AECOM

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 Report for March 2014- May 2014

[10/2014]

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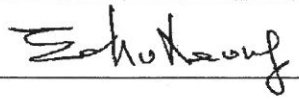
Reviewed, Approved and Certified:	Echo Leong (ETL)	

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Ref.: HYDHZMBEEM00_0_2388L.14 29 October 2014

Engineer's Representative 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. Roger Marechal

Dear Sirs,

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 Work
Quarterly Environmental Monitoring & Audit Report for Mar 2014 to May 2014

Reference is made to the Environmental Team's submission of the Quarterly Environmental Monitoring & Audit Report for March 2014 to May 2014 (letter ref: 60249820/C/RMKY14102901 dated 29 October 2014) copied to us by E-mail on 29 October 2014. Please be advised that we have no further comment at this stage but with the following observations:

1. Submission of the results of multi-variate analyses as stated in this report is still outstanding.

Thank you very much for your kind attention and please do not hesitate to contact the undersigned should you have any queries.

Yours sincerely,

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)

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TABLE OF CONTENTS

List of Tables

Figures

List of Appendices

EXECUTIVE SUMMARY

Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Work (here below, known as "the Project") 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 06 August 2013 (EP-353/2009/G) and 28 January 2014 (EP-354/2009/B) (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 Project).

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

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

AECOM Asia Co. Ltd. (AECOM) was appointed by CHEC to undertake the role of Environmental Team for the Project 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 2016. 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 March 2014 and 31 May 2014. As informed by the Contractor, major activities in the reporting quarter were:-

Marine-based Works

- Connecting arc cell installation
- Laying geo-textile
- Optimizing rubble mound seawalls
- Conforming sloping seawalls
- Sand filling
- Rock filling
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Stone column installation
- Band drain installation
- Backfill cellular structure
- Geotechnical Instrumentation works
- Construction of temporary seawall
- Portion D Construction of Access to Portion A
- Surcharge laying
- Construction of temporary pier at Portion A
- Precast Yard setup
- Seawall blocks for temporary construction
- Vibro-compaction on surcharge
- Construction of conveyors for public fill
- Temporary bridge at Portion D

Land-based Works

- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Geo-textile fabrication at Works Area WA2
- Silt curtain fabrication at Works Area WA4
- Installed sand bag at Works Area WA2

- 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 results were below the Action and Limit Level in the reporting quarter. One (1) 24-hour TSP results recorded at AMS3B exceeded the Action Level. Investigation results show that the Action level exceedance was not related to Project.

Breaches of Action and Limit Levels for Noise

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

Breaches of Action and Limit Levels for Water Quality

Eight (8) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. One (1) Limit Level exceedance was recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. One (1) Action level exceedance was recorded at measured turbidity values (in NTU) in the reporting quarter. Investigation results shows that all the Action and Limit Level Exceedance recorded were non-project related.

Breaches of Action and Limit Levels for Impact Dolphin Monitoring

One (1) Limit Level exceedance was recorded for Chinese White Dolphin monitoring in the reporting quarter.

Triggering of Event and Action Plan for Impact Dolphin Monitoring

Event and 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

EPD referred a complaint on 17 March 2014 from complainant who advised that there was sea water colored in blue observed in vicinity of Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Facilities (HKBCF) where stone column installation was taking place. The locations of stone column and impact water quality monitoring data recorded between 12 – 17 March14 were reviewed. In accordance with the monitoring records, no discoloration of sea water or silty plume appearance outside the seawall was observed during the water quality monitoring between 12 – 17 March14. Therefore the complaint is considered to be non-project related.

EPD referred a complaint from a complainant who advised that muddy water was found being discharged from the construction site of Hong Kong-Zhuhai-Macau Bridge Hong Kong Boundary Crossing Facilities (HKBCF) – Reclamation Works on 22 March 2014. With refer to the monitoring records on 21 March 2014 and the follow-up site inspection audit conducted with the representatives of the Contractor and Residential Engineer on 27 March 2014, since no discoloration of sea water or silty plume appearance outside the perimeter silt curtain was observed, the complaint is considered to be non-project related.

As informed by the Contractor, a complaint was received by the Contractor on 25 March 14 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. However, base on the available information, it cannot indicate that the air quality impact was caused by the vessel of this Contract and therefore the complaint could not be concluded as related to this Contract.

As informed by the Contractor, further to the notification of summons received March 2014 due to works carried out on 6 October 13 contrary to conditions of NCO, Cap.400. The Contractor pledged guilty to the charge during the court appearance on 28 April 2014. The Contractor has established noise control management system on restricted hour works, to prevent future violation of conditions of NCOs, Cap. 400.

As informed by the Contractor on 7 May 14, a complaint was received by the Contractor on 17 April 14 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. However, because no extra information was received for this complaint after the release of the latest investigation report, it is unable to conclude whether the complaint is related to this Contract.

As informed by the Contractor on 30 May 2014, an environmental complaint had been received on 28 May 2014. The complainant mentioned that waste such as earth and concrete were being felled into the sea everyday at the Hong Kong-Zhuhai-Macao Bridge at location where construction works are being conducted, causing pollution to the marine environment. The construction programme and waste flow record provided by the Contractor has been reviewed. With refer to the available information provided, it is concluded that the complaint is unlikely to be related to this Contract.

1 INTRODUCTION

1.1 Background

1.1.1 Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kog Boundary Crossing Facilities – Reclamation Work (here below, known as "the Project") mainly comprises seawall construction and 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) and August 2013 (EP-353/2009/G). 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) and January 2014 (EP-354/2009/B).

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 6 August 2013 (EP-353/2009/G) and 28 January 2014 (EP-354/2009/B) (for TMCLKL Southern Landfall Reclamation only).

1.1.5 A Project Specific EM&A Manual, which included all project-relation contents from the original EM&A Manuals for the Project, 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 Project).

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

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

1.1.9 AECOM Asia Co. Ltd. (AECOM) was appointed by CHEC to undertake the role of Environmental Team for the Project 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 2016.

1.1.11 According to the Project Specific EM&A Manual, there is a need of an EM&A programme including air quality, noise, water quality and dolphin monitoring and environmental site inspections. The EM&A programme of the Project commenced on 12 March 2012.

1.2 Scope of Report

1.2.1 This is the eighth 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 Project from 1 May 2014 to 31 May 2014.

1.3 Project Organization

1.3.1 The project 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	2528 3031	2668 3970
IEC / **ENPO** (ENVIRON Hong Kong Limited)	Independent Environmental Checker	Raymond Dai	3465 2888	3548 6988
	Environmental Project Office Leader	Y.H. Hui	3465 2868	3465 2899
Contractor (China Harbour Engineering Company Limited)	General Manager (S&E)	Daniel Leung	3157 1086	2578 0413
	Environmental Officer	Richard Ng	36932253	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-based Works

- Connecting arc cell installation
- Laying geo-textile
- Optimizing rubble mound seawalls
- Conforming sloping seawalls
- Sand filling
- Rock filling
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Stone column installation
- Band drain installation
- Backfill cellular structure
- Geotechnical Instrumentation works
- Construction of temporary seawall
- Portion D Construction of Access to Portion A
- Surcharge laying
- Construction of temporary pier at Portion A
- Precast Yard setup
- Seawall blocks for temporary construction
- Vibro-compaction on surcharge
- Construction of conveyors for public fill
- Temporary bridge at Portion D

Land-based Works

- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Geo-textile fabrication at Works Area WA2
- Silt curtain fabrication at Works Area WA4
- Installed sand bag at Works Area WA2
- 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 Project 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 Project 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 Project 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 Project 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 Project Specific EM&A Manual. However, for monitoring location NMS3 (Ho Yu College), as proposed in the Project 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.

2.1.4 In accordance with the Project 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 Project 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/G and EP-354/2009/B) (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 Project Specific EM&A Manual, impact 1-hour Total Suspended Particulates (TSP) monitoring was conducted for at least three times every 6 days, while impact 24-hour TSP monitoring was carried out for at least once every 6 days at the 4 monitoring stations (AMS2, AMS3B, AMS6 and AMS7).

3.1.2 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 The weather was mostly sunny, with occasional cloudy and occasional rainy in the reporting quarter. The major dust source in the reporting quarter included construction activities from the Project, as well as nearby traffic emissions.

3.1.4 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		
		March 14	April 14	May 14
1-hr TSP	AMS2	15	18	18
	AMS3B	15	18	18
	AMS7	15	18	18
24-hr TSP	AMS2	5	6	6
	AMS3B	5	6	6
	AMS7	5	6	6

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

Monitoring Parameter	Location	Level of Exceedance	Level of Exceedance		
			March 14	April 14	May 14
1-hr TSP	AMS2	Action	0	0	0
		Limit	0	0	0
	AMS3B	Action	0	0	0
		Limit	0	0	0
	AMS7	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	***1***	0	0
		Limit	0	0	0
	AMS7	Action	0	0	0
		Limit	0	0	0
		Total	***1***	***0***	***0***

3.1.5 All 1-Hour TSP results were below the Action and Limit Level in the reporting quarter. One (1) 24-hour TSP results recorded at AMS3B exceeded the Action Level in the reporting quarter. Investigation results show that the Action level exceedance was not related to Project.

3.1.6 For the 24Hr TSP Action Level exceedance recorded at AMS3B, a result of 178μg/m^3 was recorded on 11 March 14 (24-hr TSP).

3.1.6.1 According to information provided by the Contractor, land-based construction activity such transloading stitched geo-textile and transloading sand bags to barges was being undertaken at Works Area WA2 during the monitoring period.

3.1.6.2 Functional checking on HVS at AMS3B was done. Air flow of the HVS was checked and the flow was steady during the 24-hr TSP sampling at AMS3B. The filter paper was re-weighted by the assigned HOKLAS laboratory and the result was reconfirmed.

3.1.6.3 As refer to the wind data collected at wind station at Works Area WA2 during the monitoring period on 10 and 11 March 14, Southeast to South-southeast winds was prevailing during the monitoring period. As such, the 24hr-TSP exceedance is unlikely to be contributed by active works at the HKBCF – reclamations works which is located North to the monitoring location.

3.1.6.4 The 1-hr TSP values recorded at AMS3B on 11 March14, which are within the monitoring period of the 24-hr TSP, were 83μg/ m^3, 80μg/ m^3 and 81μg/ m^3 respectively. All measured values are well below the Action and Limit Levels.

3.1.6.5 The measured 24-hr TSP values recorded at AMS2 and AMS7 (which are closer to the marine-based works areas) on the same monitoring date were 111μg/m^3 and 90μg/m^3, which are below the Action and Limit Levels.

3.1.6.6 The measured 24-hr TSP values recorded at AMS3B on next monitoring date were 106μg/m^3, which did not exceed the Action or Limit Level.

3.1.6.7 The following dust mitigation measures have been implemented at Works Area WA2:

1. Works Area WA2's surface was hard-paved, compacted or hydro-seeded (Please refer to attached layout map and photo record (View B))
2. Vehicle washing facility was provided at vehicle exit points,
3. Measures for preventing fugitive dust emission are provided, e.g. canvas/tarpaulin covers.

View B (Hard paved surface observed at Works Area WA2)

3.1.6.8 The dust exceedance was therefore considered not to be due to the Project works.

3.1.7 The event action plan is annexed in Appendix L.

3.1.7.1 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 March 2014.

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		
		March 14	April 14	May 14
	NMS2	4	5	4
	NMS3B	4	5	4

Table 3.4 Summary of Number of Monitoring Exceedances for Impact Noise

Monitoring Parameter	Location	Level of Exceedance	Level of Exceedance		
			March 14	April 14	May 14
	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 L.

3.3 Water Quality Monitoring

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

3.3.2 Eight (8) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting Quarter. One (1) Limit Level exceedances was recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. One (1) Action level exceedances was recorded at measured turbidity values (in NTU) in the reporting quarter.

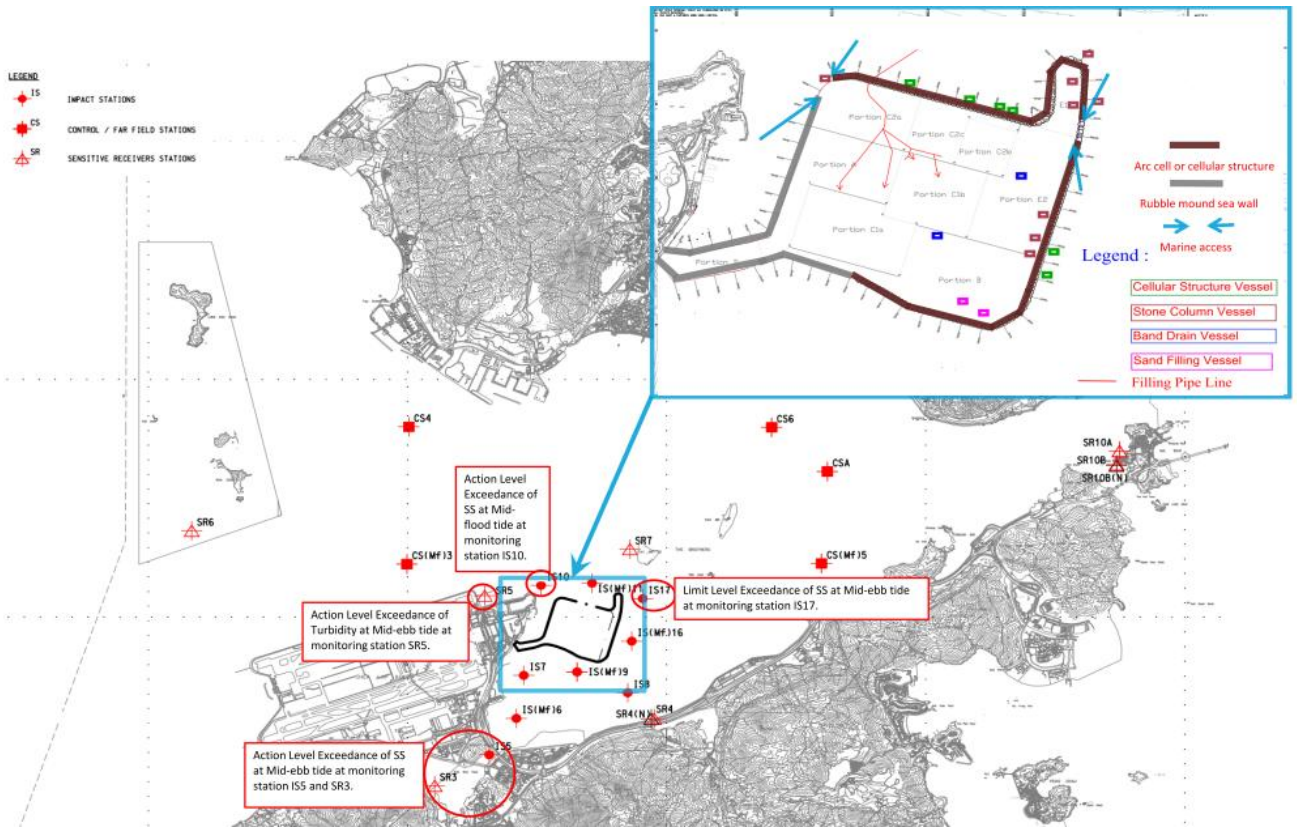
Table 3.5 Summary of Water Quality Exceedances in March 14 – May 14

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	(1) 19 March 14	0	1	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	(1) 31 March 14	0	1
	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	(1) 24 March 14	(2) 24 and 31 March 14	1	2
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	0	0	0	0	0	0	0	(1) 19 March 14	1	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	(1) 19 March 14	0	1	0
SR3	Action	0	0	0	0	0	0	(1) 19 March 14	0	1	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	(1) 19 March 14	0	0	0	1	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR6	Action	0	0	0	0	0	0	0	(1) 31 March 14	0	1
	Limit	0	0	0	0	0	0	0	0	0	0
SR7	Action	0	0	0	0	0	0	0	0	0	0
	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

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
Total	**Action**	0	0	0	0	1	0	4	4	9	
	Limit	0	0	0	0	0	0	1	0	1	

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

3.3.3 One (1) Limit level exceedance of SS was recorded at IS17 at ebb tide; three (3) Action Level exceedances of SS were recorded at IS5, SR3 at ebb tide and IS10 at flood tide; one (1) Action Level Exceedance on Turbidity was recorded at SR5 at ebb tide on 19 March 14.



