioural analysis

When dolphins are sighted during vessel surveys, their behaviour is observed. Different activities are categorised (i.e. feeding, traveling, socialising, surface active, associated with boats, unknown) and recorded in the sighting data form of Logger. The sightings form is integrated with survey effort and positional data and can be subsequently mapped to examine distribution and behavioural trends. All sightings data (“on-effort” and “opportunistic”) are used in this analysis.

2.4.5. Ranging pattern analysis

In the baseline monitoring report, the program Animal Movement Analyst Extension, created by the Alaska Biological Science Centre, USGS was used in conjunction with ArcView© 3.1 and Spatial Analyst 2.0⁴. Using the fixed kernel method, kernel density estimates and kernel density plots are created using all sightings. In the baseline monitoring, data from other studies and from outside the baseline monitoring period were used to map individual ranges. It is important to maximize the number of sightings used as kernel analyses cannot be conducted unless more than 20 independent sightings are made for an individual although it is recommended that a minimum of 70 resightings are used before kernel analyses has any accuracy (Wauters *et al* 2007; Kauhala and Auttila 2010; de Faria Oshima and de Oliveira Santos, 2016.). AFCD Annual Reports use a minimum of 15 resightings for kernel analyses (AFCD 2012). For the purposes of reporting on this project, 15 or more independent resightings per individual will be used to map utilisation densities using the fixed kernel method. At the time of this report, only 12 independent resightings have been recorded for one dolphin since impact monitoring began. Home range analysis shall be conducted once 15 resightings have been recorded so that results can be compared directly to the AFCD Annual Reports..

3. RESULTS AND DISCUSSIONS

3.1. Summary of survey effort and dolphin sightings

From September – November 2015, 12 vessel surveys were conducted in the NEL and NWL survey areas. A total of 650.7 km of “on-effort” transect lines were conducted, 626.8km (96%) of which were conducted under favourable conditions (Annex I; Annex II). Only those periods of “on-effort” survey conducted under favourable conditions were included in quantitative analyses. During September – November 2015, 13 groups of dolphins, numbering 36 (min 35; max 37⁵) individuals, were sighted from the vessel surveys. Of these, seven groups were “on-effort” and the remaining six were “opportunistic” (Annex III).

Of the 13 sightings, all groups were located in NWL. The baseline report, conducted during September-November 2011, notes a total of 44 groups, 34 of which occurred in NWL and 10 in NEL. For period September – November 2012, a total of 71 groups were sighted, 53 of which were located in NWL and 18 in NEL. For period September – November 2013, a total of 42 groups were sighted, 41 of which were located in NWL and 1 in NEL. For period September – November 2014, a total of 15 groups were sighted, all of which were located in NWL. There are differences between the number of sightings made during baseline compared to the same period in 2012; 2013, 2014 and 2015. For NEL, the number of groups almost doubled between baseline (2011) and September – November 2012 and then decreased markedly in 2013, 2014 and 2015 (September – November). For NWL, both September – November 2012 and 2013 recorded larger numbers of groups when compared to baseline monitoring, however, in both 2014 and 2015, the absolute number of sightings is reduced to below that recorded for the baseline period (Table 2). Maps depicting location of sightings which have not been corrected for effort are included as Figs. 3; 4; 5; 6.

⁴ In ArcGIS versions 9.2 and later, kernel range density calculation tools are integrated in the toolbox section and a separate extension is no longer required

⁵ During sightings a minimum, maximum and best estimate of group size is noted; the range stated represents the minimum and maximum numbers estimated)

Table 2. A Comparison of Total Sightings Recorded in NEL and NWL Areas During Sep – Nov 2011; 2012; 2013, 2014 and 2015

Monitoring Period	Total Dolphin Sighting in NWL	Total Dolphin Sighting in NEL
	Number of Groups	Number of Groups
Sep – Nov 2011* (Baseline Monitoring)	34	10
Sep – Nov 2012 (HKBCF Third Quarter)	53	18
Sep – Nov 2013 (HKBCF Seventh Quarter)	41	1
Sep – Nov 2014 (HKBCF Eleventh Quarter)	15	0
Sep – Nov 2015 (HKBCF Fifteenth Quarter)	13	0

* Surveys conducted once per month, subsequent surveys twice per month

As per the EM&A manual, only “on effort” sightings can be used for some analyses therefore the combined number of “on effort” sightings for all five periods were compared. There is an increase in the total number of “on effort” sightings between baseline monitoring (2011) and impact monitoring (2012) but a decrease below both previous totals in September – November 2013 and a marked, further decrease in September – November 2014. In 2015, there was a decrease in the number of “on effort” sightings compared to the same quarter in 2014 (Table 3). No correction for effort is made with these numbers, this is calculated in section 3.3.

Table 3. A Comparison of “On Effort” Sightings Recorded in NEL and NWL Combined During Sep – Nov 2011; 2012; 2013, 2014 and 2015.

Monitoring Period	Groups of Dolphin sighted in NEL and NWL
Sep - Nov 2011 (Baseline Monitoring)	44
Sep – Nov 2012 (HKBCF Third Quarter)	52
Sep – Nov 2013 (HKBCF Seventh Quarter)	28
Sep – Nov 2014 (HKBCF Eleventh Quarter)	9
Sep – Nov 2015 (HKBCF Fifteenth Quarter)	7

3.2. Distribution

During the baseline survey, ~77% of all “on effort” sightings were made in NWL. During the September – November periods 2012, 2013, 2014 and 2015, 75%, 100%, 100% and 100% of all sightings were made in NWL, respectively. There is a noted decrease in NEL habitat use from 2013. Again, there is no correction for effort for these group sightings (Table 4). The sightings in NWL occurred at the southern end of transect line 1 and in the Sha Chau Lung Kwu Chau Marine Park area (SCLKCMP) (Fig 6).

Table 4. A Comparison of “On Effort” Sightings Recorded in NEL and NWL During Sep – Nov 2011; 2012; 2013; 2014 and 2015.

Monitoring Period	No. of Dolphin Groups sighted in NWL	No. of Dolphin Groups sighted in NEL
Sep - Nov 2011 (Baseline Monitoring)	34	10
Sep – Nov 2012 (HKBCF Third Quarter)	39	13
Sep – Nov 2013 (HKBCF Seventh Quarter)	28	0
Sep – Nov 2014 (HKBCF Eleventh Quarter)	9	0
Sep – Nov 2015 (HKBCF Fifteenth Quarter)	7	0

3.3. Encounter rate

As some of the survey periods have different transect lengths, variation in sightings occurrence was quantified by correcting for effort (distance of transect lines surveyed, i.e., km spent “on-effort”), to obtain an encounter rate. The baseline study (Sep-Nov 2011) reports that a total of 545.6km⁶ of survey effort was conducted under favourable conditions in the NEL and NWL survey areas. In NEL, a decrease in encounter rates has been documented since before construction activities started at HKBCF and this has been attributed, largely, to the fast ferries which traverse this area (Marcotte *et al* 2015). Since commencement of the HKBCF, a marked decrease from baseline rates was noted for NEL in September – November 2013. In NWL, looking only at the period September – November, a marked decrease was apparent in 2014. (Table 5).

Table 5. A Comparison of Encounter Rates in NEL and NWL Areas During September-November 2011; 2012; 2013 and 2014.

Monitoring Period	Encounter Rate NEL	Encounter Rate NWL
Sept-Nov 2011 (Baseline Monitoring)	5.4	9.5
Sep – Nov 2012 (HKBCF Third Quarter)	5.9	8.9
Sep – Nov 2013 (HKBCF Seventh Quarter)	0	6.3
Sep – Nov 2014 (HKBCF Eleventh Quarter)	0	2.1
Sep – Nov 2015 (HKBCF Fifteenth Quarter)	0	1.7

⁶ Updated data set provided April 2013

The AFCD Annual Reports describe variation in spatial distribution between areas and between seasons in NEL and NWL. The AFCD monitoring data prior to HZMB construction (1996- to 2012) reported that overall **annual encounter rate** for NEL varies between 1.6 and 6.2 and the **annual encounter rate** for NWL varies between 5.8 and 17.0. The encounter rate for NWL for the three periods (September – November 2011; 2012; 2013) is within the annual limits recorded for this area previously, however, for this quarter in 2014 and 2015, the encounter rate falls below the lowest previously recorded encounter rate in AFCD records. For NEL, the encounter rates in September – November 2011 and 2012 are within the recorded annual norms for the area, however, the encounter rate of zero for the same period 2013, 2014 and 2015 is not. At NEL, the most marked changes in encounter rates have been observed in year two of the construction works. At NWL, during the September – November period of years three and four, the encounter rates have fallen below the lowest previously recorded. Historically, there have been both up and down movements within these limits, however, the general trend in yearly encounter rate for dolphins in all areas of Hong Kong is that of significant decline over the last decade and prior to new development projects in the Lantau area (AFCD 2012; 2013; 2014). As the impact of the work at HKBCF continues, other works associated with the bridge have increased both in intensity and in geographical area. Other projects not associated with the HZMB Project have also been ongoing in the NEL and NWL areas, and other adjacent areas. It is likely that all activities contribute to the ongoing decline in dolphin numbers from Hong Kong areas NEL and NWL.

3.4. Group size

During September – November 2015, group size of all sightings varied from 1 to 6 individuals with an average of 2.8. For baseline monitoring, the NWL average group size was 4.5 and the NEL average group size was 3.5. For the period September – November 2012, the NWL average group size was 3.1 and in NEL it was 3.6. For the period September – November 2013, the NWL average group size was 3.2 and in NEL it was 1.0. For period September – November 2014, the NWL average group size was 3.6 and no sightings were recorded in NEL (Table 6). NEL showed a decrease in group size in 2013 when compared to baseline and year one of construction monitoring (noting no groups were seen in September – November 2014 and same period 2015). In NWL, groups sizes between September – November 2012 and 2013 are approximately the same although both are lower than the baseline monitoring. The group size for NWL in 2014 increased slightly and then lowered again to the lowest recorded in 2015. A map depicting the two groups which were sighted with more than 5 individuals, shows that they both occurred at Tai O (Fig. 7). One these groups contained a calf.

Table 6. A Comparison of Sightings Group Size Averages Recorded in NEL and NWL Areas During Sep – Nov 2011; 2012; 2013; 2014 and 2015

Monitoring Period	Average Group Size (NWL)	Average Group Size (NEL)
Sep - Nov 2011 (Baseline Monitoring)	4.5	3.5
Sep – Nov 2012 (HKBCF Third Quarter)	3.1	3.6
Sep – Nov 2013 (HKBCF Seventh Quarter)	3.2	1.0
Sep – Nov 2014 (HKBCF Eleventh Quarter)	3.6	0
Sep – Nov 2015 (HKBCF Fifteenth Quarter)	2.8	0

3.5. *Habitat use*

Quantitative grid analyses indicates areas of high to moderate use within and adjacent to the SCLKCMP (Figs. 8; 9). When compared to the same period in 2014, the grid analyses show an almost identical pattern, except with one higher use block depicted to the south of SCLKCMP (Fig. 10). These areas of high use have been consistent in the long term and continue to be so.

3.6. *Mother-calf pairs*

One mother and calf pair was sighted in November and although a close approach was not made, it seemed that the mother was identified individual HZMB 114 (Fig. 11). During the same period in 2014, 7.4% of dolphins sighted were calves, compared to 7.6% in 2015.

3.7. *Activities*

Of the 13 groups sighted (using all sightings), three (23%) were engaged in feeding activities; six (46%) were travelling; three (23%) were feeding/travelling/socializing (multiple behavior); and one was unknown (8%). Travelling was the predominant activity during daylight hours in September – November (Fig. 12). There were no areas which showed a specific behavioural preference (Fig. 13).

3.8. *Photo-identification work*

The photo-identification catalogue was regularly updated and re-sightings of dolphins previously identified were recorded. The project specific photo-identification catalogue for the impact monitoring period is presented in Annex IV. All dolphins including those sighted only in the baseline are included. Not all dolphins sighted have sufficient scarring, injury or pigmentation uniqueness to be unambiguously identified. During the baseline survey, 96 individuals were noted in the NEL, NWL and WL areas. Of these, 57 were noted in the NEL and NWL area. No new dolphins have been identified in the last quarter and the catalogue stands at 117 individuals. To report date (30 November 2015), the HZMB catalogue has identified 14 dolphins that were seen in both baseline and the impact monitoring study period. Two further dolphins have been identified during impact monitoring which have been matched to the AFCD photo ID data held on the AFCD website⁷.

There are 15 dolphins which have been sighted on six days or more during impact monitoring, nine (9) of which are known from the AFCD catalogue (HZMB 001 [WL46]; HZMB 002 [WL111]; HZMB 011 [EL01]; HZMB 041 [NL24]; HZMB 044 [NL98]; HZMB 51 [NL213]; HZMB 054 [CH34]; HZMB 083 [NL136]; HZMB 098 [NL104]) (Table 7). The highest number of re-sightings recorded during impact monitoring surveys is 12 (HZMB 002), excluding multiple sightings made on the same day (Annex IV).

⁷[www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi_chi/files/Photoid_Booklet.pdf](http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/files/Photoid_Booklet.pdf)

Table 7. Dolphins Frequently Recorded During Impact Monitoring Surveys.

HZMB ID	AFCD ID	SEEN IN BASELINE	No. DAYS SIGHTED IMPACT MONITORING
HZMB 002	WL111	Y	12
HZMB 054	CH34	Y	11
HZMB 044	NL98	Y	10
HZMB 023	unknown	*	10
HZMB 051	NL213	N	9
HZMB 098	NL104	Y	8
HZMB 041	NL24	Y	7
HZMB 005	unknown	*	7
HZMB 083	NL136	Y	6
HZMB 011	EL01	Y	6
HZMB 001	WL46	N	6
HZMB 040	unknown	*	6
HZMB 064	unknown	*	6
HZMB 074	unknown	*	6
HZMB 094	unknown	*	6

* cannot be determined

4. CONCLUSION

The data from September – November 2015, shows some consistencies with the baseline data (conducted during the same season) and with the same periods in 2011, 2012, 2013 and 2014. Habitat use and behavioural trends all fall within those reported in AFCD Long Term Monitoring reports although as sightings numbers decrease, such patterns are difficult to compare. The quarterly encounter rates for both NEL and NWL is lower than that reported for **annual** rates published previously and the seasonal trend for these two areas is of a declining encounter rate. Density distribution maps depict key areas of higher use within NWL, in particular, SCLKMP. Areas to the south of SCLKMP and Tai O have seen diminished use since 2013 and this trend continues to 2015. In general, the encounter rate, habitat use and group size information suggests that in 2015, fewer dolphins are using the NWL area. It has been some time since any dolphin was sighted in NEL during this seasonal period. These observations are only for September – November, however, these trends have been apparent throughout 2015.

The decreases in encounter rates in both NEL and NWL are noted. HKBCF monthly reporting notes that the conditions of EM&A Manuel have been consistently upheld and that all measures stipulated to minimise disturbance to dolphins remain in place. Although it is likely that ongoing HKBCF activities are having an effect on dolphin encounter rates in NEL, it is also noted that other HZMB projects are ongoing in both NEL and NWL (and south of NWL into adjacent WL waters). In addition, extensive marine works which are not part of HKBCF have been ongoing in NEL and also in parts of NWL throughout this current quarter period and new projects have been initiated along the airport platform area. Some collaboration with cross border authorities has been initiated, with regards to sharing photo ID catalogues, and at recent meetings held between all environmental teams for HZMB, it was noted that some of the dolphins previously recorded in Hong Kong waters but which have been absent in 2014-15, have been recorded, at least occasionally, in adjacent waters. An additional study initiated by ENPO and conducted in the Southwest Lantau (reported separately by others on the ENPO website) details further individual dolphin movement in Hong Kong waters. Therefore, the information current to this project indicates that the dolphins have shifted distribution, to the west (and beyond).

At this stage, the intensity of in water marine works associated with the HKBCF is decreasing, however, the drivers behind the population decline stated in the AFCD long term monitoring programme for Hong Kong waters and independent studies for adjacent Pearl River Estuary (PRE) waters (Huang *et al* 2012) remain uncertain. Recent work indicates that habitat abandonment of NEL waters prior to HKBCF initiation was partially driven by the increase in high speed ferry traffic (Marcotte *et al* 2015) and that toxin burden may have a greater impact than initially predicted (Gui *et al.* 2014). Therefore, the HZMB Project was initiated at a time when there was already a widespread and long term reduction in the number of dolphins within what is believed to be their entire range of the PRE. The strict mitigation initiatives at HKBCF aim to minimize the localised impact of HKBCF construction, however, this in itself will not be sufficient to ameliorate the myriad of other impacts throughout the dolphins habitat.

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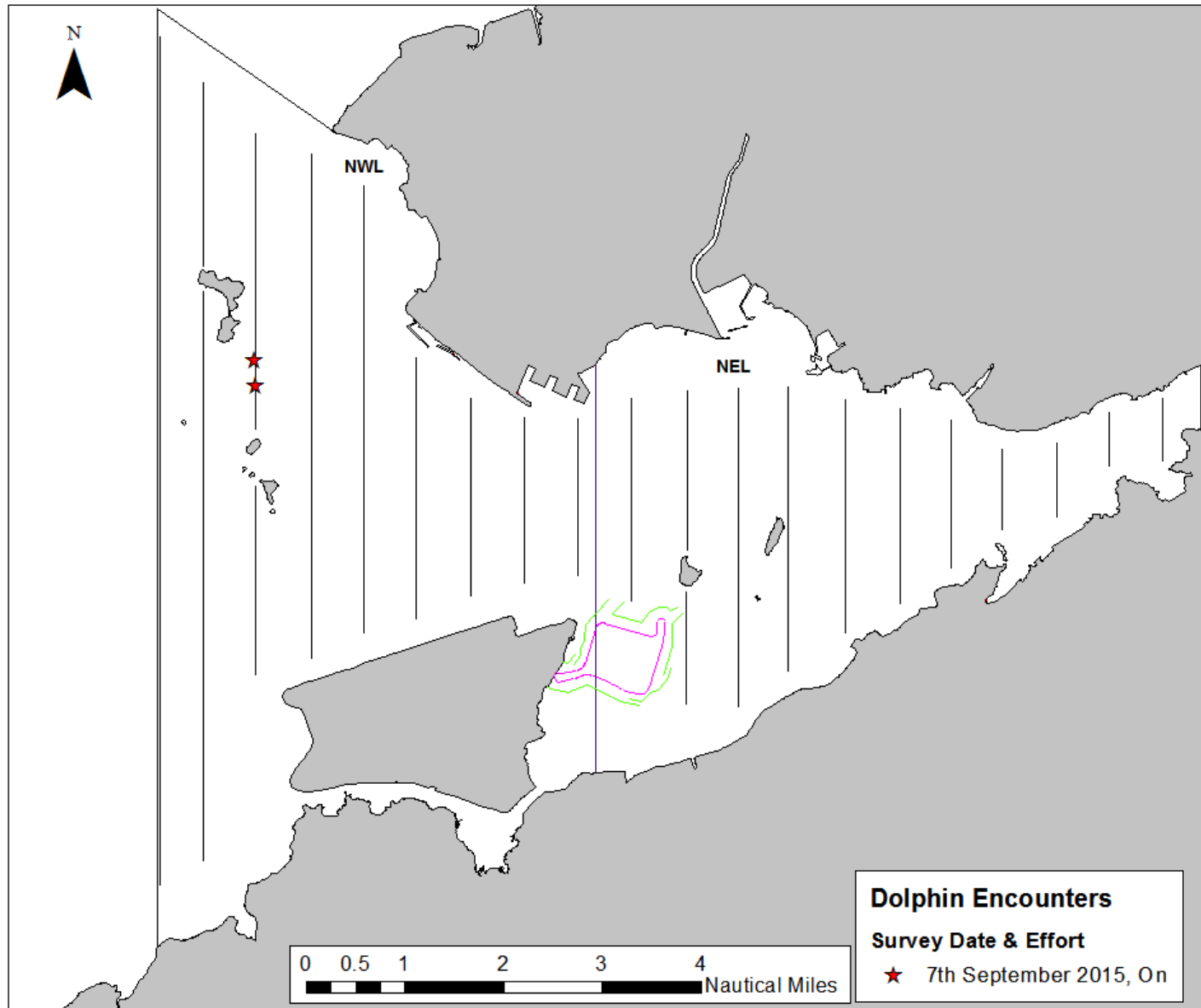


Figure 3 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (September 2015)

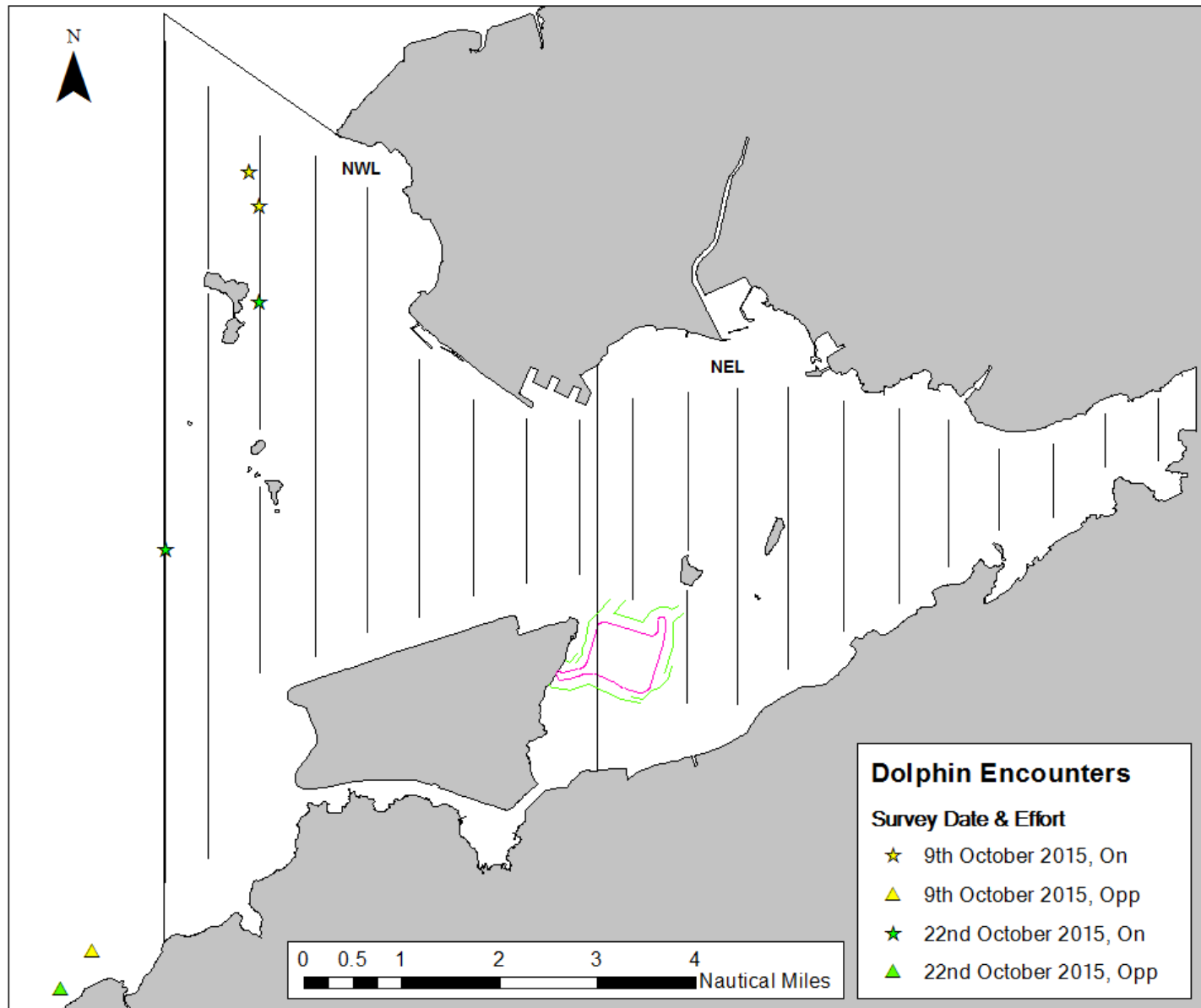


Figure 4 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (October 2015)