3.3.3.1 Please see above layout map for work activities carried out on 19 March 14.

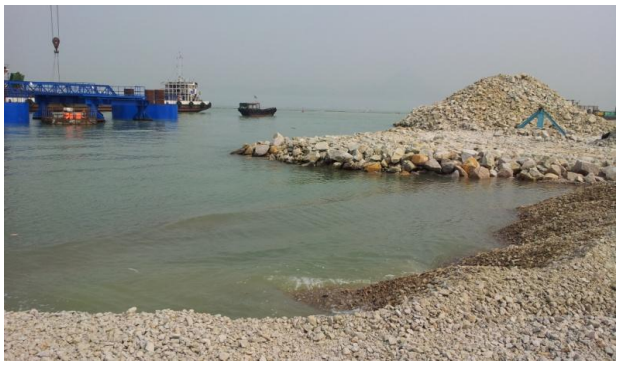
3.3.3.2 Exceedance recorded at IS10 during mid-flood tide is unlikely due to marine based construction activities of the Project because:

3.3.3.3 With reference to the information provided by the Contractor, same types of work were carried out at almost the same locations on 17, 19 and 21 March 14, impact water quality monitoring data recorded on 17 and 21 March 14 are all below the Action and Limit Level which indicates active works were unlikely to adversely affect the water quality at IS10.

3.3.3.4 With reference to monitoring record and photo record taken on 19 and 20 March 2014, no silt plume was observed on sea near the northwest part of the site which is close to IS10. (Please see attached photo record)

3.3.3.5 Photo of sea condition taken near the northwest part of the site (Near IS10) on 19 March 14

3.3.3.6 Photo of sea condition taken near the northwest part of the site (Near IS 10) on 20 March 14



3.3.3.7 In accordance with the silt curtain integrity checking record, no disconnection was observed at the northwest part of site which is near IS10.

3.3.3.8 Turbidity level recorded at IS10, SR5 and IS(Mf)11 were below the action and limit level. This indicates the turbidity level at area near IS10 was not adversely affected.

3.3.3.9 The exceedance was likely due to local effects in the vicinity of IS10.

3.3.3.10 As such, the exceedance recorded at IS10 is unlikely to be project related.

3.3.3.11 For the action Level Exceedance on Turbidity recorded at SR5 on 19 March 14.

3.3.3.12 in situ measurement was repeated to confirm findings;

3.3.3.13 The monitoring location of monitoring station SR5 is considered upstream to the active works of this project during ebb tide. Therefore it appears that it was unlikely that the exceedance recorded at SR5 was due to active construction activities of this project;

3.3.3.14 IEC, contractor and ER were informed via email;

3.3.3.15 Monitoring data, all plant, equipment and Contractor's working methods were checked;

3.3.3.16 Since it is considered that the exceedance at SR5 is unlikely to be project related, as such, actions 5 - 7 under the EAP are not considered applicable.

3.3.3.17 Exceedance recorded at SR5 during mid-ebb tide are unlikely due to marine based construction activities of the Project because:

3.3.3.18 With reference to the information provided by the Contractor, same types of work were carried out at almost the same locations on 17, 19 and 21 March 14, impact water quality monitoring data recorded on 17 and 21 March 14 are all below the Action and Limit Level which indicates active works were unlikely to adversely affect the water quality at SR5.

3.3.3.19 The monitoring location of monitoring station SR5 is considered upstream to the active works of this project during ebb tide. Therefore it appears that it was unlikely that the exceedance recorded at SR5 was due to active construction activities of this project.

3.3.3.20 With reference to the silt curtain checking record no defects was observed at parts of the perimeter silt curtain which are close to the SR5.

3.3.3.21 The exceedance was likely due to local effects in the vicinity of SR5.

3.3.3.22 As such, the exceedance recorded at SR5 is unlikely to be project related.

3.3.3.23 Exceedance recorded at SR3 during mid-ebb tide are unlikely due to marine based construction activities of the Project because:

3.3.3.24 With reference to the information provided by the Contractor, same types of work were carried out at almost the same locations on 17, 19 and 21 March 14, impact water quality monitoring data recorded on 17 and 21 March 14 are all below the Action and Limit Level which indicates active works were unlikely to adversely affect the water quality at SR3.

3.3.3.25 The monitoring location of monitoring station SR3 is considered upstream to the active works of this project during ebb tide. Therefore it appears that it was unlikely that the exceedance recorded at SR3 was due to active construction activities of this project.

3.3.3.26 With reference to the silt curtain checking record no defects was observed at parts of the perimeter silt curtain which are close to the SR3.

3.3.3.27 The exceedance was likely due to local effects in the vicinity of SR3.

3.3.3.28 As such, the exceedance recorded at SR3 is unlikely to be project related.

3.3.3.29 Exceedance recorded at IS5 during mid-ebb tide are unlikely due to marine based construction activities of the Project because:

3.3.3.30 With reference to the information provided by the Contractor, same types of work were carried out at almost the same locations on 17, 19 and 21 March 14, impact water quality monitoring data recorded on 17 and 21 March 14 are all below the Action and Limit Level which indicates active works were unlikely to adversely affect the water quality at IS5.

3.3.3.31 The monitoring location of monitoring station IS5 is considered upstream to the active works of this project during ebb tide. Therefore it appears that it was unlikely that the exceedance recorded at IS5 were due to active construction activities of this project.

3.3.3.32 With reference to the silt curtain checking record no defects was observed at parts of the perimeter silt curtain which are close to the IS5.

3.3.3.33 The exceedance was likely due to local effects in the vicinity of IS5.

3.3.3.34 As such, the exceedance recorded at IS5 is unlikely to be project related.

3.3.3.35 Exceedance recorded at IS17 during mid-ebb tide are unlikely due to marine based construction activities of the Project because:

3.3.3.36 With reference to the information provided by the Contractor, same types of work were carried out at almost the same locations on 17, 19 and 21 March 14, impact water quality monitoring data recorded on 17 and 21 March 14 are all below the Action and Limit Level which indicates active works were unlikely to adversely affect the water quality at SR5, IS5, SR3 and IS17.

3.3.3.37 With reference to monitoring record and photo record taken on 19 and 20 March 2014, no silt plume was observed on sea near the northeast part of the site which is close to IS17. (Please see attached photo record)

3.3.3.38 Photo of sea condition taken near the northeast part of the site (Near IS17) on 19 March 14.

3.3.3.39 Photo of sea condition taken near the northeast part of the site (Near IS17) on 20 March 14.

3.3.3.40 With reference to the silt curtain checking record no defects was observed at parts of the perimeter silt curtain which are close to the locations where the exceedance was recorded during mid-ebb tide.

3.3.3.41 Turbidity level recorded at IS(Mf)11, IS17 and IS(Mf)16 were below the action and limit level. This indicates the turbidity level at area near IS17 was not adversely affected.

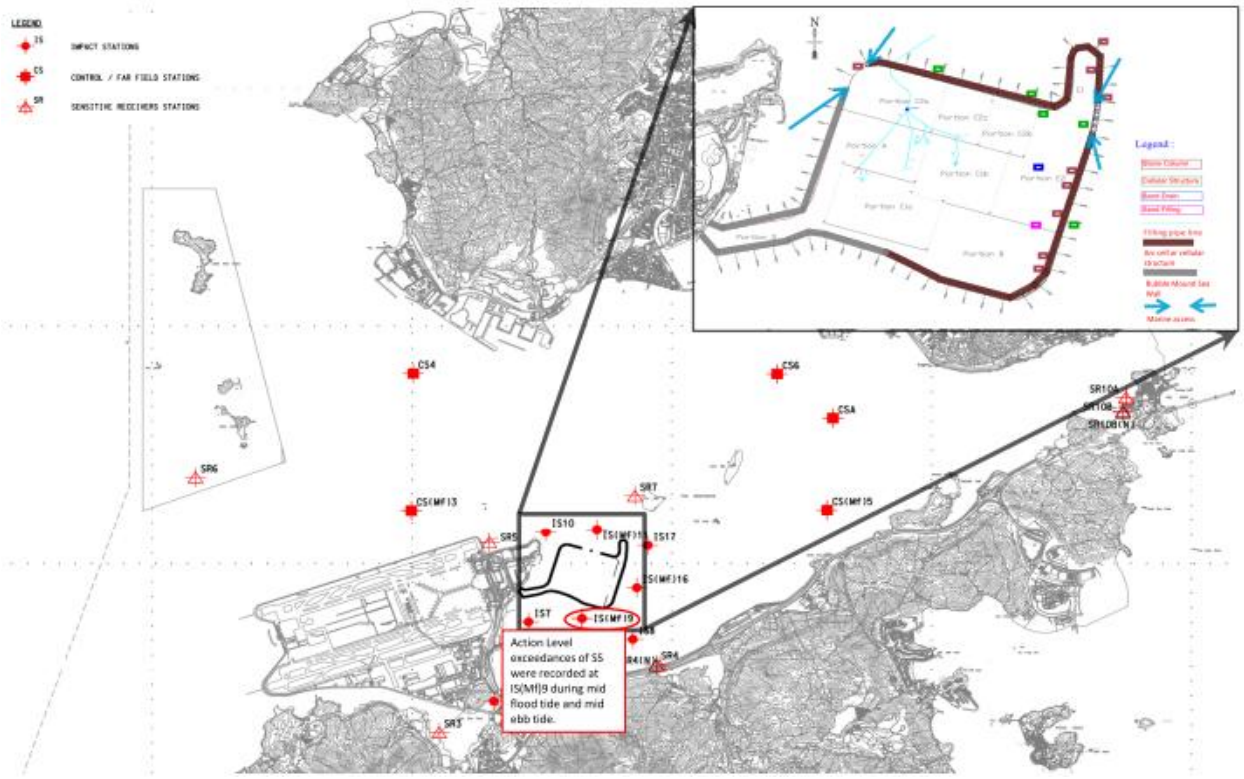
3.3.3.42 The exceedance is likely due to local effects in the vicinity of IS17.

3.3.3.43 As such, the exceedance recorded at IS17 is unlikely to be project related.

3.3.3.44 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.

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

3.3.4 Two (2) Action Level exceedances of SS were recorded at IS(Mf)9 were recorded during mid flood tide and mid ebb tide respectively on 24 March 14.



3.3.4.1 Please see above layout map for work activities carried out on 24 March 14.

3.3.4.2 In accordance with the silt curtain integrity checking record, deficiency such as missing segments at one end of the perimeter silt curtain at the southern marine access was noted. This part of the perimeter silt curtain is close to IS(Mf)9. The Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains and to carry out maintenance work once defects were found and maintenance work of the silt curtain was carried out by the Contractor on a daily basis except Sunday and public holiday.

3.3.4.3 However, exceedances recorded at IS(Mf)9 recorded during mid-Ebb tide and mid-Flood tide are unlikely due to marine based construction activities of the Project because:

3.3.4.4 With reference to the information provided by the Contractor, same types of work were carried out at almost the same locations on 21, 24 and 26 March 2014, impact water quality monitoring data recorded on 21 and 26 March 2014 are all below the Action and Limit Level which indicates active works as shown on the layout map attached is unlikely to adversely affect the water quality at IS(Mf)9.

3.3.4.5 Mitigation measures such as localised silt curtain was implemented for stone column installation. (Please refer to the photo record)

3.3.4.6 Also, in accordance with the monitoring record, no silt plume was observed to flow from the inside of the perimeter silt curtain to the outside of the perimeter silt curtain during impact water quality monitoring on 24 March 2014. (Please refer to the photo attached which shows the sea condition near IS(Mf)9 on 24 March 2014.)

3.3.4.7 Photo of silt curtain near south part of the site IS(Mf)9 on 24 March 2014.

3.3.4.8 With referred to the monitoring data, turbidity level recorded at IS7, IS(Mf)9, IS8 and IS(Mf)16 were below the action and limit level. This indicates the turbidity level at area near IS(Mf)9 was not adversely affected.

3.3.4.9 In addition, with referred to the monitoring data, the Suspended Solids recorded at IS7, IS8 and IS(Mf)16 were below the action and limit level. This indicates the Suspended Solids at areas next to IS(Mf)9 was not adversely affected.

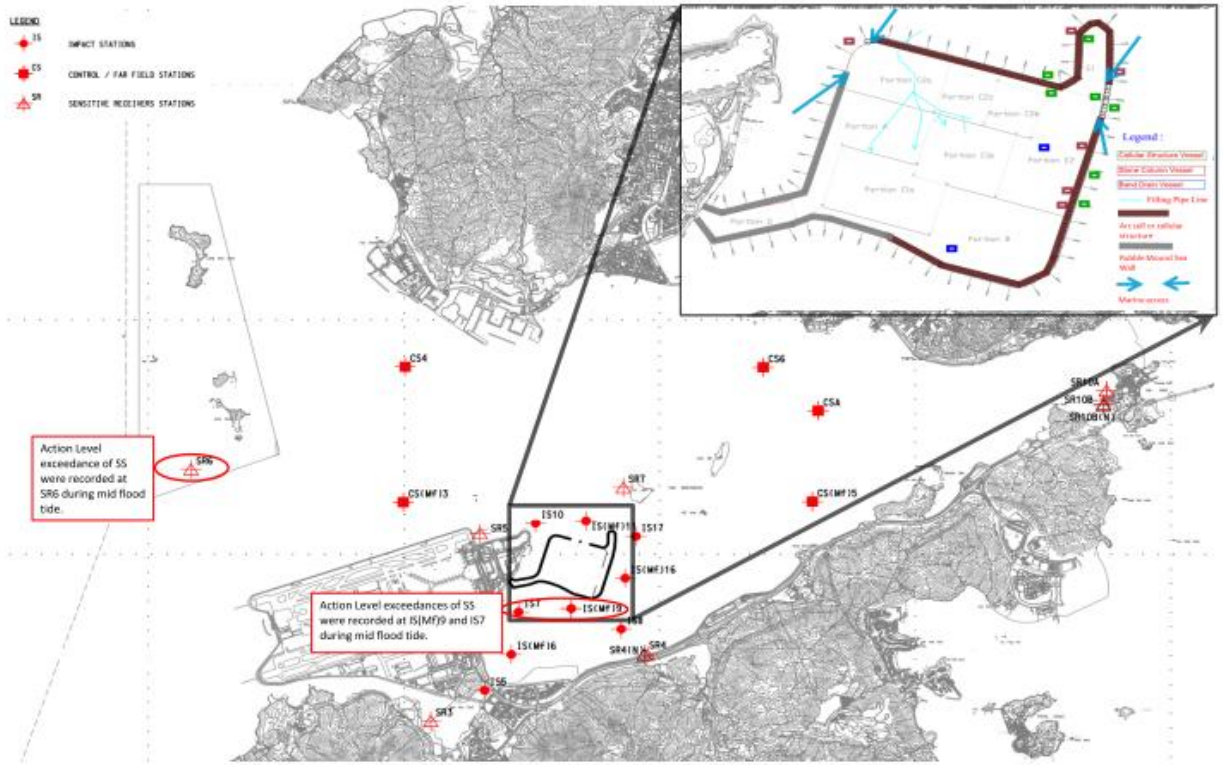
3.3.4.10 The exceedance was likely due to local effects in the vicinity of IS(Mf)9.