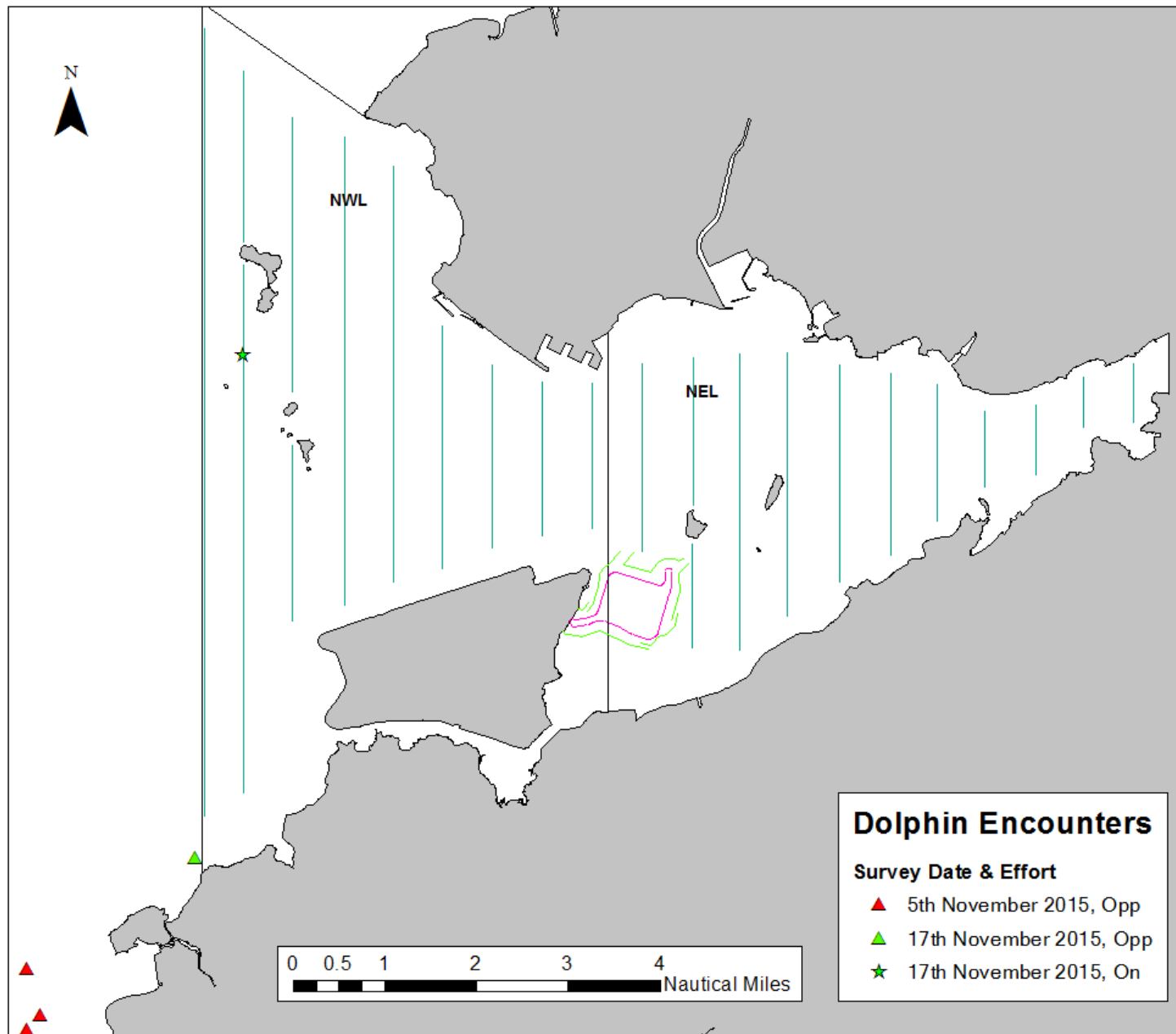


Figure 5 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (November 2015)

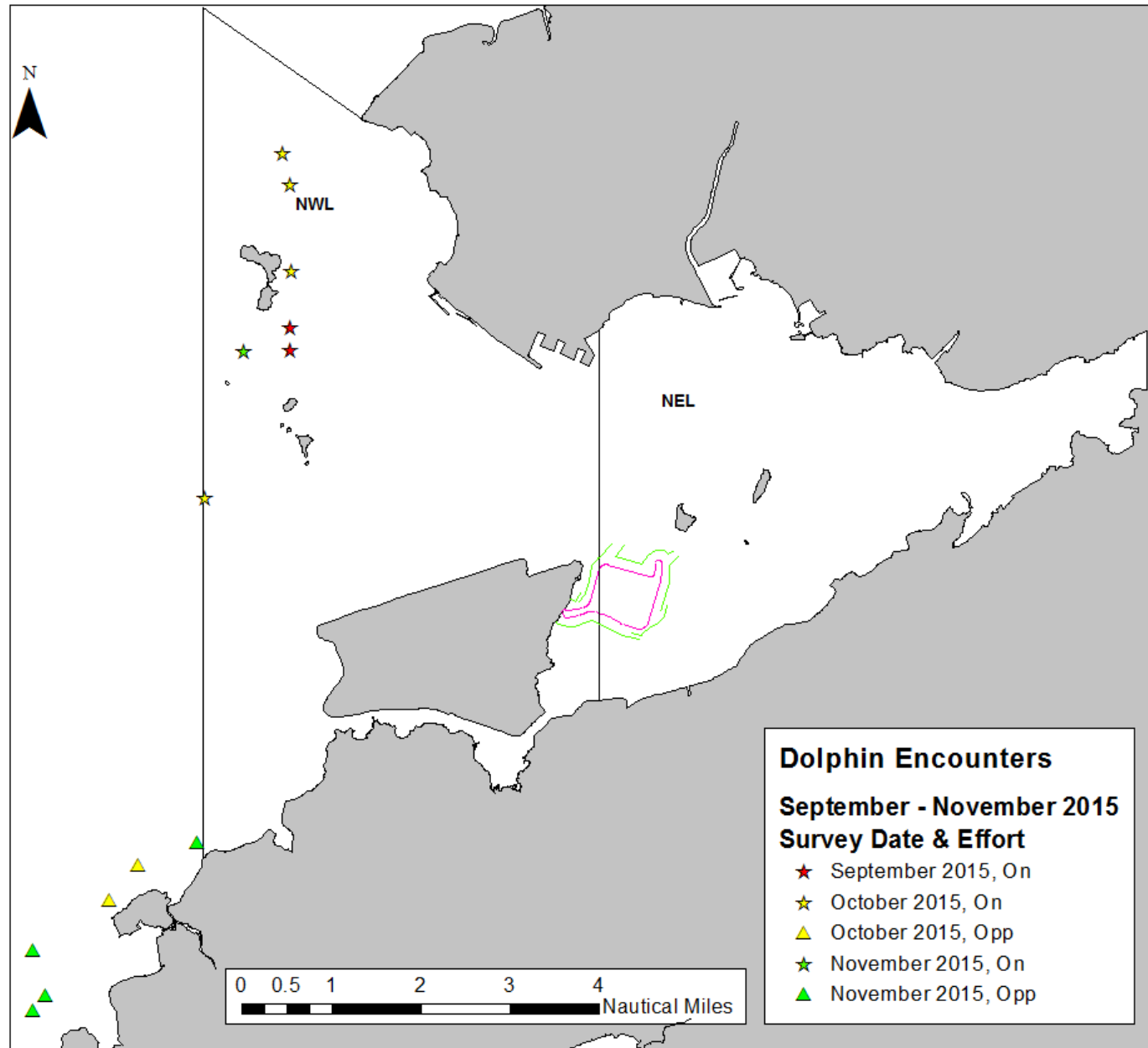


Figure 6. Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (September - November 2015)

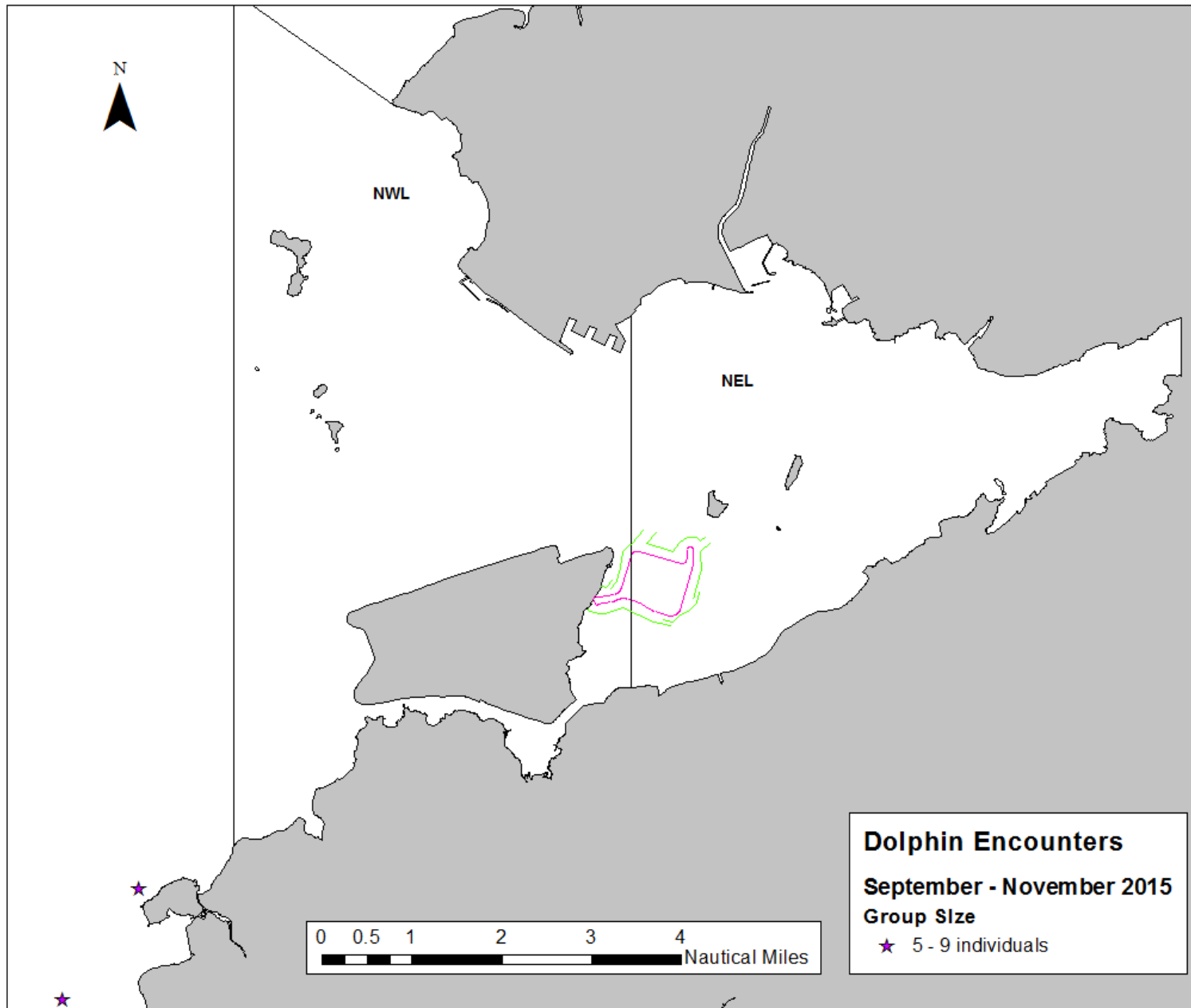


Figure 7. The Location of Dolphin Groups Numbering 5 and Above Individuals (September – November 2015)

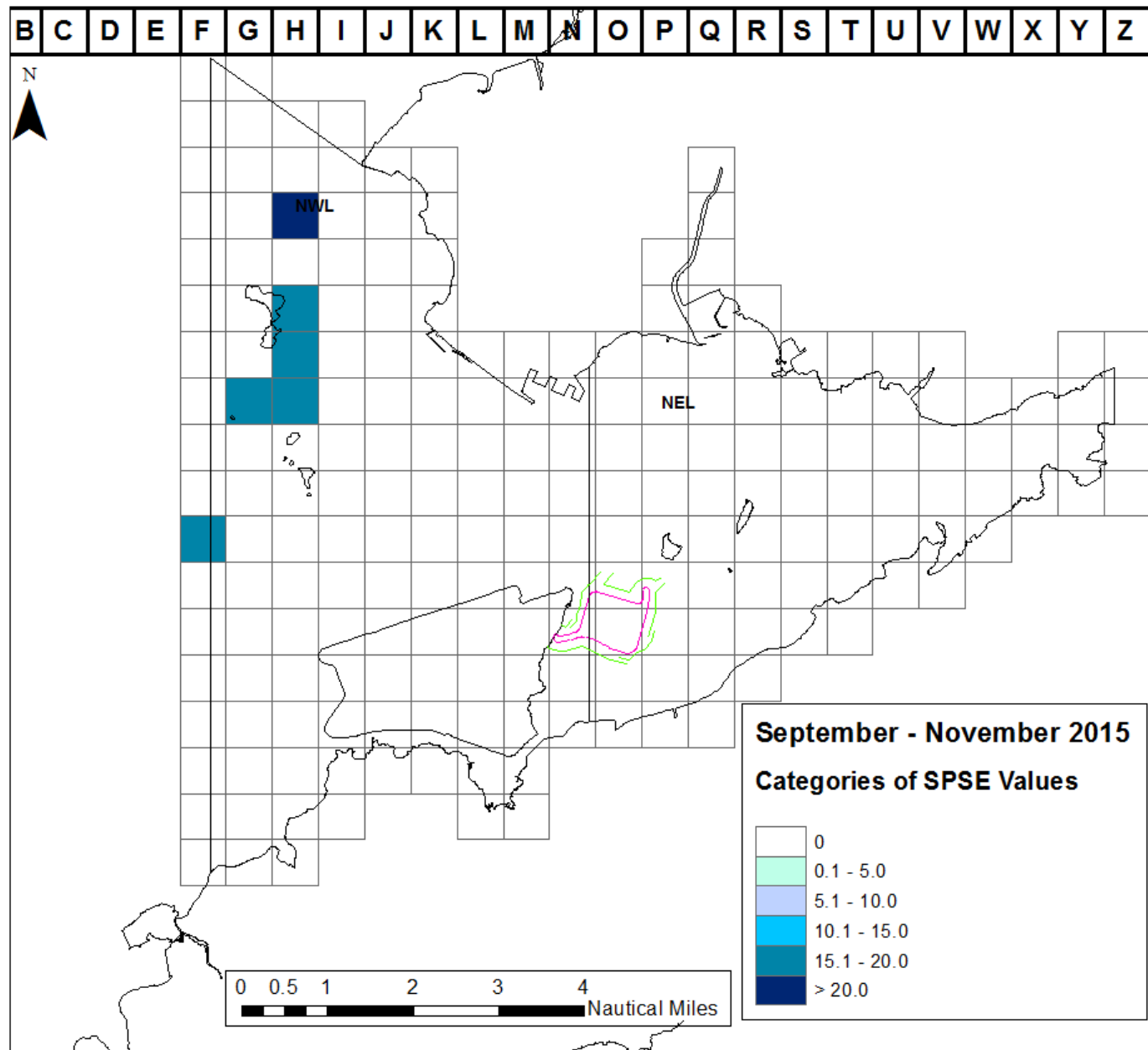


Figure 8. Sighting density SPSE (number of on-effort sightings per 100 units of survey effort) for September – November 2015.

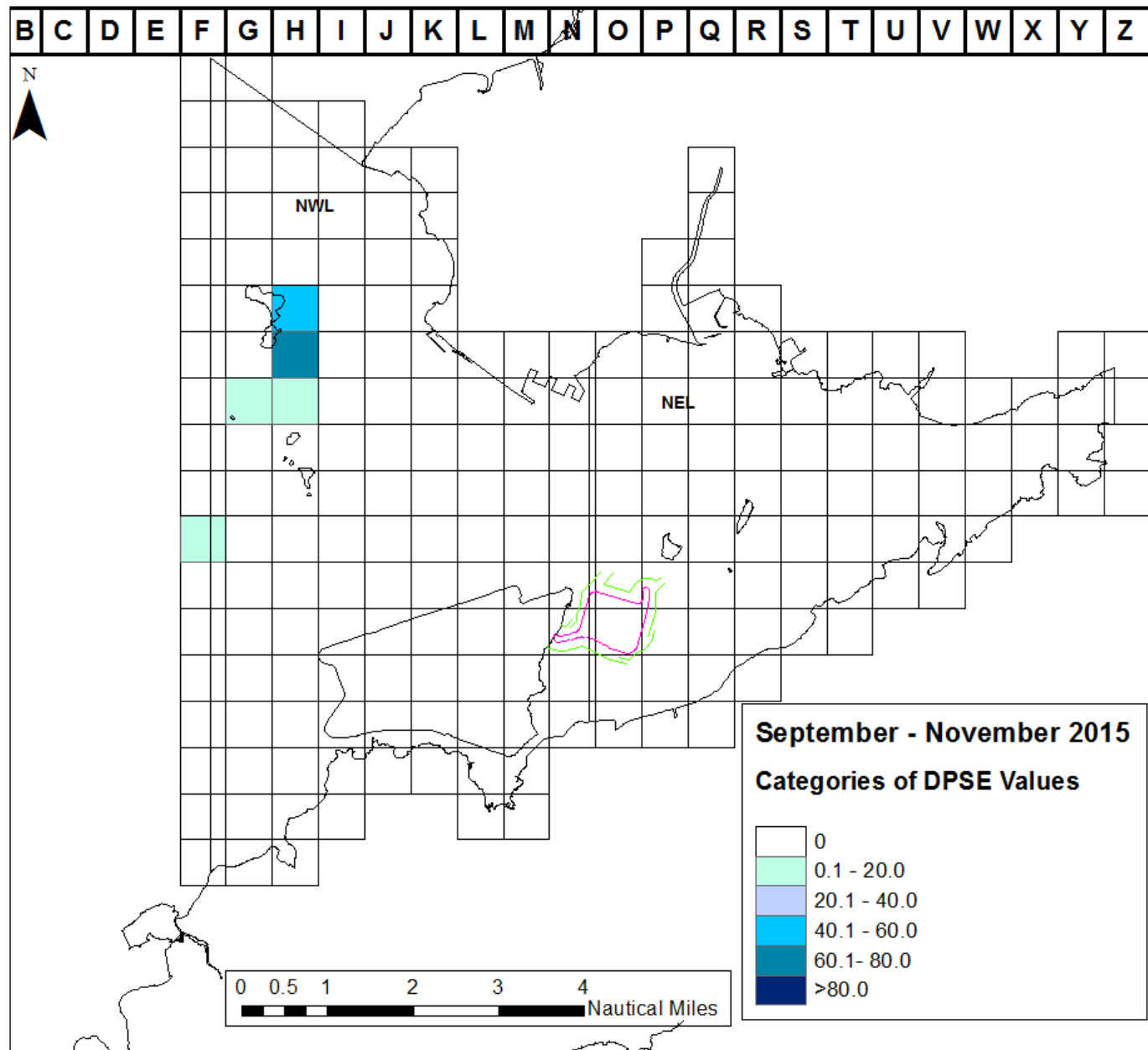


Figure 9. Dolphin density DPSE (number of dolphins per 100 units of survey effort) for September – November 2015.