3.3.4.11 As such, the exceedance recorded at IS(Mf)9 is unlikely to be project related.

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

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

3.3.5 Three (3) Action Level exceedances of SS were recorded at IS(Mf)9, IS7 and SR6 during mid flood tide on 31 March 2014.



3.3.5.1 Please see above layout map for work activities carried out on 31 March 14.

3.3.5.2 IS10 and SR5 which are located downstream and closer to active works than SR6. No Action and Limit Level exceedance was recorded at IS10 and SR5 during mid flood tide on 31 March 2014 and this indicates that the water quality noted at downstream and closer to active works were not adversely affected, hence it is considered that the exceedance recorded at SR6 are not related to the Project.

3.3.5.3 Same type of works was carried out at almost the same locations on 28 and 31 March 2014 but Suspended Solids values recorded at 28 March 2014 are all below the Action and Limit Level during mid-flood tide, this indicates active works as shown on the layout map attached is unlikely to contribute to the exceedances recorded at IS(Mf)9, IS7 and SR6.

3.3.5.4 With reference to layout map attached, construction activity close to IS(Mf)9 and IS7 such as band drain installation was conducted at southeast part of portion B, since band drain is considered unlikely to cause silt plume. Therefore, the exceedances are unlikely attributed to construction activity close to IS(Mf)9 and IS7.

3.3.5.5 In accordance with the silt curtain integrity checking record, defects such as missing segments at southern marine access at one end of the perimeter silt curtain was noted. This part of the perimeter silt curtain is close to IS(Mf)9. The Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains and to carry out maintenance work once defects were found and maintenance work of the silt curtain was carried out by the Contractor on a daily basis except Sunday and public holiday.

3.3.5.6 However, in accordance with the monitoring record, no silt plume was observed outside the perimeter silt curtain near IS(Mf)9 and IS7 on 31 March 2014. (Please refer to the photo below which shows the sea condition near IS(Mf)9 on 31 March 2014.)

3.3.5.7 With referred to the monitoring data, turbidity level recorded at IS(Mf)6, IS7, IS(Mf)9, IS8 and IS(Mf)16 were below the action and limit level. This indicates the turbidity level at area near IS(Mf)9 and IS7 were not adversely affected.

3.3.5.8 The exceedances are likely due to local effects in the vicinity of IS(Mf)9, IS7 and SR6.

3.3.5.9 As such, the exceedances recorded at IS(Mf)9, IS7 and SR6 were unlikely to be project related.

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

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

3.3.5.12 The event action plan is annexed in Appendix L.

3.4 Dolphin Monitoring

3.4.1 In accordance with the Project 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 March – May 2014

Number of Impact Surveys Completed^	6
Survey Distance Travelled under Favourable On- Effort Condition	662.7km
Number of Sightings	15 sightings (11 sightings are ”on effort” (which are all under favourable condition), 4 “sightings are opportunistic”)
Number of dolphin individual sighted	46 individuals (the best estimated group size)
Dolphin Encounter Rate#	NEL: 0.0 NWL: 2.5
Dolphin Group Size	Average of NEL: 0.0 Average of NWL: 3.1 Varied from 1-12 individuals
Most Often frequent dolphin sighting area	Sha Chau and Lung Kwu Chau Marine Park, the western limit of NWL.

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 exceedances were recorded in the reporting quarter. The investigation results showed that there is no evidence that exceedances are related to Project works are annexed in Appendix L. Actions were taken according to the Event and Action Plan for impact dolphin monitoring. Please refer to Appendix L for details of action taken.

Table 3.7 Summary of STG and ANI encounter rates in March - May 2014

	NEL	NWL	Level Exceeded
STG*	0.0	2.5	Limit
ANI**	0.0	5.7	

*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 Exposed soil observed fully loaded on barge at near Portion D and C2a. The Contractor was reminded to provide dust control measures and keep the surface of all exposed soil wet and the Contractor was reminded to use suitable barge to store public fill to prevent potential runoff to the surrounding. (Reminder)

3.5.4 Exposed earth was observed at Works Area of Portion A. The Contractor was reminded to provide dust control measures such as to treat the exposed earth by compaction. The Contractor provided dust control measures such as to treat the exposed earth by compaction. (Closed)

3.5.5 Sprinkler system and sprinkler timer were observed properly implemented at TKO Fill Bank Area 137. The Contractor was reminded to continue proper implementation of sprinkler system to prevent potential generation of fugitive dust. (Reminder)

3.5.6 Vehicle equipped with watering system was observed implemented on exposed sand. The Contractor was reminded to continue to implement such dust control measures 8 times per day. (Reminder)

3.5.7 Dark smoke was observed emitted by a vessel. The Contractor was reminded that dark smoke emission from plant/equipment should be avoided. (Reminder)

3.5.8 Fugitive dust was observed generated on site at Portion D. The Contractor provided dust suppression measures such a compaction and watering to exposed soil. The Contractor was reminded to review the effectiveness of the abovementioned mitigation measures and to review the need to provide enhancement on current measures. In addition, high pressure water jet was observed at site entrance at Portion D, Nonetheless, the Contractor was reminded to review the need to enhance the wheel washing facility to effectively prevent potential trail of mud outside site boundary cause by site vehicles. (Reminder)

Noise

3.5.9 Generator was observed without acoustic decoupling measures on barge 天駿 3. The Contractor was reminded to install acoustic decoupling measure prior to leaving Portion A. (Reminder)

Chinese White Dolphin

3.5.10 No adverse observation was identified in the reporting month.

Water Quality

3.5.11 Chemical retaining bunding on barge SHB401 was not properly plugged. The Contractor should seal the bunding entirely to retain leakage, if any. The Contractor has sealed the bunding. (Closed)

3.5.12 Oil drum was not properly stored on barge 宏陽宮 106, Works Area of Portion A, barge 天駿 3 and on temporary rock bund. The Contractor should store oil drum within the chemical retaining bunding. Drip tray was provided for the oil drum at barge 宏陽宮 106 to retain potential leakage. However, some oil drums were still observed not properly stored. The Contractor should continue to store oil drum within the bunding (Closed)

3.5.13 Generators at Portion A were placed on bare ground without the provision of drip tray. The Contractor should provide mitigation measures such as drip trays to prevent potential oil leakage. Drip tray was provided for some of the generators to retain potential leakage. However, a generator was still observed place on bare ground without the provision of drip tray. The Contractor should continue to provide mitigation measures such as drip trays to prevent potential oil leakage. (Closed)

3.5.14 Water was observed accumulated inside car tyre on barge AP3 and in side drip tray at C2a near the blue conveyor belts and other areas. The Contractor was reminded to regularly clear water accumulated inside car tire drip tray at C2a near the blue conveyor belts and kept the site clean and tidy. The Contractor removed the car tyre and cleared the water inside drip tray at C2a and kept the site clean and tidy. (Closed)

3.5.15 Tools were observed stored inside drip tray with oil drums on barge AP3. The Contractor was reminded to properly store the equipments other than oil drums at area outside drip tray. The Contractor removed the equipments other than oil drums from area inside drip tray. (Closed)

3.5.16 Oil drum was observed not closed, the Contractor was reminded that every chemical waste containers should be securely closed, correctly placed and kept clean. The Contractor properly closed chemical waste containers. (Closed)

3.5.17 Idle stone column installation was observed without localised silt curtain at barge AP2. The Contractor was reminded that active stone column installation shall be fullly enclosed by localised silt curtain prior to operation. (Reminder)

3.5.18 Active stone column installation was observed not properly enclosed. The Contractor is reminded that sufficient silt curtain shall be installed to fully enclose the active stone column installation points. The Contractor is provided silt curtain to fully enclose the active stone column installation points. (Closed)

3.5.19 The Contractor was reminded that the chemical waste containers should be kept in good condition and free from damage or any other defects which may impair the performance of the containers (Closed)

3.5.20 Stockpile of soil was observed on barge AP3 at Portion D, the Contractor was reminded to provide measures to prevent potential runoff during rainstorm. (Reminder)

Chemical and Waste Management

3.5.21 General refuse and disconnected silt curtain were observed not properly allocated on 宏陽宮 106, Portion A's waste collection point and on the way from Portion D to C2a. The Contractor should keep the barge clean and tidy and collect the refuse and the disconnected silt curtain presented in the water within and adjacent to the works site. The refuse was cleared. The Contractor was reminded to provide proper storage for general refuse such as rubbish bin with lid. (Closed)

3.5.22 Big bag was observed improperly stored on barge AP3. The Contractor was reminded to provide proper storage for general refuse such as rubbish bin with lid. The Contractor cleared the rubbish bag. The Contractor was reminded to provide proper storage for general refuse such as rubbish bin with lid. (Closed)

3.5.23 Rubbish was observed at the edge of Works Area at Portion A, temporary Rock Bund and on sea next to the temporary rock bund. The Contractor was reminded to regularly clear the rubbish on site and keep the site clean and tidy. Collection and clearing of rubbish was observed conducted by the Contractor at certain areas of Works Area at Portion A. However, rubbish was still observed at various locations on Works Area of Portion A. The Contractor was reminded to continue provide rubbish bin, regularly collect the rubbish on site and keep the site clean and tidy. (Closed)

3.5.24 Stone and gravel were observed inside drip tray containing oil drums. The Contractor was reminded to relocate the drip tray with the oil drums to avoid the situation. The situation has been rectified. (Closed.)

3.5.25 Used band drains were observed stored on site at Portion A. The Contractor was reminded to regularly collect and dispose the used band drain materials. The Contractor cleared unwanted band drains regularly. Band drain material and general refuse were observed at the road side at Portion A. The Contractor cleared general refuse stored on site. Nonetheless, the Contractor was reminded to clear unwanted band drain and other general refuse stored on site regularly. (Reminder)

3.5.26 General refuse and disconnected silt curtain were observed next to cellular structure, at Portion A's waste collection point and on the way from Portion D to C2a. The Contractor was reminded to collect the refuse and the disconnected silt curtain presented in the water within and adjacent to the works site. The Contractor collected the refuse presented in the water within and adjacent to the works site. The Contractor was reminded to review the need to increase frequency to clear and dispose of the waste at waste collection point to avoid accumulation. (Reminder)

Landscape and Visual Impact

3.5.27 No relevant works was carried out in the reporting Quarter.

Others

3.5.28 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, 3,588,233.0 m^3 of fill were imported for the Project use in the reporting period. 24 kg of paper/ carboard packaging and 40 kg of metal were generated, 2.4 tonnes of chemical waste and 344.5 m^3 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.

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 results were below the Action and Limit Level in the reporting quarter. One (1) 24-hour TSP results recorded at AMS3B exceeded the Action Level in the reporting quarter. Investigation results show that the Action level exceedance was not related to Project.

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

6.1.3 Eight (8) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting Quarter. One (1) Limit Level exceedance was recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. One (1) Action level exceedance was recorded at measured turbidity values (in NTU) in the reporting quarter. Investigation results shows that all the Action and Limit Level Exceedance recorded were non-project related.

6.1.4 One (1) limit level exceedances of Chinese White Dolphin monitoring were recorded in the reporting quarter. Investigation results show that there is no evidence that exceedance is related to Project works. Event and Action Plan for Impact Dolphin Monitoring was triggered. For detail of investigation, please refer to appendix L.

6.1.5 Cumulative statistics on exceedances is provided in Appendix J.

7 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

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

7.1.1 The Environmental Complaint Handling Procedure is annexed in Figure 5.

7.1.2 EPD referred a complaint on 17 March 2014 from complainant who advised that there was sea water colored in blue observed in vicinity of Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Facilities (HKBCF) where stone column installation was taking place. The complainant suspected that the filling material was stained and contaminated the sea water after being filled into the sea.

7.1.2.1 Staining material, stained filling material or blue colored sea water was not observed during a follow-up site in section audit conducted with the representatives of the Contractor, Residential Engineer and IEC/ENPO on 20 March 14. The photo record taken during the joint site inspection audit was attached.

7.1.2.2 The locations of stone column installation (please refer to the attached layout map for the locations of stone column installation) and impact water quality monitoring data recorded between 12 – 17 March14 were reviewed. In accordance with the monitoring records, no discoloration of sea water or silty plume appearance outside the seawall was observed during the water quality monitoring between 12 – 17 March14. Also, no Action/ Limit level exceedance of water quality was recorded in the vicinities where stone column installation was carried out.

7.1.2.3 In addition, mitigation measure for active stone column installation such as localised silt curtain was implemented in March 14. Please see below photo record for reference.

7.1.2.4 Therefore, with reference to the available information, it is indicated that the abovementioned sea water colored in blue observed in vicinity of HKBCF is unlikely to be project related.

7.1.3 EPD referred a complaint from a complainant who advised that muddy water was found being discharged from the construction site of Hong Kong-Zhuhai-Macau Bridge Hong Kong Boundary Crossing Facilities (HKBCF) – Reclamation Works on 22 March 2014.

7.1.3.1 No silt plume or muddy water was observed being discharged from HKBCF – Reclamation Works during a follow-up site inspection audit conducted with the representatives of the Contractor and Residential Engineer 27 March 2014. Please see below photo record for reference.

7.1.3.2 The locations of stone column installation (please refer to the attached layout map for the locations of stone column installation) and impact water quality monitoring data recorded on 21 March 2014 were reviewed. In accordance with the monitoring records, no discoloration of sea water or silty plume appearance outside the perimeter silt curtain was observed during the water quality monitoring conducted on 21 March 2014. Also, no Action/ Limit level exceedance of water quality was recorded in the vicinities where stone column installations were carried out.

7.1.3.3 In addition, with referred to the photo record attached, mitigation measure for active stone column installation such as localised silt curtain was implemented in March 2014. Please see below photo record for reference.

7.1.3.4 Therefore, with reference to the available information, it is indicated that the abovementioned complaint of muddy water which was found being discharged from the construction site of Hong Kong-Zhuhai-Macau Bridge HKBCF – Reclamation Works on 22 March 2014 is unlikely to be project related.

7.1.3.5 Nevertheless, the Contractor was recommended to continue implementing existing water quality mitigation measures.

7.1.4 As informed by the Contractor, a complaint was received by the Contractor on 25 March 14 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier.

7.1.4.1 As informed by the Contractor 7-10 trips of sand barges per week would stay at the concerned area.

7.1.4.2 However, base on the available information; it is unable to conclude whether the complaint it is project related, because:

1. There is no sufficient information provided by the complainant to make sure that the concerned barges are related to this project.

2. The sand barges at the construction site of the reclamation works were regularly checked and so far, all sand barges were observed equipped with watering equipment.

3. Photo record below shows that watering equipment was used to keep the sand filling material wet.

7.1.4.3 Photo record shows that watering equipment was provided on pelican barge loaded with sand for watering of sand filling material to keep the sand material wet:

7.1.4.4 Nevertheless, the Contractor was reminded to continue to properly implement all dust mitigation measures.

7.1.4.5 The Contractor was advised to ensure to continue the provision of fugitive dust mitigation measures to barges loaded with filling material such as watering to sand filling material on sand barges to keep the surface of stockpile of filling material wet.

7.1.4.6 As informed by the Contractor, skipper of all working barges would be reminded to beware and to pay particular attention to the issue concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier.

7.1.5 As informed by the Contractor, further to the notification of summons received March 2014 due to works carried out on 6 October 13 contrary to conditions of NCO, Cap.400. The Contractor pledged guilty to the charge during the court appearance on 28 April 2014.