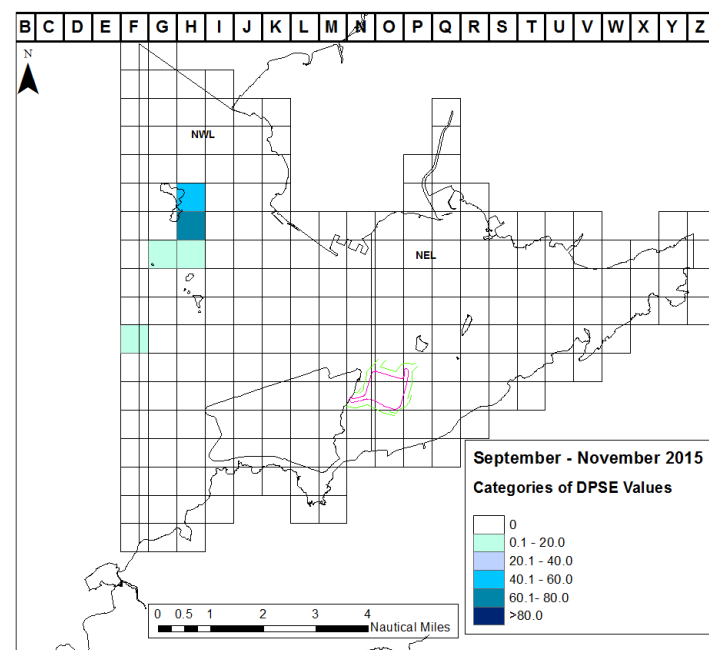
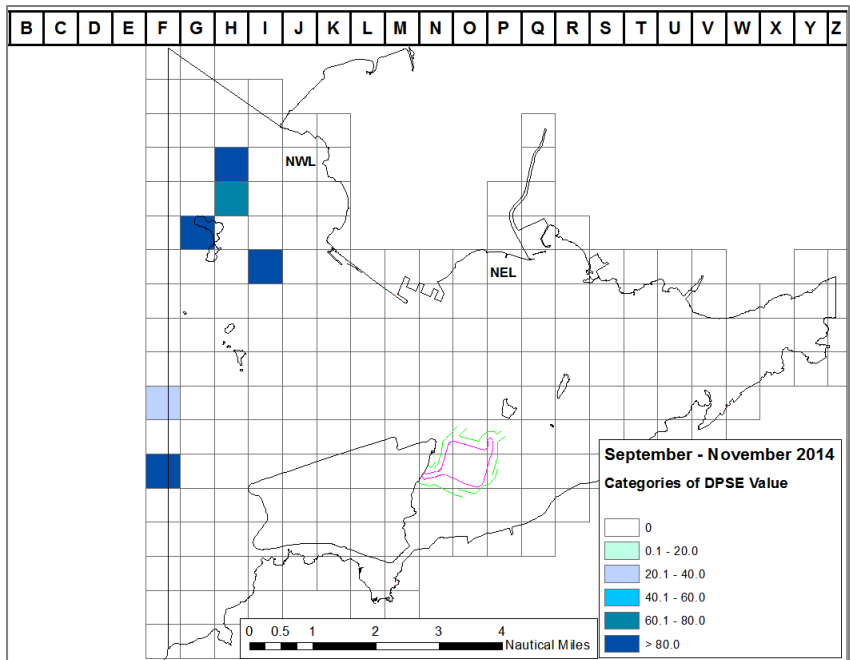
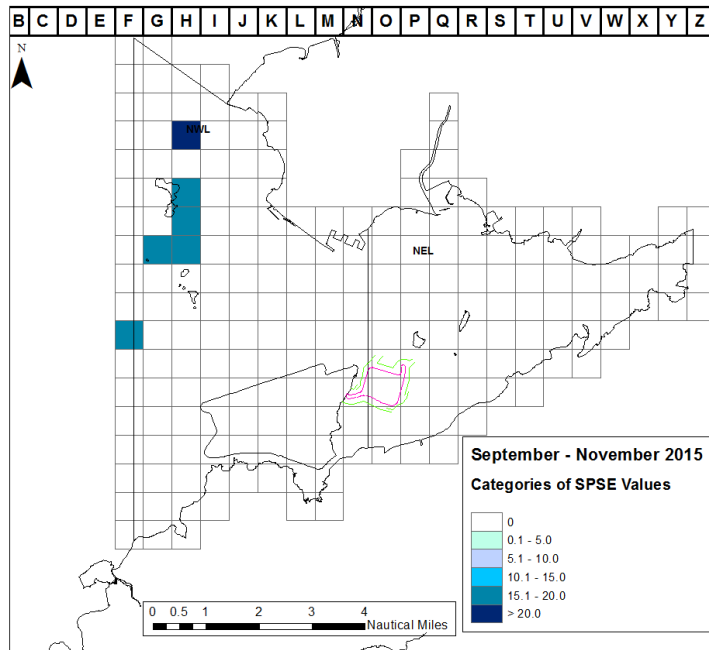
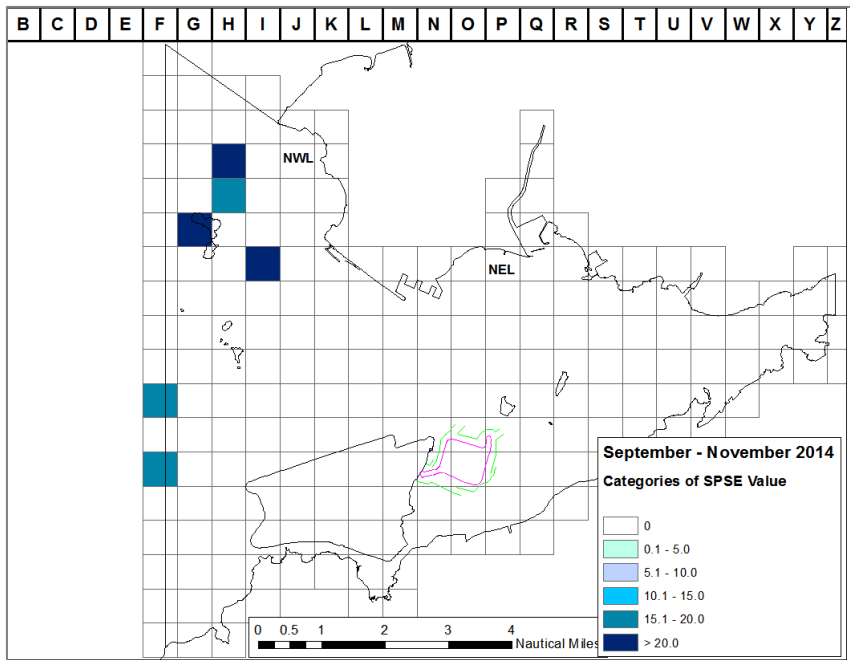


Figure 10. SPSE and DPSE Grid Analysis from periods September–November 2014 and September–November 2015

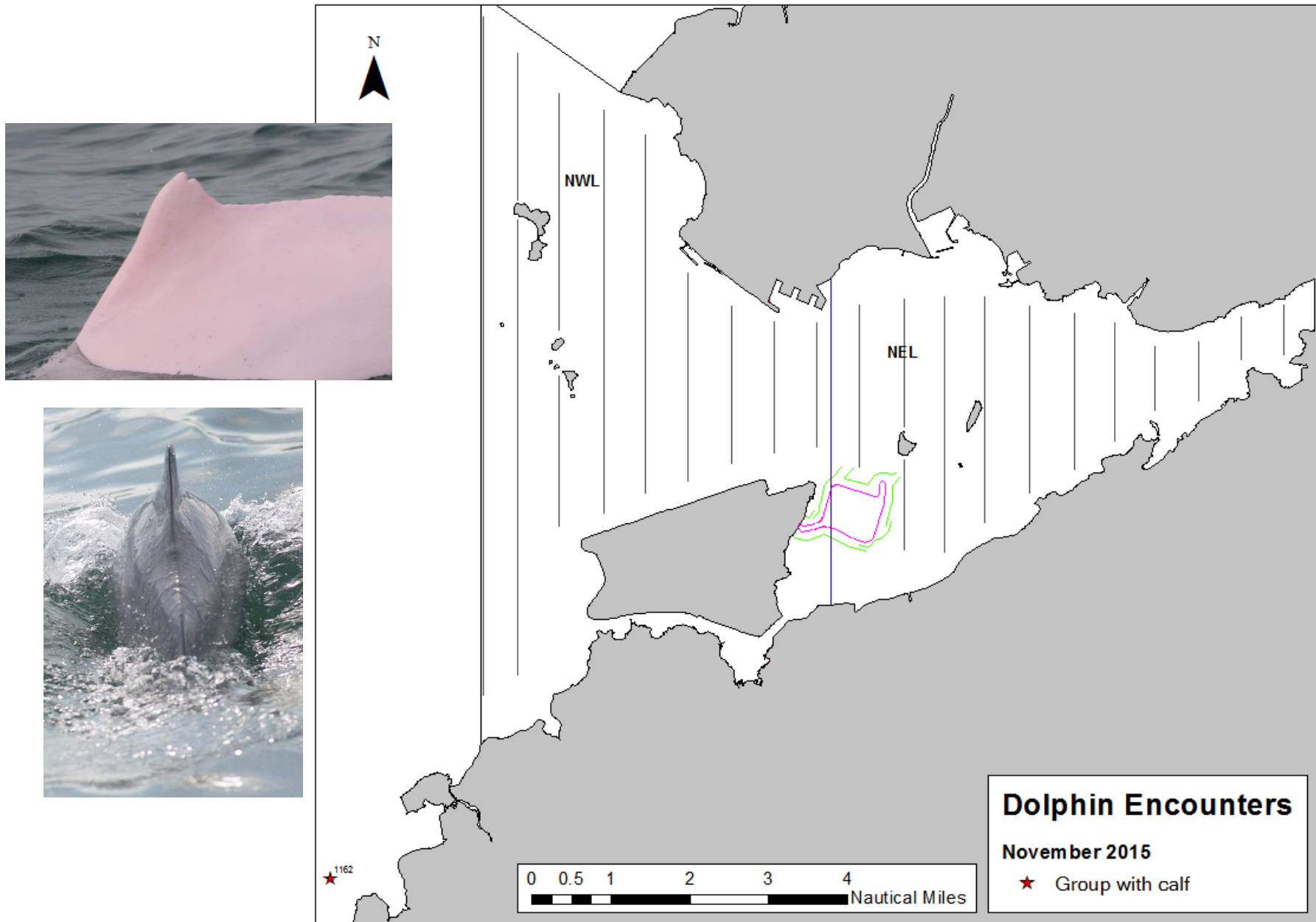


Figure 11. Location of groups containing mother and calf pairs during September – November 2015

September - November 2015 Dolphin Behaviour

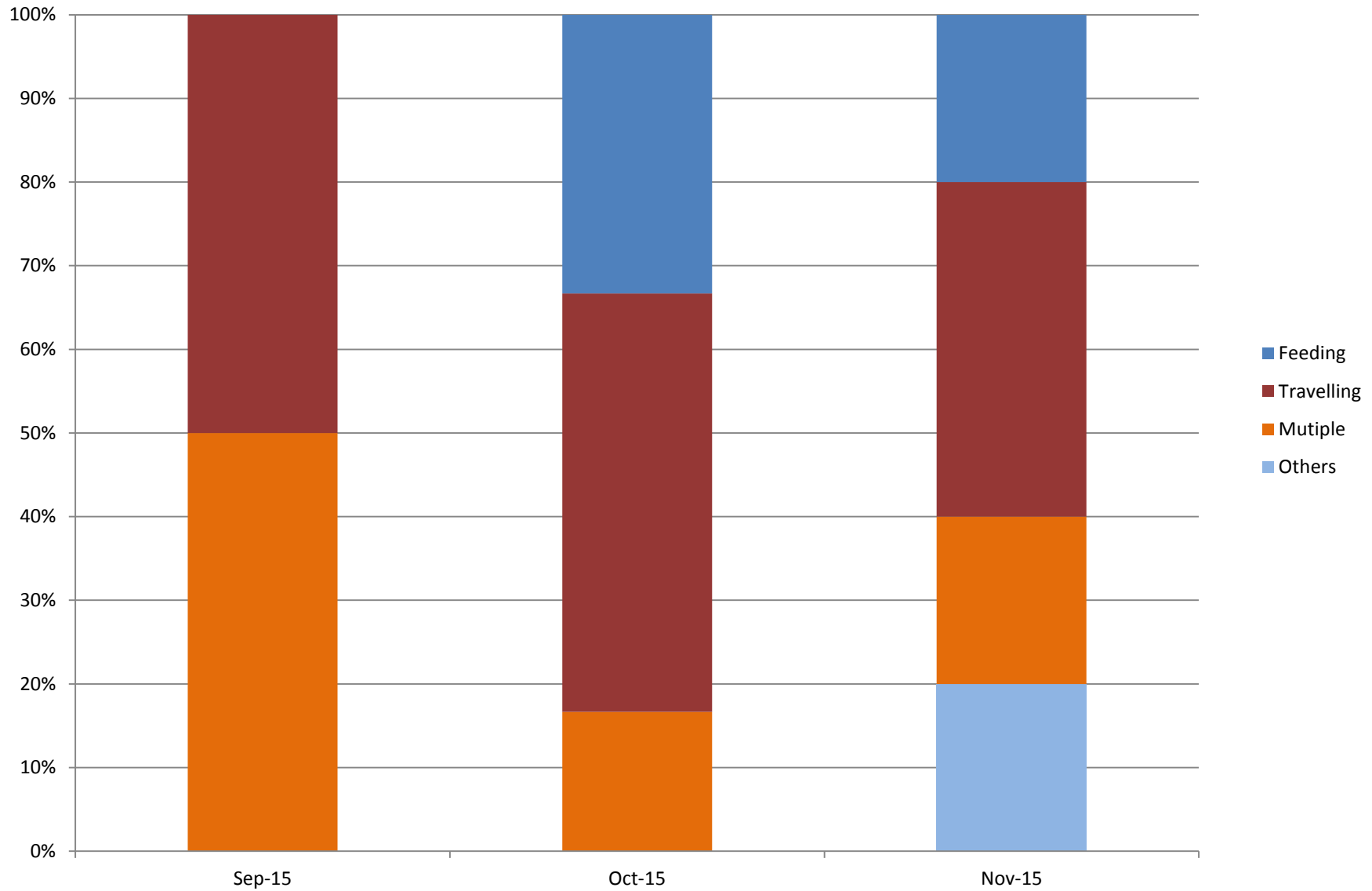


Figure 12. Activity Budget for Dolphin Behaviour September – November 2015.