7.1.5.1 The Contractor has established noise control management system on restricted hour works, to prevent future violation of conditions of NCOs, Cap. 400, actions taken include:

- Nominate CNP Supervisors to daily check CNP compliance
- Setup a white board system to present the works, with locations & no. of machineries, needed to be carried out during restricted hours
- Erect CNP markers for demarcation on site
- Provide relevant training to staff

7.1.5.2 Regular site audit and inspection and monitoring records show no information of recurrence of non-compliance in the reporting month.

7.1.5.3 No notification of summons was received in April.

7.1.6 As informed by the Contractor on 7 May 14, a complaint was received by the Contractor on 17 April 14 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier.

7.1.6.1 As informed by the Contractor 7-10 trips of sand barges per week would stay at the concerned Area.

7.1.6.2 However, because no extra information was received for this complaint after the release of last investigation report, with referred to the available information; it is unable to conclude whether the complaint is related to this Contract because:

1. There is no sufficient information provided by the complainant to make sure that the concerned barges are related to this project.
2. The sand barges at the construction site of the reclamation works were regularly checked and so far, all sand barges were observed equipped with watering equipments.
3. Photo record below shows that watering equipment was used to keep the sand filling material wet.

7.1.6.3 Photo record shows that watering equipment was provided on pelican barge loaded with sand for watering of sand filling material to keep the sand material wet:

7.1.6.4 Nevertheless, the Contractor was reminded to continue to properly implement all dust mitigation measures.

7.1.6.5 The Contractor was advised to ensure to continue the provision of fugitive dust mitigation measures to barges loaded with filling material such as watering to sand filling material on sand barges to keep the surface of stockpile of filling material wet.

7.1.6.6 As informed by the Contractor, skipper of all working barges would further be reminded to beware and to pay particular attention to the issue concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier.

7.1.7 As informed by the Contractor on 30 May 2014, an environmental complaint had been received on 28 May 2014. The complainant mentioned that waste such as earth and concrete were being felled into the sea everyday at the Hong Kong-Zhuhai-Macao Bridge at location where construction works are being conducted, causing pollution to the marine environment.

7.1.7.1 Site inspections were conducted and project documents were reviewed, please see the following for details of investigation actions and results:

7.1.7.2 Regular site inspection was conducted on 29 May 2014 and a follow up site inspection was conducted on 5 June 2014 at HKBCF Reclamation Works, waste such as concrete and earth were not observed being felled into the sea.

7.1.7.3 The waste flow record provided by the Contractor has been reviewed (please see attached), the waste flow record shows that waste described by the complainant (i.e. concrete or earth) were not generated by this Contract.

7.1.7.4 In addition, the construction programme provided by the Contractor (Please see construction program attached) has been reviewed and it is noted that concrete and earth were not used as marine fill for any on-going construction activities of this Contract in May 2014. Also, all filling works were conducted inside the designated work zone inside the site boundary of HKBCF Reclamation Works. Furthermore,

impact water quality monitoring result of May 2014 has been reviewed and no impact water quality exceedance was recorded in May 2014, this indicates that the works carried by this Contract is unlikely to cause pollution to the marine environment.

7.1.7.5 As such, with referred to the available information, it is concluded that the complaint is unlikely to be related to this Contract.

7.1.7.6 Nevertheless, the Contractor was reminded to continue to properly implement all water quality mitigation measures and strictly follow the waste handling procedure according of this Contract.

7.1.7.7 No notification of summons and successful prosecutions was received in May.

7.1.8 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.

Construction Noise Impact

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

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 results were below the Action and Limit Level in the reporting quarter. One (1) 24-hour TSP results recorded at AMS3B exceeded the Action Level. Investigation results show that the Action level exceedance was not related to Project.

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

8.3.4 Eight (8) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting Quarter. One (1) Limit Level exceedance was recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. One (1) Action level exceedance was recorded at measured turbidity values (in NTU) in the reporting quarter.

8.3.5 Investigation results shows that all the Action and Limit Level Exceedance recorded were non-project related.

8.3.6 One (1) Limit Level exceedances were recorded for Chinese White Dolphin monitoring in the reporting quarter. Investigation results show that there is no evidence that exceedance is related to Project works.

8.3.7 Environmental site inspection was carried out thirteen times in the reporting quarter. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.

8.3.8 EPD referred a complaint on 17 March 2014 from complainant who advised that there was sea water colored in blue observed in vicinity of Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Facilities (HKBCF) where stone column installation was taking place. The locations of stone column and impact water quality monitoring data recorded between 12 – 17 March 14 were reviewed. In accordance with the monitoring records, no discoloration of sea water or silty plume appearance outside the seawall was observed during the water quality monitoring between 12 – 17 March 14. Therefore the complaint is considered to be non-project related.

8.3.9 EPD referred a complaint from a complainant who advised that muddy water was found being discharged from the construction site of Hong Kong-Zhuhai-Macau Bridge Hong Kong Boundary Crossing Facilities (HKBCF) – Reclamation Works on 22 March 2014. With refer to the monitoring records on 21 March 2014 and the follow-up site inspection audit conducted with the representatives of the Contractor and Residential Engineer on 27 March 2014, since no discoloration of sea water or silty plume appearance outside the perimeter silt curtain was observed, the complaint is considered to be non-project related.

8.3.10 As informed by the Contractor, a complaint was received by the Contractor on 25 March 14 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. However, base on the available information, it cannot indicate that the air quality impact was caused by the vessel of this Contract and therefore the complaint could not be concluded as related to this Contract.

8.3.11 As informed by the Contractor, further to the notification of summons received March 2014 due to works carried out on 6 October 13 contrary to conditions of NCO, Cap.400. The Contractor pledged guilty to the charge during the court appearance on 28 April 2014. The Contractor has established noise control management system on restricted hour works, to prevent future violation of conditions of NCOs, Cap. 400.

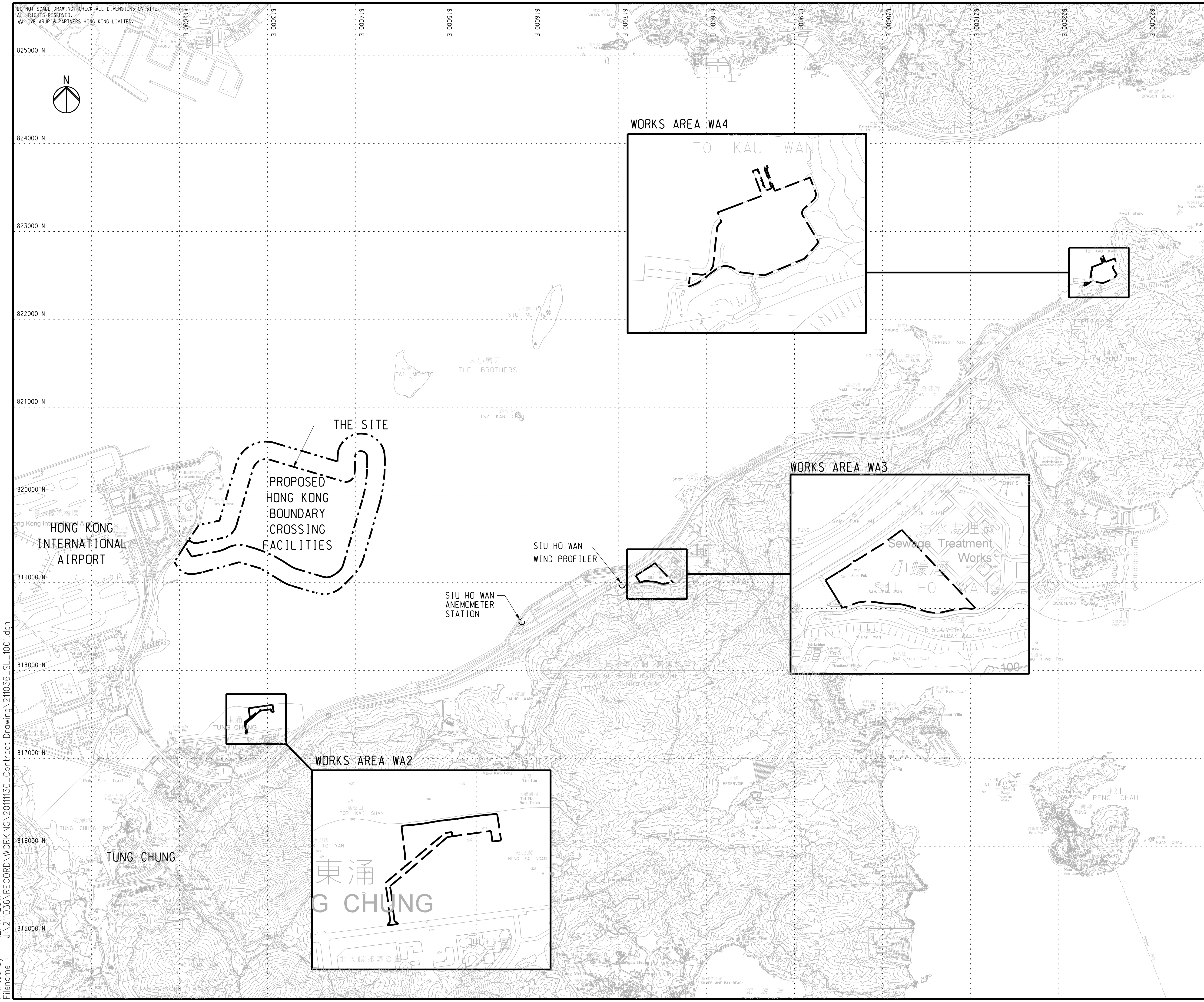
8.3.12 As informed by the Contractor on 7 May 14, a complaint was received by the Contractor on 17 April 14 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. However, because no extra information was received for this complaint after the release of the latest investigation report, it is unable to conclude whether the complaint is related to this Contract.

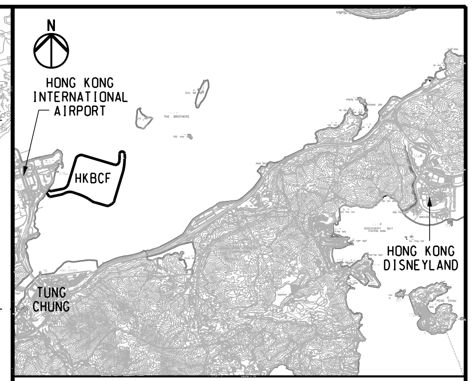
8.3.13 As informed by the Contractor on 30 May 2014, an environmental complaint had been received on 28 May 2014. The complainant mentioned that waste such as earth and concrete were being felled into the sea everyday at the Hong Kong-Zhuhai-Macao Bridge at location where construction works are being conducted, causing pollution to the marine environment. The construction programme and waste flow record provided by the Contractor has been reviewed. With refer to the available information provided, it is concluded that the complaint is unlikely to be related to this Contract.

8.3.14 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.

8.3.15 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.

8.3.16 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.





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

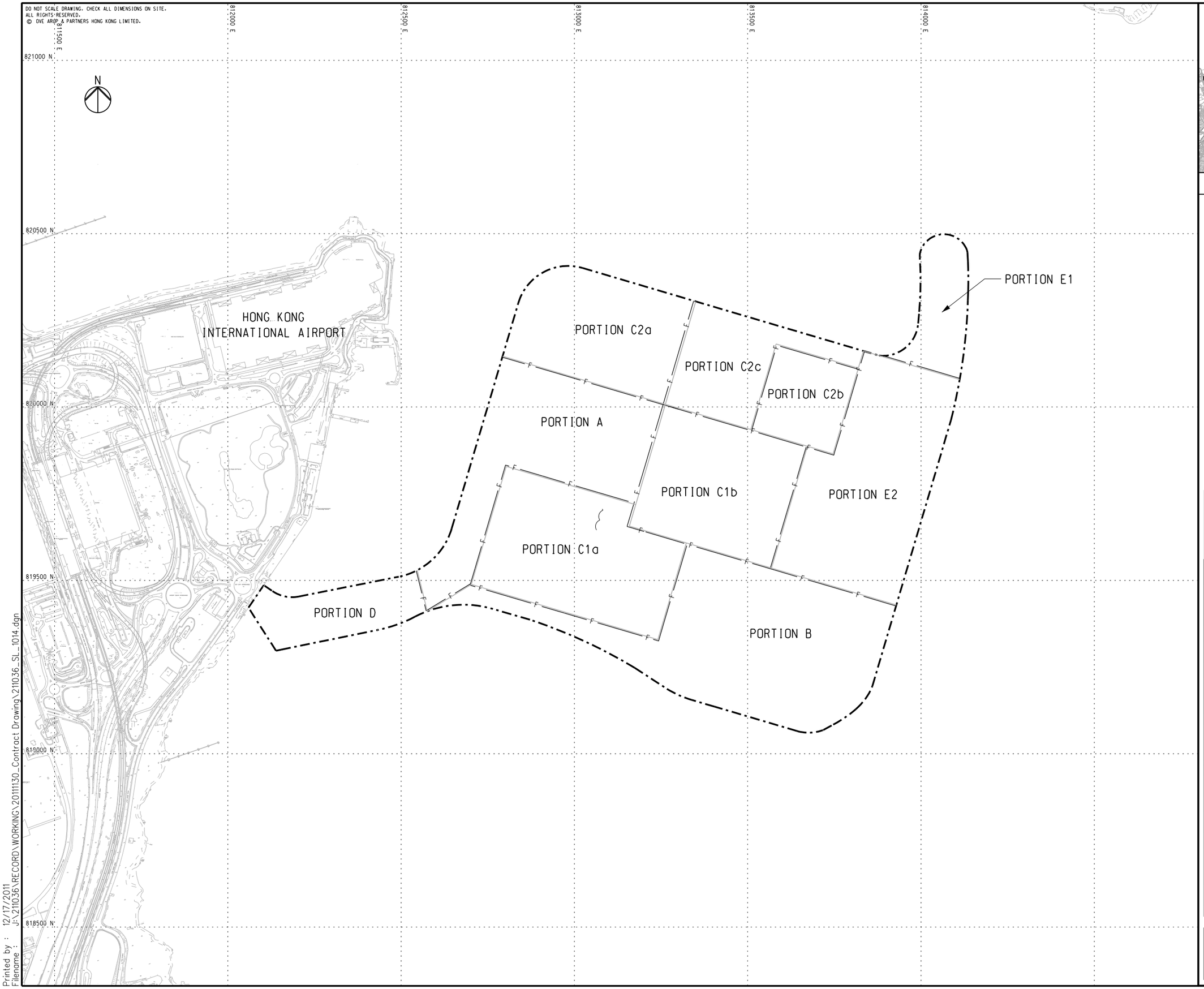
Supported By : Ecosystems Ltd.
EDA Marine Ltd.
Geotechnical Consulting Group (Asia) Ltd.
Hong Kong Cetacean Research Project
InteliBuild Technyx Asia Limited
Tony Gee and Partners LLP

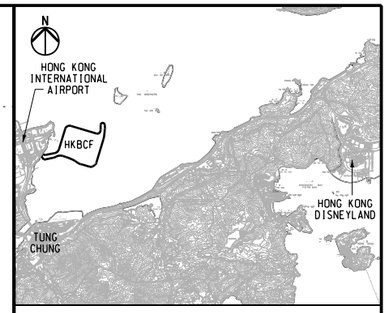
Contract No. and Title:
Contract No. HY/2010/02
Hong Kong-Zhuhai-Macao Bridge
Hong Kong Boundary Crossing Facilities
- Reclamation Works

Drawing title
KEY PLAN

Drawing no.		Rev.	
211036/SL/1001		-	
Drawn	Date	Checked	Approved
RL	11/09	KKY	DML
Scale 1:20000 @A1 1:40000 @A3		Status WORKING	

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





KEY PLAN

NOTES

1. FOR LEGENDS AND NOTES FOR CHAIN LINK FENCE AND GATE REFER TO DRG NO. 211036/SL/1013.
2. 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.
3. FOR SETTING OUT COORDINATES OF DIFFERENT PORTIONS OF SITE REFER TO DRG NO. 211036/SL/1003.
4. ACCESS POINTS BETWEEN PORTIONS SHALL BE PROVIDED BY THE CONTRACTOR. AND THE LOCATIONS SHALL BE AGREED WITH THE ENGINEER ON SITE.
5. 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 Ove Arup & Partners Hong Kong Limited

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

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

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

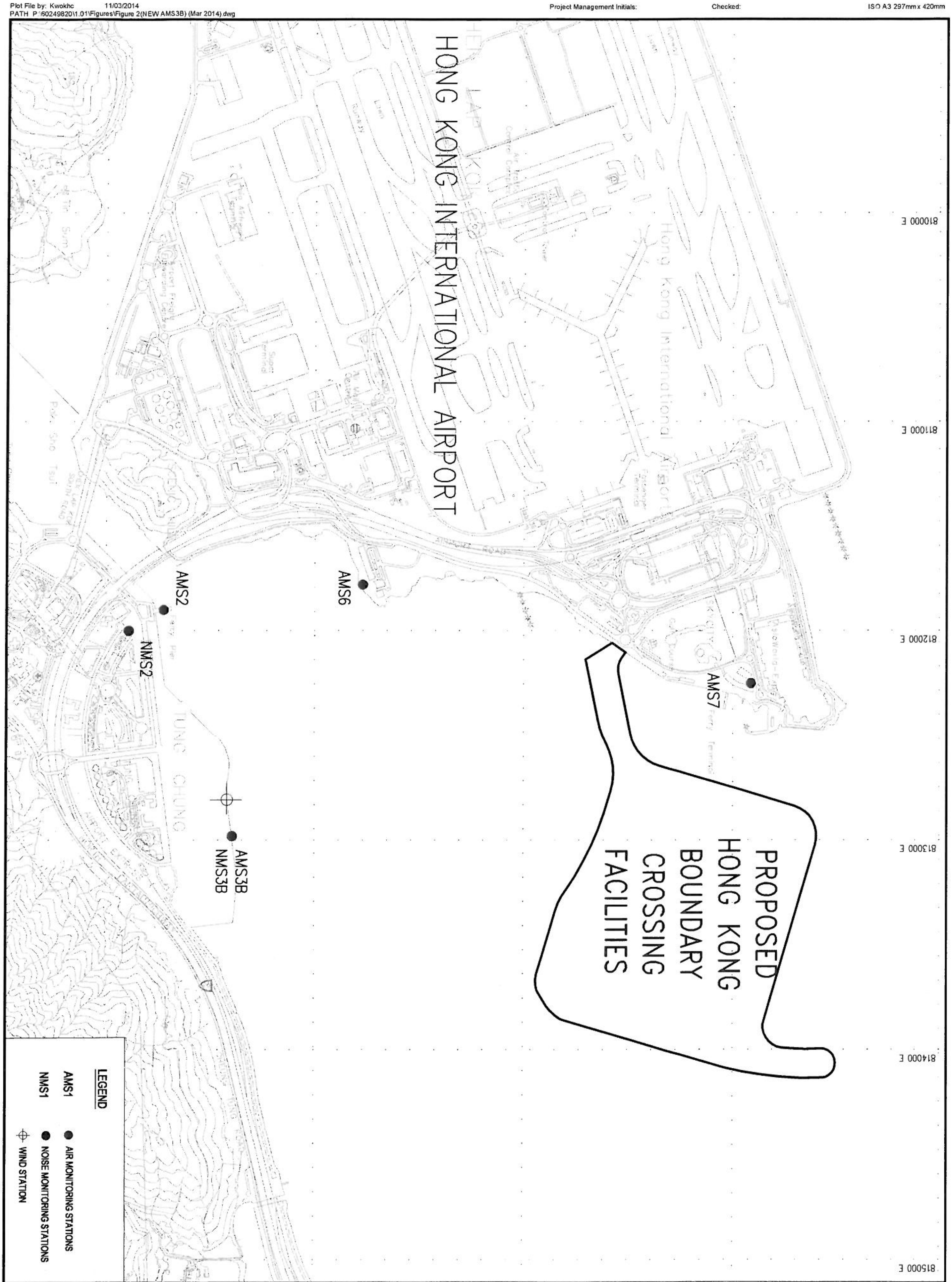
Drawing no.	Rev.
211036/SL/1014	-

Drawn	Date	Checked	Approved
RL	06/10	KKY	DML

Scale 1:5000 @A1 1:10000 @A3
Status WORKING

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

Printed by : 12/17/2011
Filename : J:\211036\RECORD\WORKING\20111130_Contract Drawing\211036_SL_1014.dgn



HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS
Project No.: - Date: MARCH 2014

AIR QUALITY AND NOISE MONITORING STATIONS FOR HKBCF

AECOM

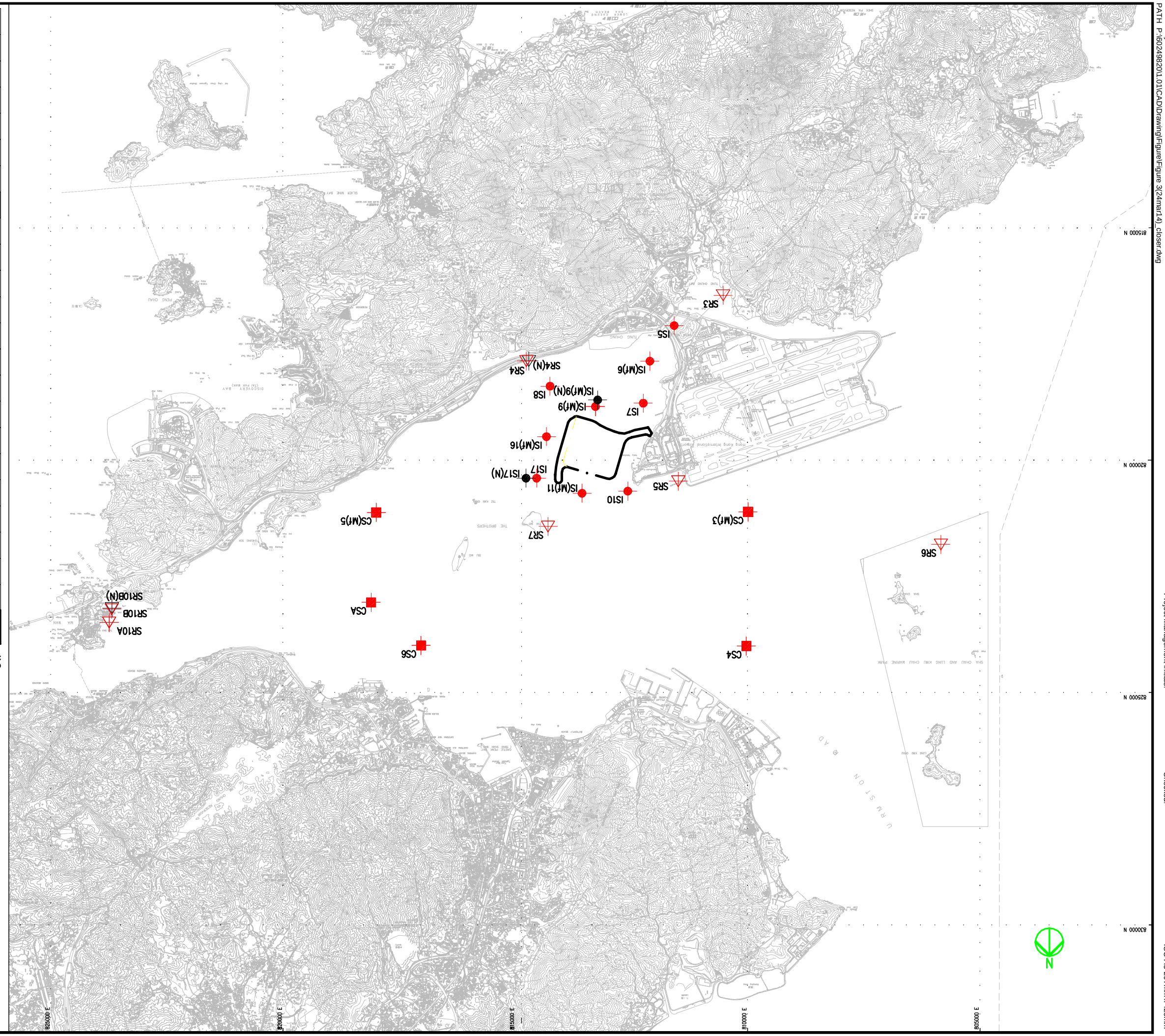
Figure 2

Plot File by: Kwokhc
PATH P:\60249820\1.01CAD\Drawing\Figure\Figure 3(24mar14)_closer.dwg
25/03/2014

Project Management Initials:

Checked:

ISO A3 297mm x 420mm



MONITORING STATIONS	CO-ORDINATES	
	EASTING	NORTHING
IS5	811579	817106
IS(M)6	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

SETTING OUT SCHEDULE

LEGEND

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

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

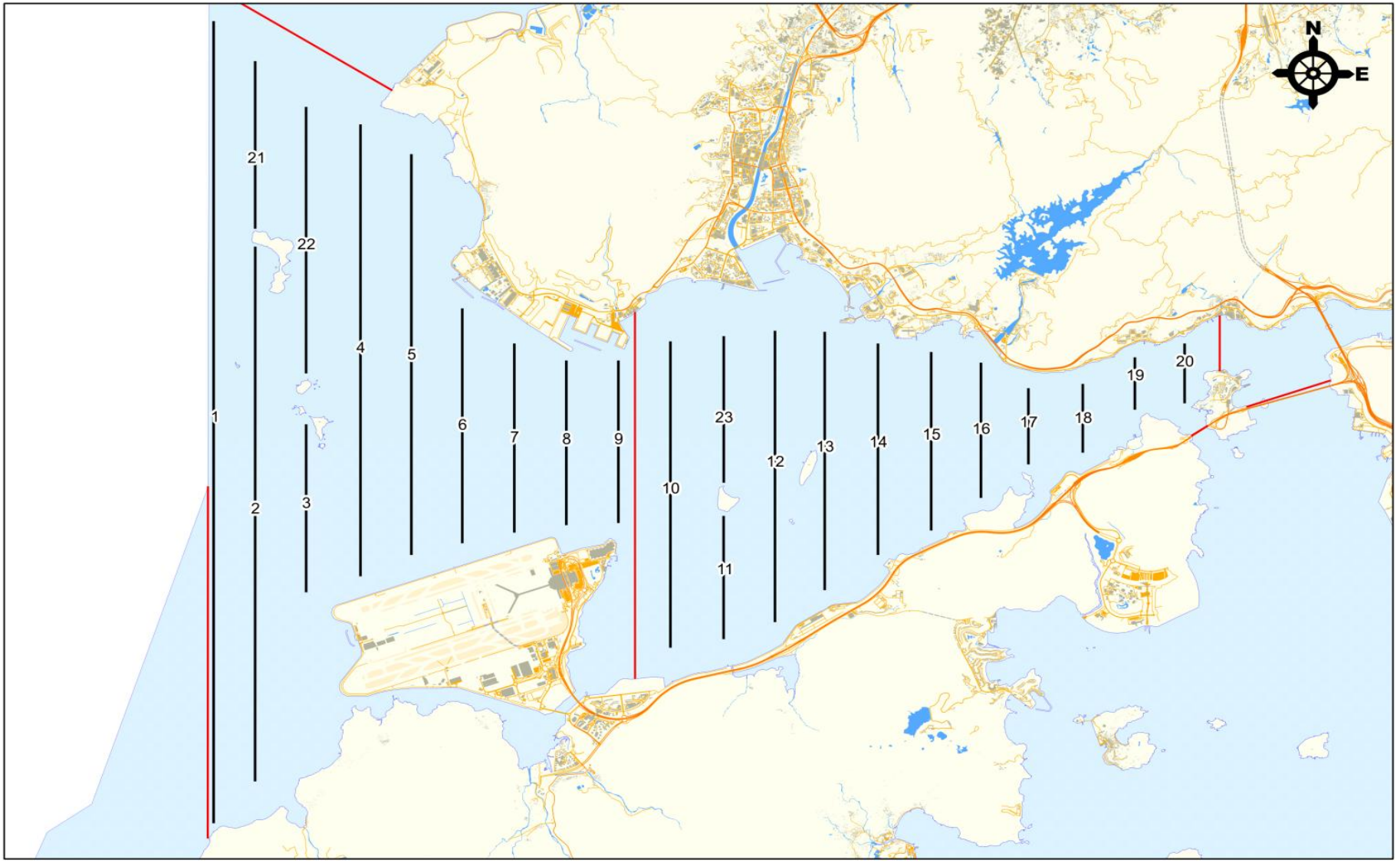
Project No.: -

Date: MAR 2014

WATER QUALITY MONITORING STATION

AECOM

Figure 3



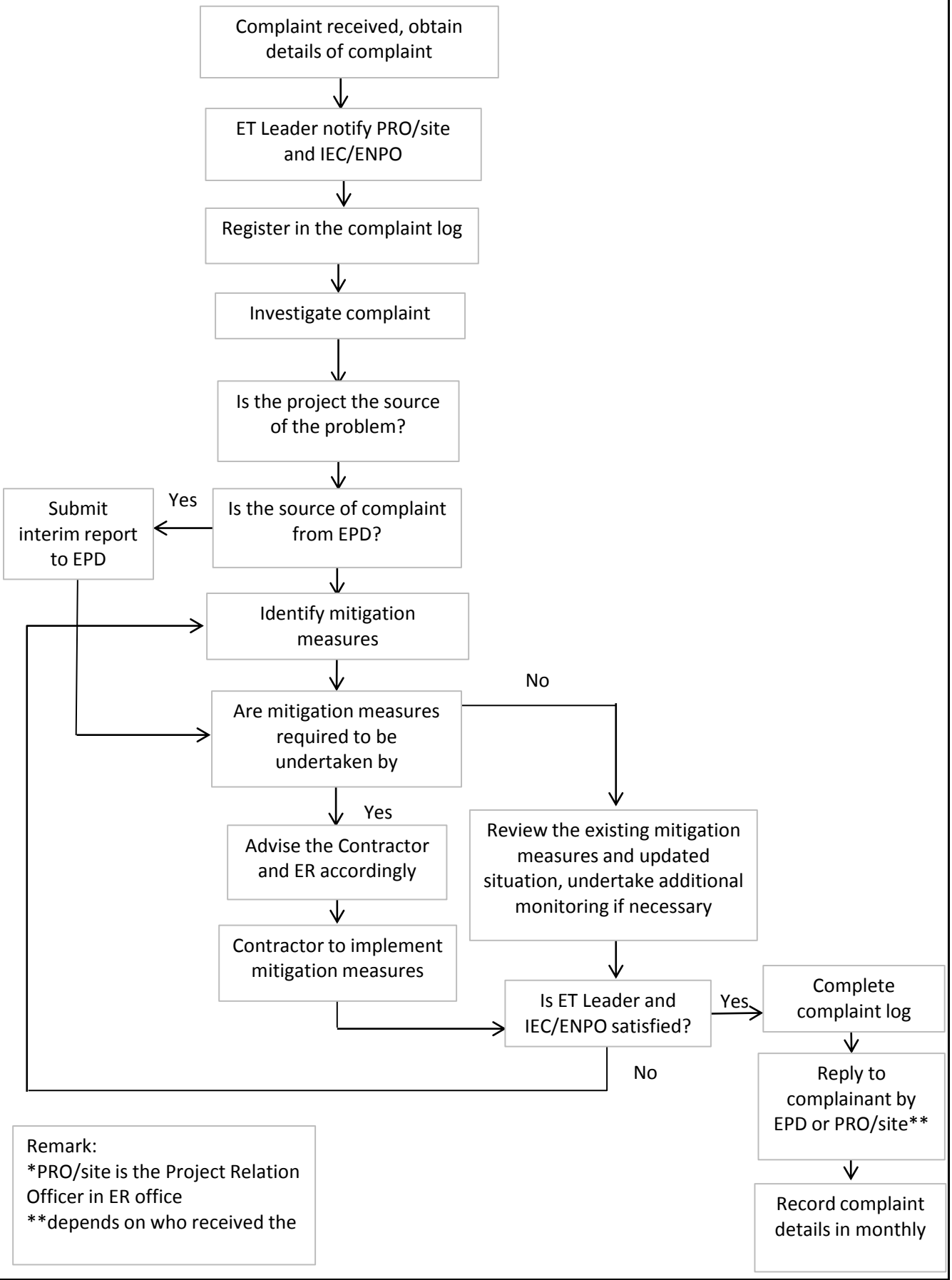
***Remark: Transect 10 is now 3.6km in length due to the HKBCF construction site. The total transect length for both NEL and NWL combined is 111km.**

HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS
Project No.: 60249820 Date: January 13

Impact Dolphin Monitoring
Line Transect Layout Map

AECOM

Figure 4



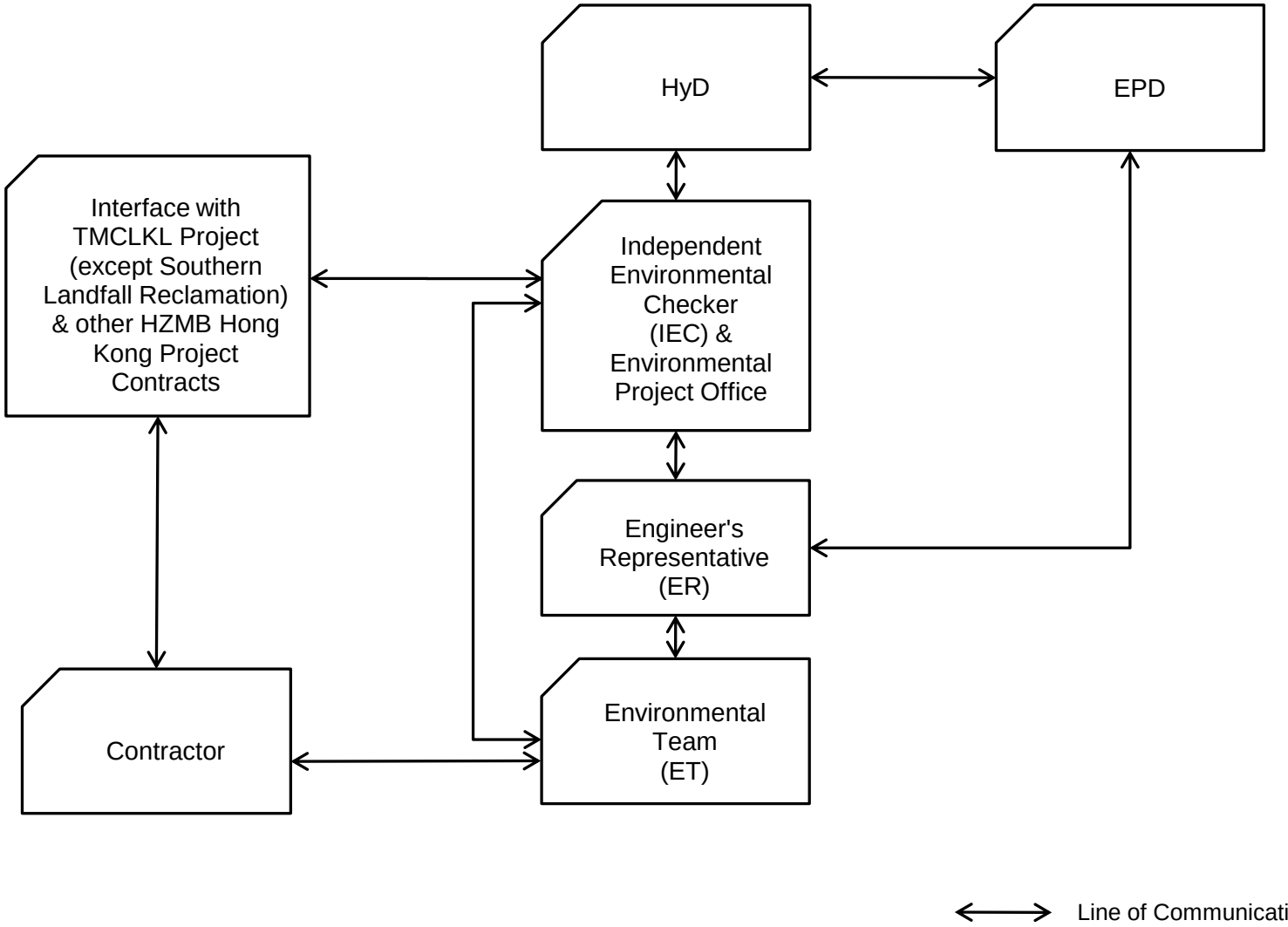
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

AECOM

Environmental Complaint Handling Procedure

Project No.: 60249820 **Date: July 2012**

Figure 5



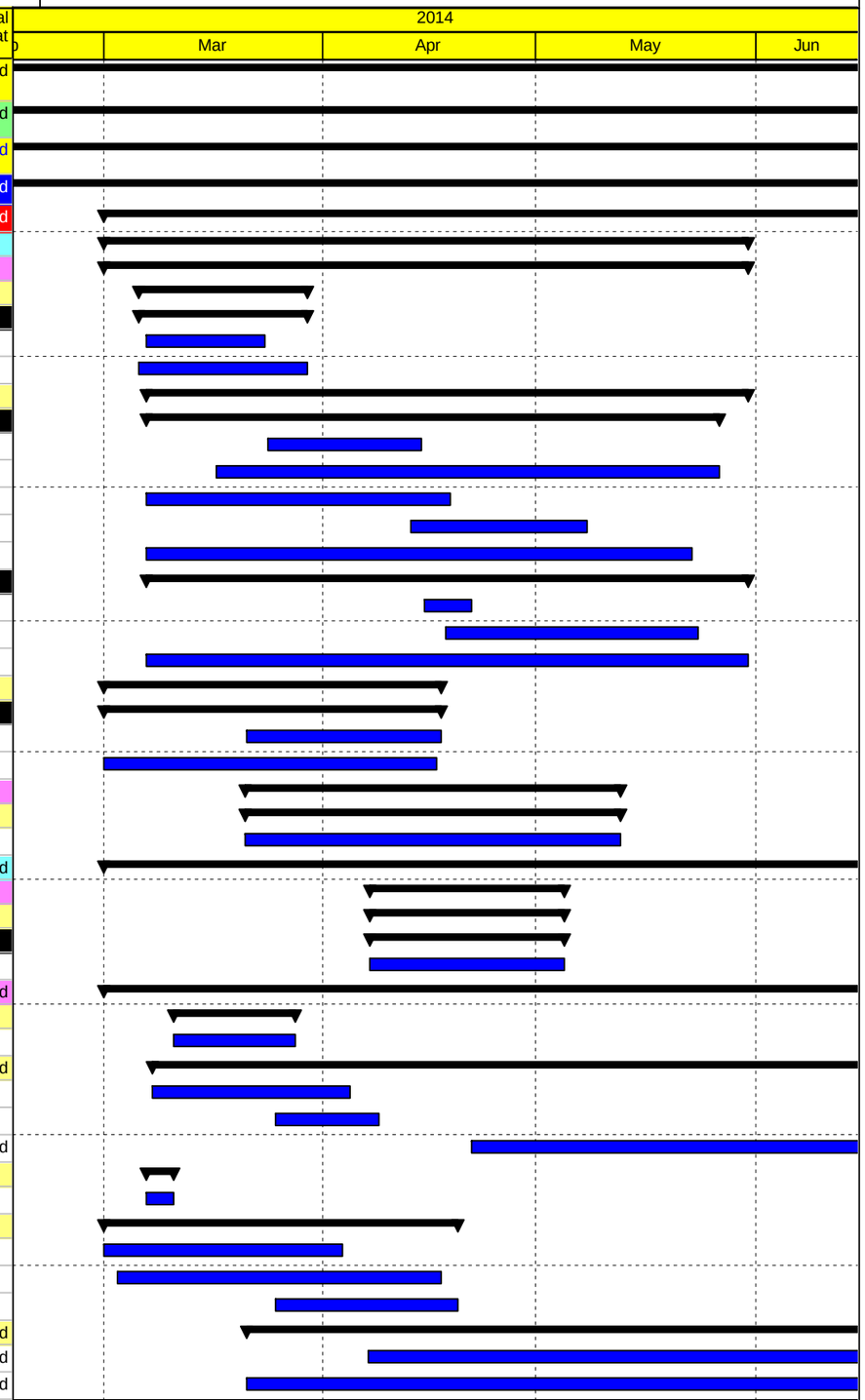
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
--RECLAMATION WORKS
Project No.: 60249820 Date: April 2013