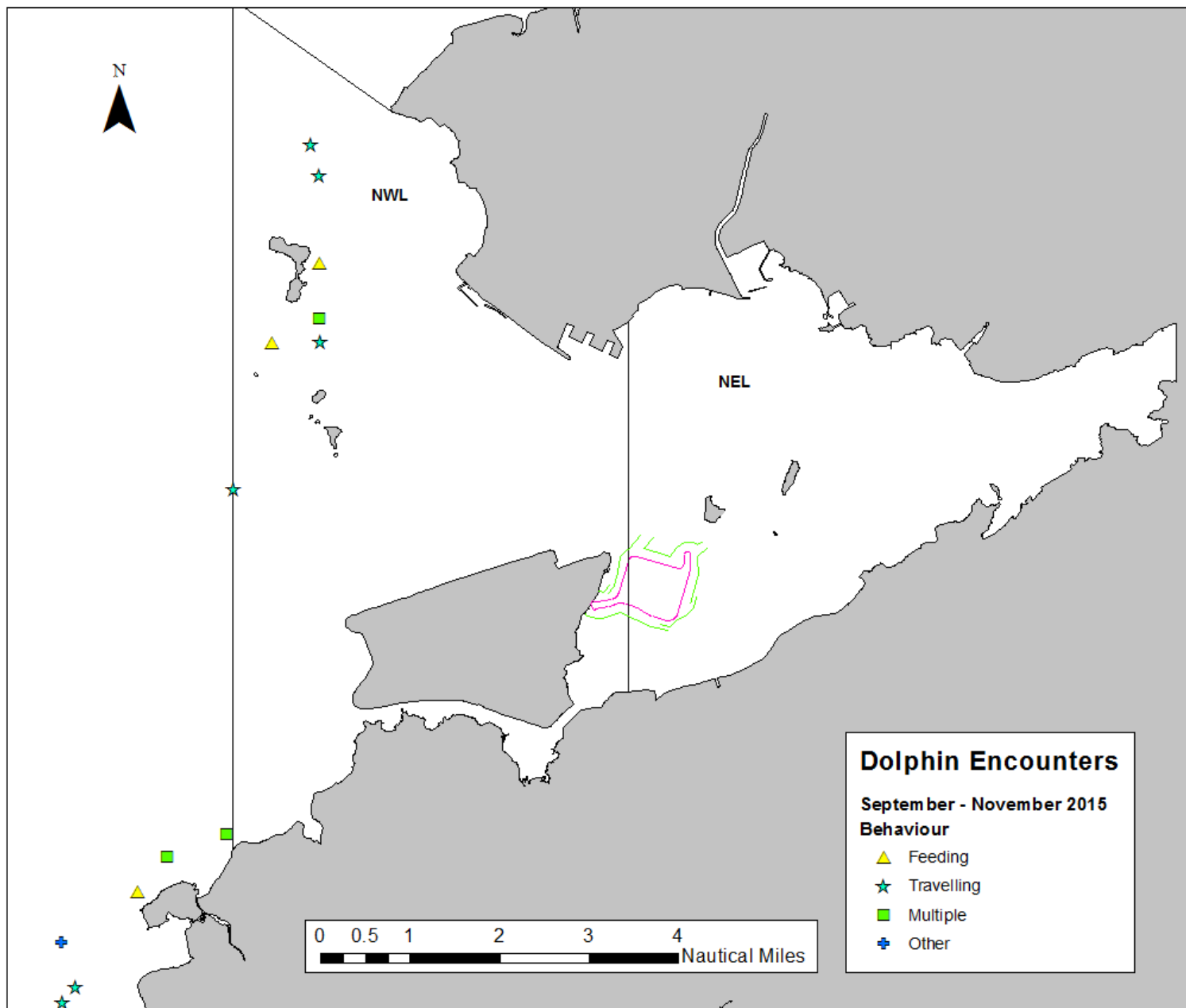


Figure 13. The Location of Different Behavioural Activities September – November 2015

Annex I. Impact Monitoring Survey Schedule and Details (September – November 2015)

Date	Location of Survey	No. Sightings ON	No. Sightings Opp	Total km ON EFFORT (favourable conditions)
09/07/2015	NWL (1-5, 21, 22)	2	0	57.1
09/08/2015	NE and NW Lantau (6-20,23)	0	0	50.9
09/29/2015	NE and NW Lantau (1-7, 21, 22)	0	0	62.4
09/30/2015	NWL (8-20,23)	0	0	42.1
10/07/2015	NE and NW Lantau (7-20,23)	0	0	47.3
10/09/2015	NWL (1-6, 21, 22)	2	1	57.8
10/22/2015	NWL (1-7, 21, 22)	2	1	65.7
10/23/2015	NE and NW Lantau (8-20,23)	0	0	42.7
11/05/2015	NWL (1-5, 21, 22)	0	3	56.6
11/06/2015	NE and NW Lantau (6-20,23)	0	0	35.5
11/17/2015	NWL (1-4, 21, 22)	1	1	48.3
11/19/2015	NE and NW Lantau (5-20,23)	0	0	60.4

Annex II. Impact Monitoring Survey Effort Summary (September – November 2015)

Date	Area	Sea State (on effort)	Effort (km)	Season	Vessel	Type
09/07/2015	NWL	1	53.9	AUTUMN	HKDW	IMPACT
09/07/2015	NWL	2	3.2	AUTUMN	HKDW	IMPACT
09/08/2015	NWL	1	14.9	AUTUMN	HKDW	IMPACT
09/08/2015	NEL	1	13.7	AUTUMN	HKDW	IMPACT
09/08/2015	NEL	2	22.3	AUTUMN	HKDW	IMPACT
09/29/2015	NWL	1	4	AUTUMN	HKDW	IMPACT
09/29/2015	NWL	2	30.6	AUTUMN	HKDW	IMPACT
09/29/2015	NWL	3	27.8	AUTUMN	HKDW	IMPACT
09/29/2015	NWL	4	3.8	AUTUMN	HKDW	IMPACT
09/30/2015	NWL	1	3	AUTUMN	HKDW	IMPACT
09/30/2015	NWL	2	3.1	AUTUMN	HKDW	IMPACT
09/30/2015	NEL	1	12.4	AUTUMN	HKDW	IMPACT
09/30/2015	NEL	2	15.5	AUTUMN	HKDW	IMPACT
09/30/2015	NEL	3	8.1	AUTUMN	HKDW	IMPACT
10/07/2015	NWL	1	9.9	AUTUMN	HKDW	IMPACT
10/07/2015	NEL	1	37.4	AUTUMN	HKDW	IMPACT
10/09/2015	NWL	1	21.7	AUTUMN	HKDW	IMPACT
10/09/2015	NWL	2	28.9	AUTUMN	HKDW	IMPACT
10/09/2015	NWL	3	7.2	AUTUMN	HKDW	IMPACT
10/09/2015	NWL	4	3.3	AUTUMN	HKDW	IMPACT
10/22/2015	NWL	1	22.3	AUTUMN	HKDW	IMPACT
10/22/2015	NWL	2	40.1	AUTUMN	HKDW	IMPACT
10/22/2015	NWL	3	3.3	AUTUMN	HKDW	IMPACT
10/23/2015	NWL	2	6.3	AUTUMN	HKDW	IMPACT
10/23/2015	NEL	1	26.4	AUTUMN	HKDW	IMPACT
10/23/2015	NEL	2	10	AUTUMN	HKDW	IMPACT
11/05/2015	NWL	0	0.7	AUTUMN	HKDW	IMPACT
11/05/2015	NWL	1	37.2	AUTUMN	HKDW	IMPACT
11/05/2015	NWL	2	16.4	AUTUMN	HKDW	IMPACT
11/05/2015	NWL	3	2.3	AUTUMN	HKDW	IMPACT
11/06/2015	NWL	3	4.3	AUTUMN	HKDW	IMPACT
11/06/2015	NWL	4	10.9	AUTUMN	HKDW	IMPACT
11/06/2015	NEL	1	1.3	AUTUMN	HKDW	IMPACT
11/06/2015	NEL	2	7	AUTUMN	HKDW	IMPACT
11/06/2015	NEL	3	22.9	AUTUMN	HKDW	IMPACT
11/06/2015	NEL	4	5.9	AUTUMN	HKDW	IMPACT
11/17/2015	NWL	1	38.9	AUTUMN	HKDW	IMPACT
11/17/2015	NWL	2	9.4	AUTUMN	HKDW	IMPACT
11/19/2015	NWL	1	18.6	AUTUMN	HKDW	IMPACT
11/19/2015	NWL	2	4.8	AUTUMN	HKDW	IMPACT
11/19/2015	NEL	1	31.3	AUTUMN	HKDW	IMPACT
11/19/2015	NEL	2	5.7	AUTUMN	HKDW	IMPACT

Annex III. Impact Monitoring Sighting Database (September – November 2015)

Project	Contract	Date	Sighting No.	Time	Group Size	Area	Beaufort	PSD	Effort	Type	Latitude	Longitude	Season	Boat Association
HKBCF	HY/2010/02	7-Sep-15	1142	1:04:11 PM	1	NWL	1	257	On	Impact	22.36255	113.8874	Autumn	No
HKBCF	HY/2010/02	7-Sep-15	1143	1:20:30 PM	4	NWL	1	77	On	Impact	22.36687	113.8873	Autumn	No
HKBCF	HY/2010/02	9-Oct-15	1151	9:17:58 AM	2	NWL	2	N/A	Opp	Impact	22.26605	113.8569	Autumn	No
HKBCF	HY/2010/02	9-Oct-15	1152	1:10:20 PM	3	NWL	2	441	On	Impact	22.39369	113.8873	Autumn	No
HKBCF	HY/2010/02	9-Oct-15	1153	2:20:21 PM	2	NWL	2	69	On	Impact	22.39952	113.8856	Autumn	No
HKBCF	HY/2010/02	22-Oct-15	1156	9:17:10 AM	6	NWL	1	N/A	Opp	Impact	22.25957	113.8512	Autumn	No
HKBCF	HY/2010/02	22-Oct-15	1157	10:42:04 AM	1	NWL	1	381	On	Impact	22.33491	113.8702	Autumn	No
HKBCF	HY/2010/02	22-Oct-15	1158	1:34:55 PM	3	NWL	1	9	On	Impact	22.37733	113.8874	Autumn	No
HKBCF	HY/2010/02	5-Nov-15	1161	9:30:07 AM	2	NWL	1	N/A	Opp	Impact	22.24998	113.8357	Autumn	No
HKBCF	HY/2010/02	5-Nov-15	1162	9:53:25 AM	5	NWL	1	N/A	Opp	Impact	22.23884	113.8358	Autumn	No
HKBCF	HY/2010/02	5-Nov-15	1163	9:55:30 AM	4	NWL	1	N/A	Opp	Impact	22.24159	113.8384	Autumn	No
HKBCF	HY/2010/02	17-Nov-15	1171	11:17:20 AM	2	NWL	1	N/A	Opp	Impact	22.27022	113.8688	Autumn	No
HKBCF	HY/2010/02	17-Nov-15	1173	1:20:39 PM	1	NWL	1	149	On	Impact	22.36228	113.8779	Autumn	No

Annex IV
March 2012– November 2015
(and Baseline September – November 2011)
Photo Identification Information

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 129		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		2015/02/23	1068	NWL
		2015/01/03	1054	NWL
HZMB 125		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		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
HZMB 114		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		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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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
HZMB 098	NL104	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		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
HZMB 091		2013/02/15	579	NWL
HZMB 090		2013/06/25	697	NWL
		2013/06/13	682	NWL
		2013/02/15	579	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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	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
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
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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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
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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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
HZMB 054	CH34	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
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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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		2014/02/17	910	NWL
		2013/06/13	682	NWL
		2013/02/15	579	NWL
		2012/11/01	495	NWL
HZMB 044	NL98	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
HZMB 042	NL260	2015/10/22	1156	NWL
		2013/12/19	863	NWL
		2012/11/01	495	NWL
		2011/11/07	Baseline	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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
		2011/10/10	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		2012/11/01	490	NWL
HZMB 037		2012/11/01	490	NWL
HZMB 036		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
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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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		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
HZMB 022		2012/07/10	330	NWL
		2015/07/09	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
HZMB 021	NL37	2012/07/10	330	NWL
		2011/09/16	Baseline	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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
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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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		
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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 001	WL46	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
	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	2011/11/07	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
	NL278	2011/11/02	Baseline	NWL
	NL279	2011/11/02	Baseline	NWL
	SL42	2011/11/02	Baseline	NWL
	SL43	2011/10/28	Baseline	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
	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
	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

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

HZMB 001 2012-03-18_10-52-16



HZMB 001 2012-03-18_11-07-00



HZMB 002 2012-03-18_10-53-38



HZMB 002 2013-02-14_15-41-58_02



HZMB 003 2012-03-18_10-54-02_02



HZMB 003 2012-12-10_11-20-34_02



HZMB 004 2012-03-18_10-54-28_01



HZMB 004 2012-09-04_09-24-54



HZMB 005 2012-03-18_10-51-26_01



HZMB 005 2012-12-10_15-49-53_04



HZMB 006 2012-03-18_11-17-54



HZMB 006 2012-03-18_11-21-16_02



HZMB 007 2012-03-18_11-06-40_01



HZMB 007 2012-12-10_11-21-27



HZMB 008 2012-05-28_09-14-06



HZMB 009 2012-05-28_09-15-02



HZMB 011 2012-03-10_13-19-04_01



HZMB 011 2012-03-10_13-22-52



HZMB 012 2012-05-28_09-15-44_01



HZMB 013 2012-05-28_09-11-04_01



HZMB 013 2012-05-28_09-19-30_01



HZMB 014 2012-06-13_12-57-56_02 1C



HZMB 015 2012-07-10_10-22-28_02



HZMB 016 2012-07-10_10-23-28_02 9A



HZMB 016 2012-12-11_12-26-46_01



HZMB 017 2012-07-10_10-31-34_03



HZMB 018 2012-07-10_10-34-36_03



HZMB 018 2012-12-10_11-14-55



HZMB 019 2012-07-10_10-42-50_01



HZMB 020 2012-07-10_10-43-22_02



HZMB 021 WL 2012-07-10_10-23-30



HZMB 022 2013-02-15_14-59-12_01



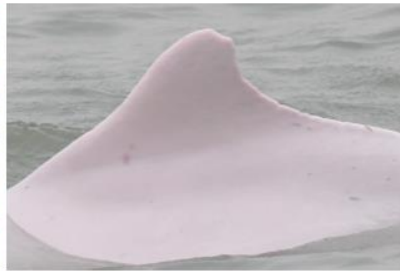
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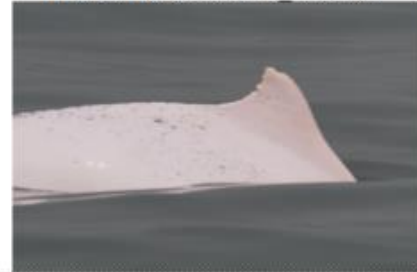
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HZMB 129 2015-09-07-13-47-07 MED



Monthly Summary Waste Flow Table for November / 2015 (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	Disposed as Public Fill	Imported Fill	Imported Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (see Note 2)	Chemical Waste (see Note 4)		Others, e.g. general refuse (see Note 3)	
						Sand	Public fill	Rock				Solid	Liquid	(in '000 tonne)	(in '000 m ³)
	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)			(in '000 kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000L)	(in '000 tonne)	(in '000 m ³)
Jan-15	0.0000	0.0000	0.0000	0.0000	0.0000	1681.2210	21.3475	72.2160	0.0000	0.4200	4.0000	0.0000	2.4000	0.0114	0.0455
Feb-15	0.0000	0.0000	0.0000	0.0000	0.0000	1070.1265	37.7205	12.8205	0.0000	0.1400	0.0000	0.0000	0.0000	0.0116	0.0390
Mar-15	0.0000	0.0000	0.0000	0.0000	0.0000	315.7710	61.1365	13.9660	0.0040	0.3340	0.0020	0.0000	0.0000	0.0111	0.0390
Apr-15	0.0000	0.0000	0.0000	0.0000	0.0000	198.3400	41.2990	11.6793	0.0000	0.1400	0.0000	0.0000	0.0000	0.0119	0.0390
May-15	0.0000	0.0000	0.0000	0.0000	0.0000	710.7385	39.1055	29.1402	0.0000	0.1960	0.0000	0.0000	0.0000	0.0024	0.0260
Jun-15	0.0000	0.0000	0.0000	0.0000	0.0000	342.6870	37.9285	20.0273	0.0000	0.1680	0.0000	0.0000	0.0000	0.0164	0.0520
Sub-total	0.0000	0.0000	0.0000	0.0000	0.0000	4318.8840	238.5375	159.8494	0.0040	1.3980	4.0020	0.0000	2.4000	0.0648	0.2405
Jul-15	0.0000	0.0000	0.0000	0.0000	0.0000	21.7170	22.7765	16.2173	0.0150	0.4750	0.0020	0.0000	0.0000	0.0180	0.0585
Aug-15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	23.6245	37.0473	0.0000	0.3360	5.1200	0.0000	0.0000	0.0190	0.0585
Sep-15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	34.5200	35.3287	0.0000	0.0000	0.0000	0.0000	0.0000	0.0243	0.0780
Oct-15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9.2460	23.2273	0.0000	0.2800	0.0000	0.0000	0.0000	0.0191	0.0715
Nov-15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	40.5700	0.0000	0.3920	0.0000	0.0000	0.0000	0.0191	0.0715
Dec-15															
Total	0.0000	0.0000	0.0000	0.0000	0.0000	4340.6010	328.7045	312.2401	0.0190	2.8810	9.1240	0.0000	2.4000	0.1643	0.5785

Notes: (1) Broken concrete for recycling into aggregates.

(2) Plastics refer to plastic bottles/ containers, plastic sheets/ foam from packaging materials.

 (3) Use the conversion factor : 1 full load of dumping truck being equivalent to 6.5m³ by volume.

(4) Solid of chemical waste refer to spent battery and liquid of chemical waste refer to spent lubricating oil.

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
1-Hour TSP	Action	-	-
	Limit	-	-
24-Hour TSP	Action	-	-
	Limit	-	-
Noise	Action	-	-
	Limit	-	-
Water Quality	Action	-	2
	Limit	-	3
Dolphin Monitoring	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 month	Total no. received since project commencement
Environmental complaints	23 October 2015	A complainant who lives at 1 Sky City Road East, Hong Kong SkyCity Marriott Hotel, Hong Kong International Airport, Lantau, Hong Kong complained to EPD's hotline on 23 October 2015 that loud noise were generated by HZMB artificial island construction site of China Harbour Engineering Company Ltd adjacent to the	Closed	1	34

		<p>premises approximately between 10pm to 12am, during recent weekdays and Saturday. In addition, loud noise and dark smoke were noted on the construction site of HZMB artificial island during Sunday and public holiday. The complainant questioned whether the Contractor was allowed to conduct construction work during Sunday and public holiday.</p> <p>The complaint was referred by EPD to the project team of Contract No. HY/2010/02 to follow up on 23 October 2015.</p> <p>After investigation, with referred to the available information, it is unable to determine whether the night time noise complaint and the concerned dark smoke are related to this Contract.</p>			
Notification of summons	-	-	-	-	2
Successful Prosecutions	-	-	-	-	2

Appendix K – Event Action Plan

Event / Action Plan for Air Quality

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

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

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

Event / Action Plan for Construction Noise

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

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

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

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

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

Event / Action Plan for Dolphin Monitoring

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

	<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>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>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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Report No. D011
Monitoring Period September 2015 - November 2015

The Action and Limit Levels of Chinese White Dolphin (CWD) monitoring which was extracted from the enhanced Event and Action Plan[#] are reproduced below:

	North Lantau Social Cluster	
	NEL	NWL
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)]	

Quarterly Encounter Rate

	STG*	ANI**	Level Exceeded
NEL	0.0	0.0	Limit
NWL	1.9	3.8	

[#] Reference is made to the enhanced Event Action Plan for Chinese White Dolphin Monitoring accepted by EPD on 7 May 2013.

*Quarterly Encounter Rate of Number of Dolphin Sightings (STG) presents averaged encounter rates of the three monitored months in terms of groups per 100km per survey event.

**Quarterly Encounter Rate of Total Number of Dolphins (ANI) presents averaged encounter rates of the three monitored months in terms of individuals per 100km per survey event.