Project Organisation for Environmental Works

AECOM

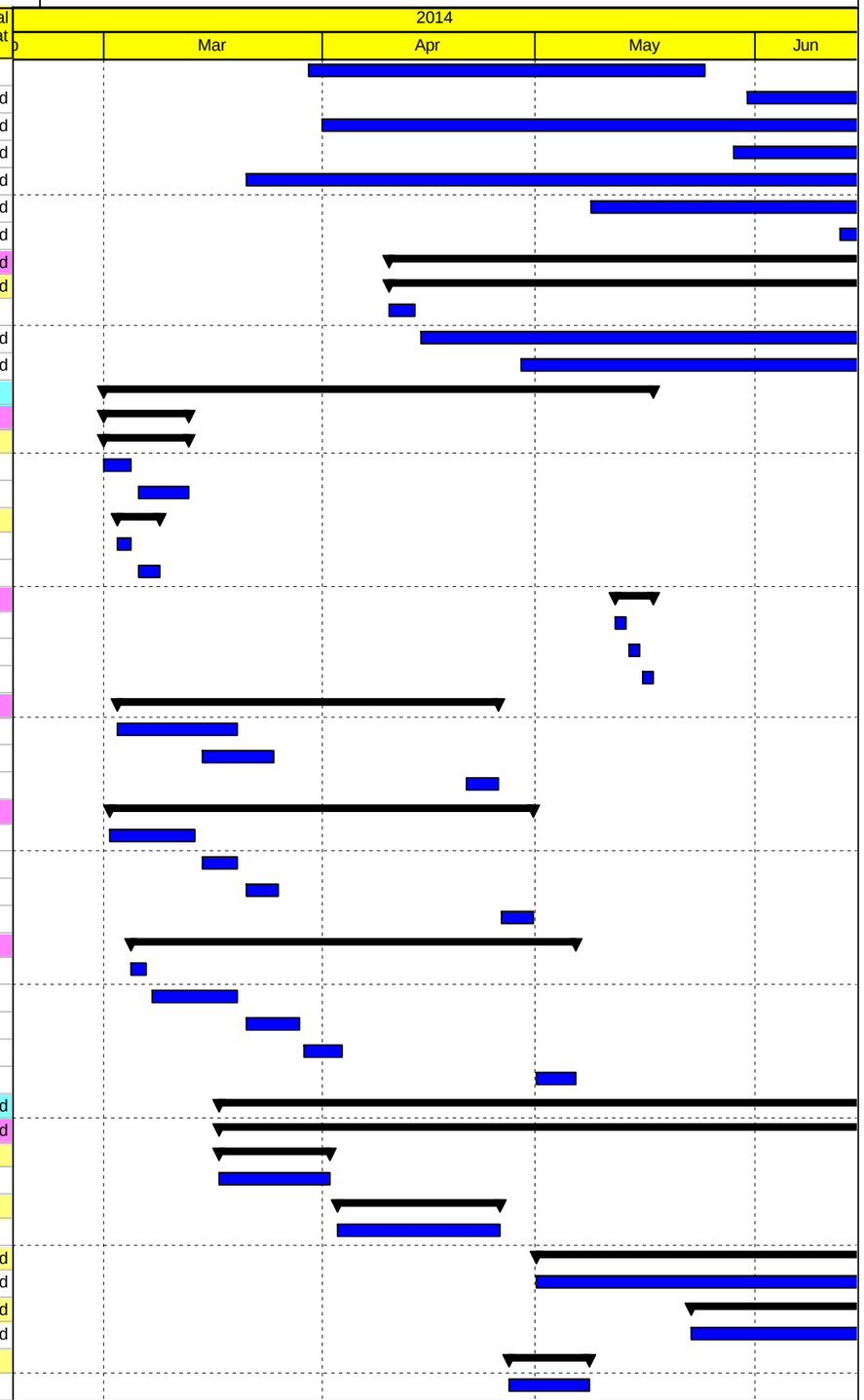
Appendix A

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
30th Monthly Progress Report Status as on 21Jun2014 Ver.5		1745d	21-May-12 A	28-Feb-17	24d
Work Zone, as defined in PS Clause 1.03(6)		359d	05-Feb-14 A	29-Jan-15	784d
Portion A, B, C & E		359d	05-Feb-14 A	29-Jan-15	784d
Portion A, B, C & E		359d	05-Feb-14 A	29-Jan-15	784d
Seawall		180d	01-Mar-14 A	07-Aug-14	-16d
Ground Treatment		100d	01-Mar-14 A	31-May-14 A	
Stone Columns Outside cellular Structures by Marine Plant		78d	01-Mar-14 A	31-May-14 A	
Seawall Portion E2 at K053 - C067 2,252nrs		23d	06-Mar-14 A	29-Mar-14 A	
K053 - C067		23d	06-Mar-14 A	29-Mar-14 A	
SCOE2-A0	PE2 Stone Columns K057 - K067 Row 01-11 232nrs (14nrs/day) FTB19	16d	07-Mar-14 A	23-Mar-14 A	
SCOE2-A0	PE2 Stone Columns K057 - K067 Row 12-14 138nrs (6nrs/day) AP6	23d	06-Mar-14 A	29-Mar-14 A	
Seawall Portion E1 at C068 - C091 24cells 6,428nrs		73d	07-Mar-14 A	31-May-14 A	
C068 - C079		70d	07-Mar-14 A	27-May-14 A	
SCOE1-A0	PE1 Stone Columns C068 - C071 Row 01-11 273nrs (14nrs/day) FTB19	20d	24-Mar-14 A	14-Apr-14 A	
SCOE1-A0	PE1 Stone Columns C068 - C078 Row 12-14 325nrs (8nrs/day) FTB16	45d	17-Mar-14 A	27-May-14 A	
SCOE1-A0	PE1 Stone Columns C076 - C076 Row 01-11 385nrs (14nrs/day) FTB16	68d	07-Mar-14 A	19-Apr-14 A	
SCOE1-A0	PE1 Stone Columns C077 - C077 Row 01-11 390nrs (6nrs/day) AP7	36d	13-Apr-14 A	08-May-14 A	
SCOE1-A0	PE1 Stone Columns C078 - C079 Row 01-11 780nrs (14nrs/day) FTB19	56d	07-Mar-14 A	23-May-14 A	
C080 - C091		73d	07-Mar-14 A	31-May-14 A	
SCOE1-B0	PE1 Stone Columns C080 - C080 Row 01-11 390nrs (14nrs/day) FTB19	28d	15-Apr-14 A	22-Apr-14 A	
SCOE1-B0	PE1 Stone Columns C081 - C083 Row 01-11 479nrs (14nrs/day) FTB18	34d	18-Apr-14 A	24-May-14 A	
SCOE1-B0	PE1 Stone Columns C085 - C090 Row 01-11 284nrs (18nrs/day) FTB18	65d	07-Mar-14 A	31-May-14 A	
Seawall Portion C at C103 - C112 10cells @197nrs/cell 1970nrs		56d	01-Mar-14 A	17-Apr-14 A	
Beside of front cellular walls C103-C112 985nrs		56d	01-Mar-14 A	17-Apr-14 A	
SCOC-B010	PC2a Stone Columns C110 - C112 Row 01-11 368nrs (14nrs/day) FTB18	26d	21-Mar-14 A	17-Apr-14 A	
SCOC-B10	PC2a Stone Columns C110 - C112 Row 12-14 252nrs (6nrs/day) AP5	56d	01-Mar-14 A	17-Apr-14 A	
Stone Columns Inside cells by Land Plant 2,640nrs		16d	21-Mar-14 A	13-May-14 A	
Seawall Portion E2 at K052 - C060 9cells 720nrs		16d	21-Mar-14 A	13-May-14 A	
SCIE2-030	PE2 Stone Columns inside cells K056 - C056 80nrs (3nrs/day) LB-BC1	16d	21-Mar-14 A	13-May-14 A	
Cellular Structures		160d	01-Mar-14 A	24-Jul-14	-12d
Cellular Main Cells 85cells		26d	07-Apr-14 A	05-May-14 A	
Full Guide Frames Method 85cells		26d	07-Apr-14 A	05-May-14 A	
Portion E1 C078 & C079 & Portion E2 C065 & C066 4cells		26d	07-Apr-14 A	05-May-14 A	
CSE2-020	PE2 Cellular Structure C064 & C065 2cells Type_C 6,195m3	26d	07-Apr-14 A	05-May-14 A	
Connecting Arcs		131d	01-Mar-14 A	22-Jul-14	-8d
Portion B between K028/K029 to K050/K051 23arcs		16d	11-Mar-14 A	28-Mar-14 A	
CA00B-025S	PB Connecting Arc K049/K050 & K050/K051 Seaside upper arcs splicing 2nrs (201)	16d	11-Mar-14 A	28-Mar-14 A	
Portion E2 between K051/K052 to C066/C067 16arcs		90d	08-Mar-14 A	02-Jul-14	-134d
CAE2-018	PE2 Final backfill cellular cells & Arcs K051/K052 to C061/C062 Type_C 48,652m3	24d	08-Mar-14 A	04-Apr-14 A	
CAE2-024L	PE2 Connecting Arc C062/C063 & C066/C067 Landside upper arcs splicing 2nrs (HF)	12d	25-Mar-14 A	08-Apr-14 A	
CAE2-024S	PE2 Connecting Arc C062/C063 - C066/C067 Seaside upper arcs splicing 5nrs (205)	31d	22-Apr-14 A	02-Jul-14	-134d
Portion C2a between C103/104 to C111/C112 9arcs		4d	07-Mar-14 A	11-Mar-14 A	
CAC2a-038	PC2a Final backfill cellular cells & Arcs C103/104 - C106/C107 Type_C 27,326m3	4d	07-Mar-14 A	11-Mar-14 A	
Portion C2c between C091/C092 to C102/C103 12arcs		41d	01-Mar-14 A	20-Apr-14 A	
CAC2c-018	PC2c Final backfill cellular cells & Arcs C100/C101 to C104/C105 Type_C 84,830m3	29d	01-Mar-14 A	03-Apr-14 A	
CAC2c-034S	PC2c Connecting Arc C087/C088 - C093/C094 Seaside upper arcs splicing 7nrs (210)	39d	03-Mar-14 A	17-Apr-14 A	
CAC2c-038	PC2c Final backfill cellular cells & Arcs C0087/C088 to C099/C100 Type_C 82,397m3	20d	25-Mar-14 A	20-Apr-14 A	
Portion E1 between C073/C074 to C090/C091 18arcs		114d	21-Mar-14 A	22-Jul-14	-8d
CAE1-014L	PE1 Connecting Arc C084/C085 - C087/C088 Landside upper arcs splicing 4nrs (HF)	34d	07-Apr-14 A	21-Jun-14	-34d
CAE1-014S	PE1 Connecting Arc C080/C081 - C086/C087 Seaside upper arcs splicing 7nrs (205)	65d	21-Mar-14 A	26-Jun-14	-11d



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
CAE1-016L	PE1 Connecting Arc C080/C081 - C083/C084 Landside upper arcs splicing 4nrs (HF)	24d	30-Mar-14 A	25-May-14 A	
CAE1-018	PE1 Final backfill cellular cells & Arcs C080/C081 to C090/C091 Type_C 91,454.5 m3	22d	31-May-14 A	04-Jul-14	-12d
CAE1-034L	PE1 Connecting Arc C072/C073 - C076/C077 Landside upper arcs splicing 5nrs (210)	44d	01-Apr-14 A	24-Jun-14	-65d
CAE1-034S	PE1 Connecting Arc C072/C73 - C076/C077 Seaside upper arcs splicing 5nrs (WC1)	33d	29-May-14 A	16-Jul-14	-9d
CAE1-044L	PE1 Connecting Arc C067/C068 - C071/C072 Landside upper arcs splicing 5nrs (401)	53d	21-Mar-14 A	25-Jun-14	-37d
CAE1-044S	PE1 Connecting Arc C067/C068 - C071/C072 Seaside upper arcs splicing 5nrs (WC1)	30d	09-May-14 A	28-Jun-14	5d
CAE1-048	PE1 Final backfill cellular cells & Arcs C077 to C066 Type_C 108,416m3	26d	13-Jun-14 A	22-Jul-14	-8d
Capping Beams		90d	10-Apr-14 A	24-Jul-14	-210d
Portion B between K028 to K056 Capping Beams		90d	10-Apr-14 A	24-Jul-14	-210d
CB025-00005	Trial Capping Beams structure 14days/cell	5d	10-Apr-14 A	14-Apr-14 A	
CB025-00010	PB Capping Beams structure K028 - K043 16-1=15cells 4days/cell	50d	15-Apr-14 A	08-Jul-14	-210d
CB025-00020	PB Capping Beams structure K044 - K056 13cells 4days/cell	52d	29-Apr-14 A	24-Jul-14	-210d
Optimizing Rubble Mound Seawalls		72d	01-Mar-14 A	17-May-14 A	
Optimizing Portion A at C118 - C134		12d	01-Mar-14 A	13-Mar-14 A	
Seawall Portion A at C122 - C124, Ch5+220 to 5+100		12d	01-Mar-14 A	13-Mar-14 A	
RFA2-0090	PA at C122 - C124 Rockfill (Cat1) upto +6.0mPD & geotextile laying 4,940m3	4d	01-Mar-14 A	05-Mar-14 A	
RFA2-0100	PA at C122 - C124 UnderLayer 0mPD 7,800m3	8d	06-Mar-14 A	13-Mar-14 A	
Seawall Portion A at C132 - C134, Ch5+700 to 5+550		7d	03-Mar-14 A	09-Mar-14 A	
RFA5-0090	PA at C132 - C134 Rockfill (Cat1) upto +6.0mPD & geotextile laying 4370m3	3d	03-Mar-14 A	05-Mar-14 A	
RFA5-0100	PA at C132 - C134 UnderLayer 0mPD 7,800m3	4d	06-Mar-14 A	09-Mar-14 A	
Seawall Portion C2a at C117 - C113		6d	12-May-14 A	17-May-14 A	
RFC2a-0010	PC2a at C117 - C113 Geotextile Type 1 above stone blanket 17,800m2	2d	12-May-14 A	13-May-14 A	
RFC2a-0020	PC2a at C117 - C113 sound survey	2d	14-May-14 A	15-May-14 A	
RFC2a-0030	PC2a at C117 - C113 settlement markers install	2d	16-May-14 A	17-May-14 A	
Seawall Portion B at K013 - K017		50d	03-Mar-14 A	25-Apr-14 A	
RFB1-0080	PB at K013 - K017 Rockfill (Cat1) platform upto +2.5mPD 4,680m3	17d	03-Mar-14 A	20-Mar-14 A	
RFB1-0090	PB at K013 - K017 Rockfill (Cat1 Fill) upto +6.0mPD & geotextile laying 1,620m3	10d	15-Mar-14 A	25-Mar-14 A	
RFB1-0100	PB at K013 - K017 UnderLayer 0mPD	5d	21-Apr-14 A	25-Apr-14 A	
Seawall Portion B at K018 - K022		55d	02-Mar-14 A	30-Apr-14 A	
RFB2-0070	PB at K018 - K022 Rockfill (Cat1) , filter layer & geotextile +2.5mPD 5040m3	12d	02-Mar-14 A	14-Mar-14 A	
RFB2-0080	PB at K018 - K022 Rockfill (Cat1) for platform upto +2.5mPD 4680m3	5d	15-Mar-14 A	20-Mar-14 A	
RFB2-0090	PB at K018 - K022 Rockfill (Cat1) upto +6.0mPD & geotextile laying 1620m3	5d	21-Mar-14 A	25-Mar-14 A	
RFB2-0100	PB at K018 - K022 UnderLayer 0mPD	5d	26-Apr-14 A	30-Apr-14 A	
Seawall Portion B at K023 - K027		58d	05-Mar-14 A	06-May-14 A	
RFB3-0060	PB at K023 - K027 Sand Blanket behind upto -4.0mPD	3d	05-Mar-14 A	07-Mar-14 A	
RFB3-0070	PB at K023 - K027 Rockfill (Cat1) , filter layer & geotextile +2.5mPD 5040m3	12d	08-Mar-14 A	20-Mar-14 A	
RFB3-0080	PB at K023 - K027 Rockfill (Cat1) for platform upto +2.5mPD 4680m3	8d	21-Mar-14 A	28-Mar-14 A	
RFB3-0090	PB at K023 - K027 Rockfill (Cat1) upto +6.0mPD & geotextile laying 1620m3	5d	29-Mar-14 A	03-Apr-14 A	
RFB3-0100	PB at K023 - K027 UnderLayer 0mPD	5d	01-May-14 A	06-May-14 A	
Conforming Sloping Seawalls		152d	17-Mar-14 A	07-Aug-14	-15d
Geotextile		115d	17-Mar-14 A	24-Jun-14	-17d
Seawall Portion B at K028 - K040		16d	17-Mar-14 A	02-Apr-14 A	
SGB2-000	PB Geotextile at K028 - K040	16d	17-Mar-14 A	02-Apr-14 A	
Seawall Portion B at K041 - K051		22d	03-Apr-14 A	26-Apr-14 A	
SGB3-000	PB Geotextile at K041 - K051	22d	03-Apr-14 A	26-Apr-14 A	
Seawall Portion C2a at C112 - C103 10cells		20d	01-May-14 A	22-Jun-14	-47d
SGC2a-000	PC2a Geotextile at C112 - C103 10cells	20d	01-May-14 A	22-Jun-14	-47d
Seawall Portion C2c at C102 - C091 12cells		24d	23-May-14 A	24-Jun-14	-17d
SGC2c-000	PC2c Geotextile at C102 - C091 12cells	24d	23-May-14 A	24-Jun-14	-17d
Seawall Portion E2 at K052 - C067 16cells		11d	27-Apr-14 A	08-May-14 A	
SGE2-000	PE2 Geotextile at K052 - K062 11cells	11d	27-Apr-14 A	08-May-14 A	



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
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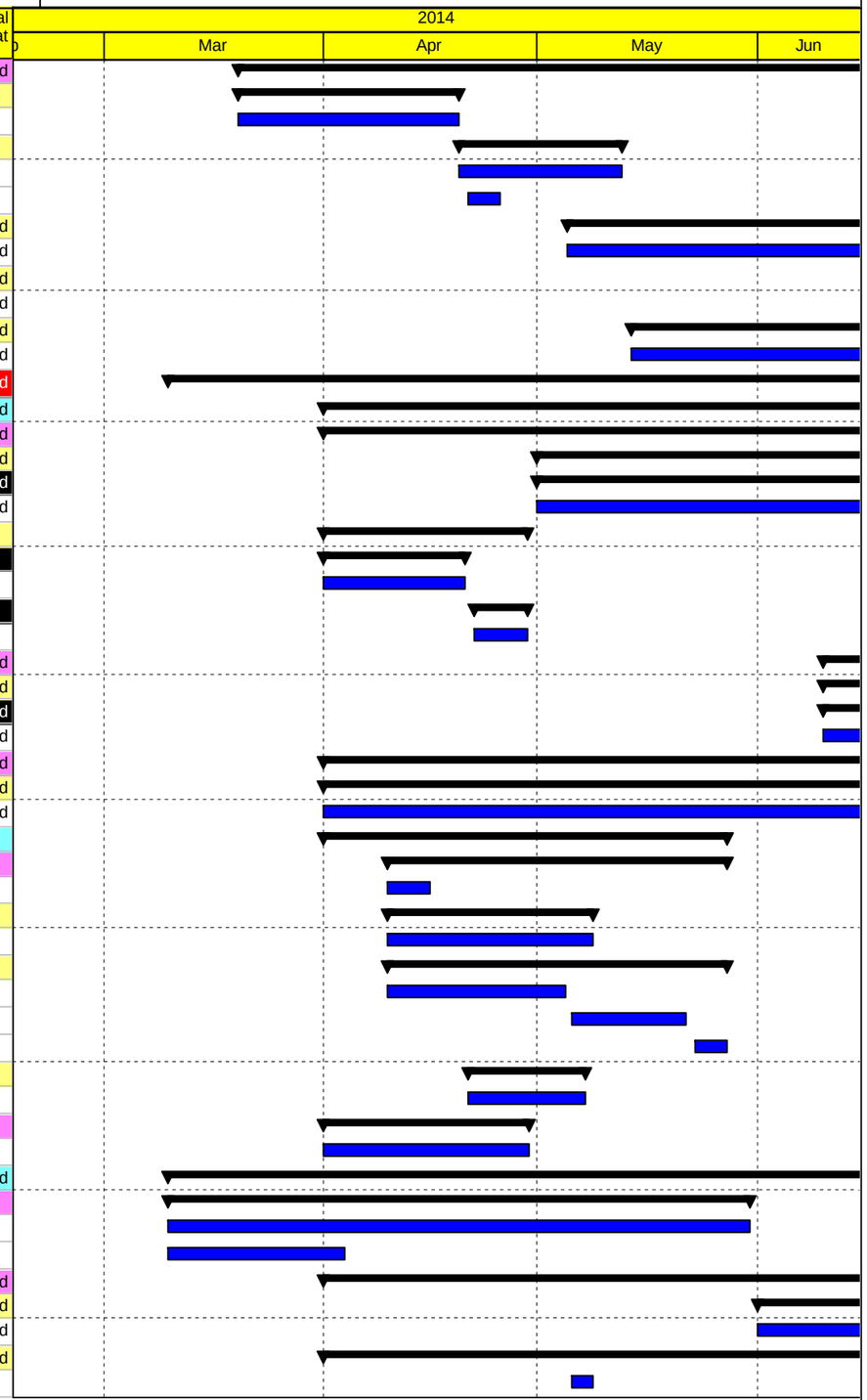
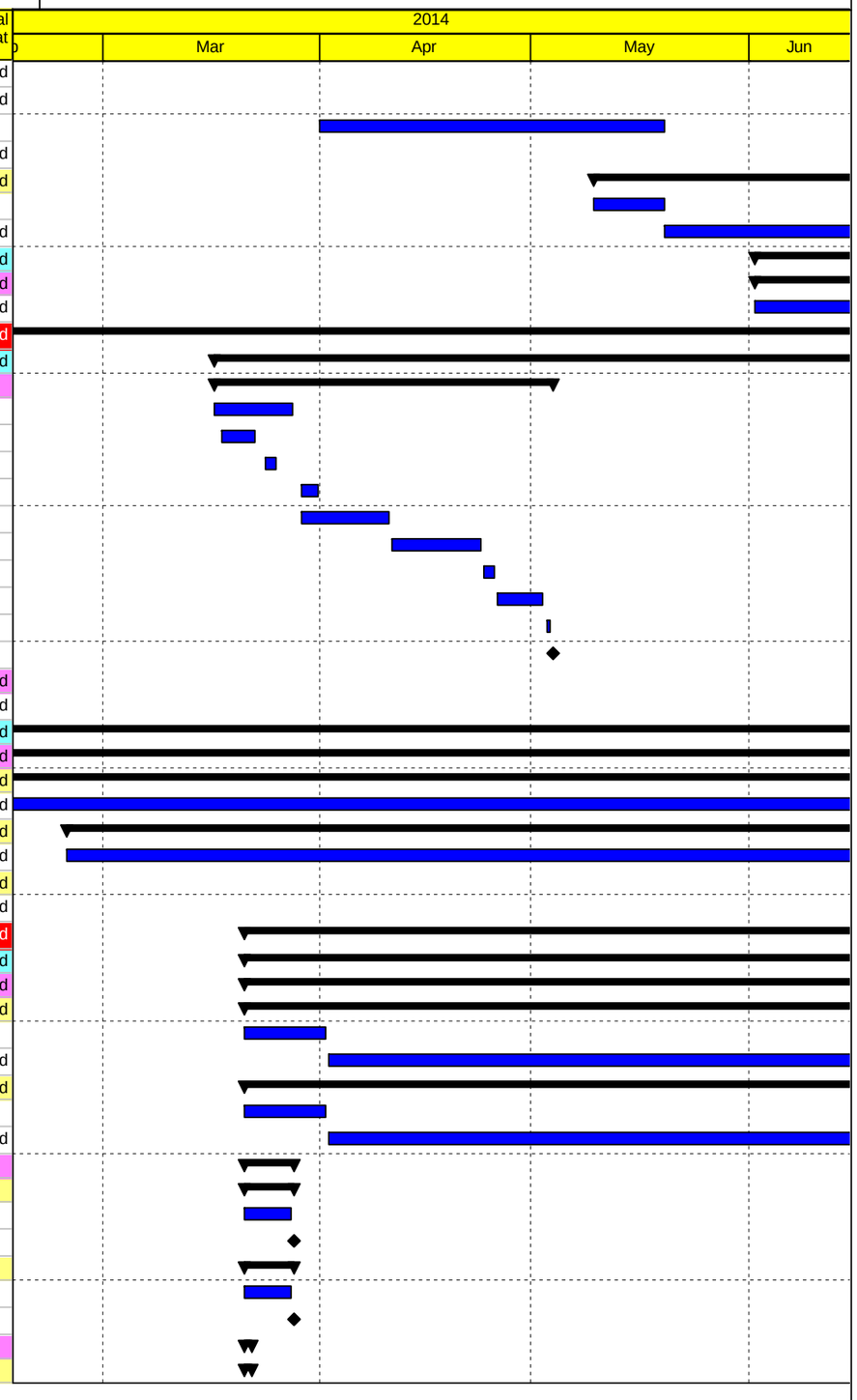
Milestone
Summary