Investigation Results:

- a) Causes of exceedance
 - After review of all available and relevant data, including the raw data and analyses of other parameters included in the EM&A, no significant variation is detected in key environmental parameters.
 - No direct relationship with Project construction activities can be found between either the increase or decrease of dolphin numbers in NEL but this project activities may contribute to disturbance.
 - Current mitigation measures are being upheld. Both day and night MMO and PAM systems have been fully implemented from the start of works of the Project.
 - There has been no failure or reduction of dolphin-specific mitigation measures.
 - Meetings were held on 9 December 2014, 27 April 2015, 10 July 2015, 6 October 2015 and 15 January 2016, between ENPO, project ET for this and other HZMB contracts and engineer representatives, to discuss dolphin encounter rates during the period September-November 2014, December 2014-February 2015, March 2015-May 2015, June 2015-August 2015 and September 2015 - November 2015. It was concluded that the HZMB construction work is one of the contributing factors affecting the dolphins. It was also concluded the contribution of impacts due to individual HZMB contracts and processes cannot be separated from the other activities within the dolphins habitat.
- b) Action required under the action plan
Please refer to corresponding Event and Action Plan.
- c) Action taken under the action plan

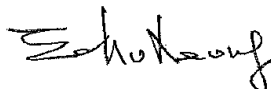
1. Statistical data analysis has been repeated to confirm findings;
2. All available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&A have been reviewed;
3. Identification of source of impact was carried out;
4. The IEC, ER and Contractor have been informed of findings;
5. Monitoring data have been checked;
6. Repeated review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary;
7. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related solely to Project 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.

d) ET's conclusions and recommendations for mitigation

- Current mitigation measures for CWD are being implemented fully, and the Contractor has been reminded to consistently implement existing mitigation measures.
- It was considered that the current monitoring works under the EM&A programmes have already provided a high level of monitoring effort, and the joint meeting with ENPO, project ET for this and other HZMB projects and engineer representatives on 15 January 2016 concluded that additional monitoring in the three monitoring areas was not considered necessary as it may not generate additional information regarding dolphin distribution pattern in these three areas. Instead, it was considered that existing data can be reviewed and alternative analytical methods can be explored to see if it could provide new insight to the dolphin distribution pattern. On a meeting held on 6 October 2015, ENPO stated an extension of survey work into waters outside the three currently surveyed areas for this project was underway to investigate expanded habitat use of dolphins outside the project area.
- The joint meeting with ENPO, project ET for this and other HZMB projects and engineer representatives on 6 October 2015 suggested that the protection measures (e.g., speed limit control) for the proposed Brothers Marine Park (BMP) be brought forward as soon as possible to reduce boat related impacts soonest. It was noted that under the Regular Marine Travel Route Plan, the contractors of HKBCF Reclamation Works have committed to reduce the vessel speed in BMP.

e) Contractor's actions to implement the mitigation

- The Contractor was reminded to ensure relevant mitigation measures were fully implemented.
- It was recommended that the marine works of HZMB projects should be accelerated and completed as soon as possible so as to reduce the overall duration of impacts and allow the dolphins population to recover as early as possible.
- It was also recommended that the marine works footprint to be reduced (e.g., reduce the size of peripheral silt curtain). It is noted that a phase plan proposal for perimeter silt curtain removal has been submitted to EPD on 27 October 2014, comments were issued by EPD on 9 December 2014 and it was under project team's review in the reporting quarter.
- It was also recommended that vessels for the marine works should be reduced as much as possible, and vessels idling / mooring in other part of the North Lantau shall be avoided whenever possible. The Contractor was already using large capacity sand barge so as to reduce the number of vessel traffic .



ET Leader Signature & Date:

30-May-16

Report No. D011
Monitoring Period September 2015 - November 2015

Investigation Report Attachment

- 1. Review all available and relevant data (construction activities), including raw data and analyses of other parameters (air, noise, water and underwater acoustic) covered in the EM&A, to ascertain if differences are a result of natural variation or previously observed seasonal differences.***

On 15 January 2016, a meeting was held between ENPO, ET for this contract and other HZMB contracts and engineer representatives following the limit level/action level exceedances for Chinese white dolphin encounter rate during the period September – November 2015. After review of the AFCD annual monitoring data, it was advised that dolphins in Hong Kong waters may have re-distributed throughout Hong Kong waters and that data from all three monitoring sections, as well as areas from outside these, should be reviewed to give a better, overall picture of current dolphin distribution patterns and to monitor individual dolphin movement. As AFCD data suggests that some dolphins have been distributed outside the range of the current monitoring for this Project, it was noted that ENPO had initiated a new study in areas adjacent to WL. The data from this new investigation will be reported via ENPO directly and is not part of this Projects monitoring obligation.

In the last year, there has been a consistent decrease of dolphins in the NEL and NWL areas. As stated in previous investigation reports, the HZMB works is one of the contributing factors affecting the dolphins and it was reiterated at this latest meeting that there are also concurrent works ongoing in both NEL and NWL, some of which are not part of the HZMB Project. Further, it was noted that it is extremely difficult to attribute specific impacts from any single works or activity and also, it is not possible to separate the impact caused by one part of the HZMB project from another. It was noted that there has been consistently less dolphins adjacent to HZMB construction sites as all parts of the HZMB Project have been initiated. These are in addition to the existing pressures the dolphins faced in the Lantau habitat before the HZMB development started, e.g., boat traffic, habitat degradation, pollution, competition with fisheries. All ETs noted at the meeting that mitigation across individual HZMB sites has been fully implemented. The regular checking and auditing of all mitigation works at the HKBCF reclamation works record that all dolphin mitigation measures in the form of vessel routes and speeds, etc., have been implemented and DEZ/DWP are in place. The meeting summarised that multiple factors, as listed above and including the HZMB project, have all contributed to dolphin distribution changes in Hong Kong.

Three (3) action level exceedances of Suspended Solids (SS) were recorded in the reporting period, one (1) at monitoring station SR7, one (1) at monitoring station SR6 and one (1) at IS(Mf)9 during flood tide on 30 September 2015, 2 October 2015, 6 November 2015 respectively. After investigation, the information available concluded that the recorded exceedances were not related to this Contract.

SR6 IWQM action level exceedances of SS (mg/L) was at location close to northern end of transect line 3, SR7 IWQM action level exceedance of SS (mg/L) was at location close to southern end of transect line 23, IS(Mf)9 IWQM action level exceedance of SS(mg/L) was at location close to south of HKBCF reclamation Works relatively close to southern end of line 11.

All three action level exceedances of SS (mg/L) were of a localised nature. It is anticipated that short duration, locally confined increases in sedimentation in an area that is unsuitable for dolphins to traverse anyway, would not impact dolphins which may have occurred in the area.

2. Identify source(s) of impacts.

There is a documented significant population decline of the Hong Kong dolphin and, in 2008, an expert panel concluded that the anthropogenic activities which occur in the Hong Kong and adjacent habitat have the potential to affect the dolphin population through pollution, infection, lowered prey availability, intense and low noise levels, collisions, behavioural changes, disturbance, entanglement in fishing gear and habitat modification by activities such as construction, dredging, sewage disposal, industrial effluent discharge, shipping, reclamation, fishing. Since this review, pro-active management by AFCD has resulted in a reduction of the negative impacts caused by non-sustainable fishing, i.e., as the trawling ban progresses, more prey should be available to dolphins, and a general reduction in fishing activities will reduce the potential for entanglement in fishing gear. It is noted that other fishing activities are ongoing in Hong Kong waters which also pose a risk of entanglement, however, data from strandings programme often cannot discern which type of fishery is (and/or net) is responsible for an individual entanglement. In other areas where coastal fisheries have been monitored by independent observers, it was noted that of trawling, purse seine and gill netting have the highest bycatch incidence for bottlenose dolphins, with trawling noted as having the greatest impact (Allen *et al* 2014). Globally, trawling fisheries are of the greatest conservation concern due to their high impact on small cetaceans (Ross and Isaac 2004), and although there may still be other fisheries in operation in Hong Kong which pose an entanglement risk to dolphins, none are as intensive or as widespread as the trawl fishery was. Other identified impacts, however, are ongoing and it is noted that construction activities and the high speed ferry traffic in NEL and NWL have both increased since 2008 (AFCD Annual Monitoring Reports 2009;2010;2011;2012;2013;2014;2015). A recent publication incorporating data from AFCD assessed impacts known from Hong Kong between 1996 and 2013 and concluded that high speed ferries have significantly contributed to the decline in dolphins from NEL. This paper also suggests that there has been an overall decline of dolphins in the northern waters of Lantau Island (Marcotte *et al* 2015). This paper also states that caution should be exercised

when interpreting these preliminary findings and further analysis is encouraged. It is noted that the high speed ferries from NEL have been re-routed to travel to the east and north of Sha Chau Lung Kwu Chau Marine Park during the reporting period resulting in increased high speed ferry traffic adjacent to an area that the dolphins have traditionally used frequently. A recent publication (Li *et al* 2015) examined the acoustic disturbance of high speed boats¹ on Chinese white dolphins and observed that frequencies of over >100kHz dominated. This is within the dolphins communication range. The recorded boat noise raised the ambient underwater noise levels from ~5 to 47 decibels, with louder levels recorded at higher speeds and at closer distances. In Hong Kong, similar vessels include small fishing boats, commonly referred to as “P4s” and high speed ferries. This study notes the potential impact these elevated levels have on Chinese white dolphins in southern China and it can be assumed that similar acoustic disturbance may occur in Hong Kong waters. It is known from studies elsewhere that dredging and marine piling activities cause significant disturbance to marine mammals (David 2006; Jefferson *et al.* 2009; Bailey *et al* 2010) including vibratory piling which was conducted as part of the HZMB construction (Wang *et al* 2014; Yang *et al* 2015). Activities which are stressful to dolphins are usually associated with increased underwater noise levels and this includes vessel traffic (from all construction works in the proximity of North Lantau). It is also noted that Hong Kong and adjacent ports are the world’s busiest commercial shipping area with heavy shipping traffic.

As discussed in previous meetings, the ET for HY/2010/02 advised that the contractor was already using large capacity sand barges so as to reduce the number of vessel traversing the north Lantau. Underwater noise levels from vessels are related to the horse power of the engine, the size and shape of the hull, the propeller type and the speed of the vessel. Although few quantitative comparative studies have been conducted, one such study investigates different sound sources from vessels of different lengths (Kipple and Gabriele, 2007). Vessels over 250 foot (approx. 76m) fall into the same sound source category (170 – dB re 1 microPa at 1 yard). As both the large capacity barge and the smaller capacity sand vessel it replaces are within the over 250 foot length category and fall into the same sound source category², a reduction in both the number of active vessels and the number of journeys across NEL per day will lead to a reduction in sources of underwater noise levels, therefore reducing the underwater noise attributable to sand barges. Protective measures (e.g., speed limit control) for the proposed Brothers Marine Park (BMP) are underway.

Other non project related works and activities around the HZMB project area may contribute to changes in dolphin distribution and include, but may not be limited to;

- Shift in distribution or change in composition of prey resources (Buchary *et al.* 2003).
- Recent publications suggest that the health status of the dolphins in Hong Kong and adjacent waters may be poor due to the long term accumulation of pollutants therefore, making them more susceptible to new stressors (Gui *et al.* 2014)

¹ Boats travelling at over 15kmph

² Please note, actual sound sources levels from Hong Kong vessels have not been measured but sound reduction assumption have been inferred from measurements from similar vessels elsewhere.

3. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise if additional measures are necessary.

Site inspection of the implementation of vessel speed limit, acoustic decoupling measures, spillage and runoff prevention measures on barges, training records related to regular marine travel routes for Contract's vessels, record of implementation of dolphin watching plan and silt curtain integrity checking record were conducted during weekly site inspection. The appropriate mitigation monitoring was in place depending on site activities, i.e., Dolphin Exclusive Zone for silt curtain laying and Dolphin Watching Plan for all other Project activities.

4. Investigate whether the exceedance was caused by any of the construction activity associated with the works contract.

No single construction works associated with the HKBCF Project can be found to coincide with the observed reduction in dolphin encounter rates in NEL and NWL. As discussed at the series of meetings held, it was agreed that all HZMB works is one of the contributing factors affecting the dolphins. It was also concluded the contribution of impacts due to individual Projects cannot be quantified nor separate from the other stress factors. All mitigation measures as detailed in the EM&A are being upheld and additional measures to restrict traffic number and routing have been proposed and, in some cases, already implemented for the HKBCF Project.

These factors were reported in D005, D006, D007, D008, D009 and D010, and the conclusions therein are still valid, that is, there are ongoing construction works, both Project related and not, which are known to impact dolphins. At this time, the long term impacts of these works cannot be assessed although expanding the scope of monitoring areas will provide better data on impacts outside the NEL and NWL zones.

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