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
Rockfill		149d	20-Mar-14 A	07-Aug-14	-15d
Seawall Portion B at K028 - K040		29d	20-Mar-14 A	20-Apr-14 A	
RFB1-000	PB Rockfill at K028 - K040 Rockfill 13cells	29d	20-Mar-14 A	20-Apr-14 A	
Seawall Portion B at K041 - K051		22d	20-Apr-14 A	13-May-14 A	
RFB3-000	PB Rockfill at K041 - K051 Rockfill 11cells	22d	20-Apr-14 A	13-May-14 A	
RFB3-120	PB Constructed the fender piles by HY/2012/07	5d	21-Apr-14 A	25-Apr-14 A	
Seawall Portion C2a at C112 - C103 10cells		40d	05-May-14 A	06-Jul-14	-123d
RFC2a-000	PC2a Rockfill at C112 - C103 Rockfill 10cells	40d	05-May-14 A	06-Jul-14	-123d
Seawall Portion C2c at C102 - C091 12cells		48d	18-Jun-14 A	07-Aug-14	-15d
RFC2c-000	PC2c Rockfill at C102 - C091 12cells	48d	18-Jun-14 A	07-Aug-14	-15d
Seawall Portion E2 at K052 - C067 16cells		44d	14-May-14 A	09-Jul-14	-18d
RFE2-010	PE2 Rockfill at C052 - C062 11cells	44d	14-May-14 A	09-Jul-14	-18d
Reclamation		148d	10-Mar-14 A	31-Jul-14	-80d
Ground Treatment		91d	01-Apr-14 A	31-Jul-14	-80d
Geotextile		63d	01-Apr-14 A	19-Jul-14	-74d
Existing Seabed Below -5mPD		8d	01-May-14 A	19-Jul-14	-74d
Land Portion E2 Northern Part		8d	01-May-14 A	19-Jul-14	-74d
GERE2-010	PE2 Geotextile for sand blanket Northern (seabed below -5mPD)	8d	01-May-14 A	19-Jul-14	-74d
Existing Seabed above -5mPD		27d	01-Apr-14 A	29-Apr-14 A	
Land Portion B		19d	01-Apr-14 A	21-Apr-14 A	
GERB0-020	PB Geotextile for sand blanket at K041 - K056	19d	01-Apr-14 A	21-Apr-14 A	
Land Portion E2 Southern Part		8d	22-Apr-14 A	29-Apr-14 A	
GERE2-012	PE2 Geotextile for sand blanket Southern (seabed above -5mPD)	8d	22-Apr-14 A	29-Apr-14 A	
Sand Blankets		15d	10-Jun-14 A	24-Jul-14	-75d
Existing Seabed below -5mPD		15d	10-Jun-14 A	24-Jul-14	-75d
Land Portion E2 Northern Part		15d	10-Jun-14 A	24-Jul-14	-75d
SABRE2-020	Sand Blankets at PE2 71,000m3 5,000m3/day North-East	15d	10-Jun-14 A	24-Jul-14	-75d
Vertical Band Drains by Marine Plant		84d	01-Apr-14 A	31-Jul-14	-74d
Land Portion E2 Northern Part 84,746nrs		84d	01-Apr-14 A	31-Jul-14	-74d
VBDE2-020	Vertical Band Drains 61,714nrs by marine plant at PE2 (750nrs/day)	84d	01-Apr-14 A	31-Jul-14	-74d
Marine Fill		71d	01-Apr-14 A	27-May-14 A	
Land Portion B		62d	10-Apr-14 A	27-May-14 A	
MFB2-005	Pipe Installation for Marine Fill	7d	10-Apr-14 A	16-Apr-14 A	
Edge K013 - K27		31d	10-Apr-14 A	09-May-14 A	
MFB1-010	Marine Fill Type A Sand 100% at PB Edge at K013 - K027 380,000m3 10,000m3/day	31d	10-Apr-14 A	09-May-14 A	
Edge K028 - K054		62d	10-Apr-14 A	27-May-14 A	
MFB2-010	Marine Fill Type A Sand 100% stg1 at PB Corridor to at K028 - K056 140,000m3 20,000m3/day	26d	10-Apr-14 A	05-May-14 A	
MFB3-010	Marine Fill Type A Sand 100% stg2 at PB Edge at K028 - K034 140,000m3 27,000m3/day	6d	06-May-14 A	22-May-14 A	
MFB3-020	Marine Fill Type A Sand 100% stg2 at PB Edge at K035 - K040 106,000m3 27,000m3/day	5d	23-May-14 A	27-May-14 A	
Main Area		17d	21-Apr-14 A	07-May-14 A	
MFB5-010	Marine Fill Type A Sand 100% stg4 at PB Main South 350,000m3 40,000m3/day	17d	21-Apr-14 A	07-May-14 A	
Land Portion C1a		28d	01-Apr-14 A	30-Apr-14 A	
MFC1a-010	Marine Fill Type A Sand 100% at PC1a 170,250m3 5,000m3/day	28d	01-Apr-14 A	30-Apr-14 A	
Vertical Band Drains by Land Plant		148d	10-Mar-14 A	15-Jul-14	-210d
Land Portion A 233,590nrs		83d	10-Mar-14 A	31-May-14 A	
VBDA0-060	Vertical Band Drains 39,000nrs by Land plant at PA C127 - C134 w CLP substation 500nrs/day (2VP + 4HP (NS	83d	10-Mar-14 A	31-May-14 A	
VBDA0-080	Vertical Band Drains by Land Plant at PA southern of PCB area (4HP)	26d	10-Mar-14 A	04-Apr-14 A	
Land Portion B 304,328nrs		76d	01-Apr-14 A	15-Jul-14	-210d
Edge K13 - K27 26,798nrs by Land		45d	01-Jun-14 A	15-Jul-14	-210d
VBDB0-010	Vertical Band Drains by land plant at PB Edge K013 - K027 26,798nrs 650nrs/day (6VP + 6HP(NS))	45d	01-Jun-14 A	15-Jul-14	-210d
Edge K28 - K54 76,000nrs by Land		69d	01-Apr-14 A	30-Jun-14	-207d
VBDB0-025	Vertical Band Drains by land plant at PB Corridor 12,000nrs 4,000nrs/day (13HP)	4d	06-May-14 A	09-May-14 A	



Remaining Level of Effort
Actual Level of Effort
Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
VBDB0-045	Vertical Band Drains by land plant at PB Edge K035 - K040 12,000nrs 4,000nrs/day (13HP)	3d	20-Jun-14 A	23-Jun-14	-211d
VBDB0-050	Vertical Band Drains by land plant at PB Edge K041 - K048 44,000nrs 4,000nrs/day	11d	20-Jun-14 A	30-Jun-14	-211d
VBDB0-052	Vertical Band Drains by marine plant at PB Edge K049 - K054 30,000nrs 750nrs/day	40d	01-Apr-14 A	20-May-14 A	
VBDB0-055	Vertical Band Drains by land plant at PB Edge K049 - K054 20,000nrs 4,000nrs/day	5d	20-Jun-14 A	30-Jun-14	-207d
Main Area 201,530nrs by Land		13d	10-May-14 A	30-Jun-14	-215d
VBDB0-030	Vertical Band Drains by land plant at PB Main South 20,000nrs 4,000nrs/day (13HP)	5d	10-May-14 A	20-May-14 A	
VBDB0-060	Vertical Band Drains by land plant at PB Main North 15,000nrs 4,000nrs/day (13HP)	4d	20-May-14 A	30-Jun-14	-215d
Earthwork Fill		17d	02-Jun-14 A	01-Jul-14	-221d
Land Portion A		17d	02-Jun-14 A	01-Jul-14	-221d
EFA0-070	Earthwork Fill Type D Sand 100% at PA at C127 - C134 Edge Area 202,097m3 12,000m3/day at CLP area	17d	02-Jun-14 A	01-Jul-14	-221d
Surcharge		151d	05-Feb-14 A	30-Jun-14	-133d
Temporary Jettys		97d	17-Mar-14 A	21-Jun-14	-124d
1st Temporary Jetty at C118		48d	17-Mar-14 A	04-May-14 A	
TP10010	Footing at Land - Place Steel Bridge precast footing and anchor block on	11d	17-Mar-14 A	28-Mar-14 A	
TP10030	Installation of Dolphins 2nrs	5d	18-Mar-14 A	22-Mar-14 A	
TP10040	Installation of main pier	2d	24-Mar-14 A	25-Mar-14 A	
TP10050	Installation of steel bridge from Jetty to the land footing	2d	29-Mar-14 A	31-Mar-14 A	
TP10060	Assembly of conveyor at Land yard	10d	29-Mar-14 A	10-Apr-14 A	
TP10070	Installation of conveyor	8d	11-Apr-14 A	24-Apr-14 A	
TP10080	Installation of accessory parts	2d	24-Apr-14 A	25-Apr-14 A	
TP10090	Trial testing	5d	26-Apr-14 A	02-May-14 A	
TP10100	Certification for the System	1d	03-May-14 A	03-May-14 A	
TP10110	Start Operation of unloading public fill at C118	0d	04-May-14 A		
2nd Temporary Jetty at C101		5d	17-Jun-14 A	21-Jun-14	-102d
TP20010	Footing at Land - Place Steel Bridge precast footing and anchor block on	5d	17-Jun-14 A	21-Jun-14	-102d
Portion A Surcharge		151d	05-Feb-14 A	30-Jun-14	-134d
Main Reclamation Areas		151d	05-Feb-14 A	30-Jun-14	-134d
A1 PCB East		105d	05-Feb-14 A	30-Jun-14	-142d
SURA0-120	Surcharge Period at PA PCB East 3.5mths (8-4.5=3.5mths)	105d	05-Feb-14 A	30-Jun-14	-142d
A1 PCB West		105d	24-Feb-14 A	30-Jun-14	-134d
SURA0-220	Surcharge Period at PA PCB West 3.5mths (8-4.5=3.5mths)	105d	24-Feb-14 A	30-Jun-14	-134d
at C127 - C134 for Power Substation Area		4d	20-Jun-14 A	24-Jun-14	-163d
SURA0-310	Sand Surcharge Laying upto +11.5mPD & compaction upto +8.5mPD on Main Area at PA CLP substation 10,000	4d	20-Jun-14 A	24-Jun-14	-163d
Geotechnical Instrumentation Works		315d	21-Mar-14 A	29-Jan-15	784d
Geotechnical Instrumentation Works for Seawalls		315d	21-Mar-14 A	29-Jan-15	55d
Cluster Type SA 2nrs Piezometer, Extensometer and Settlement Marker Cluster inside Cells		315d	21-Mar-14 A	29-Jan-15	55d
SA-1 K048 Portion B		286d	21-Mar-14 A	31-Dec-14	0d
CTSA1-010	Installation of SA-1 C048 (within 10days after filling C048) PB	10d	21-Mar-14 A	01-Apr-14 A	
CTSA1-020	Montioring of SA-1 C048 PB by weekly for subsequent 10mths	274d	02-Apr-14 A	31-Dec-14	0d
SA-2 C113 Portion C2a		315d	21-Mar-14 A	29-Jan-15	55d
CTSA2-010	Installation of SA-2 C113 (within 10days after filling C113) PC2a	10d	21-Mar-14 A	01-Apr-14 A	
CTSA2-020	Monitoring of SA-2 C113 PC2a by weekly for subsequent 10mths	303d	02-Apr-14 A	29-Jan-15	55d
Cluster Type SB 2nrs Inclinometer Cluster inside cells		7d	21-Mar-14 A	28-Mar-14 A	
SB-1 K049 Portion B		7d	21-Mar-14 A	28-Mar-14 A	
CTSB1-010	Installation of SB-1 K049 PB	6d	21-Mar-14 A	27-Mar-14 A	
CTSB1-020	Commencement of Monitoring of SB-1 K049 PB	0d	28-Mar-14 A		
SB-2 C112 Portion C2a		7d	21-Mar-14 A	28-Mar-14 A	
CTSB2-010	Installation of SB-2 C112 PC2a	6d	21-Mar-14 A	27-Mar-14 A	
CTSB2-020	Commencement of Monitoring of SB-2 C112 PC2a	0d	28-Mar-14 A		
Cluster Type SC 3nrs Strain Guage and Inclinometer Cluster inside cells		1d	21-Mar-14 A	22-Mar-14 A	
SC-1 K044 Portion B		1d	21-Mar-14 A	22-Mar-14 A	



Remaining Level of Effort
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Actual Work
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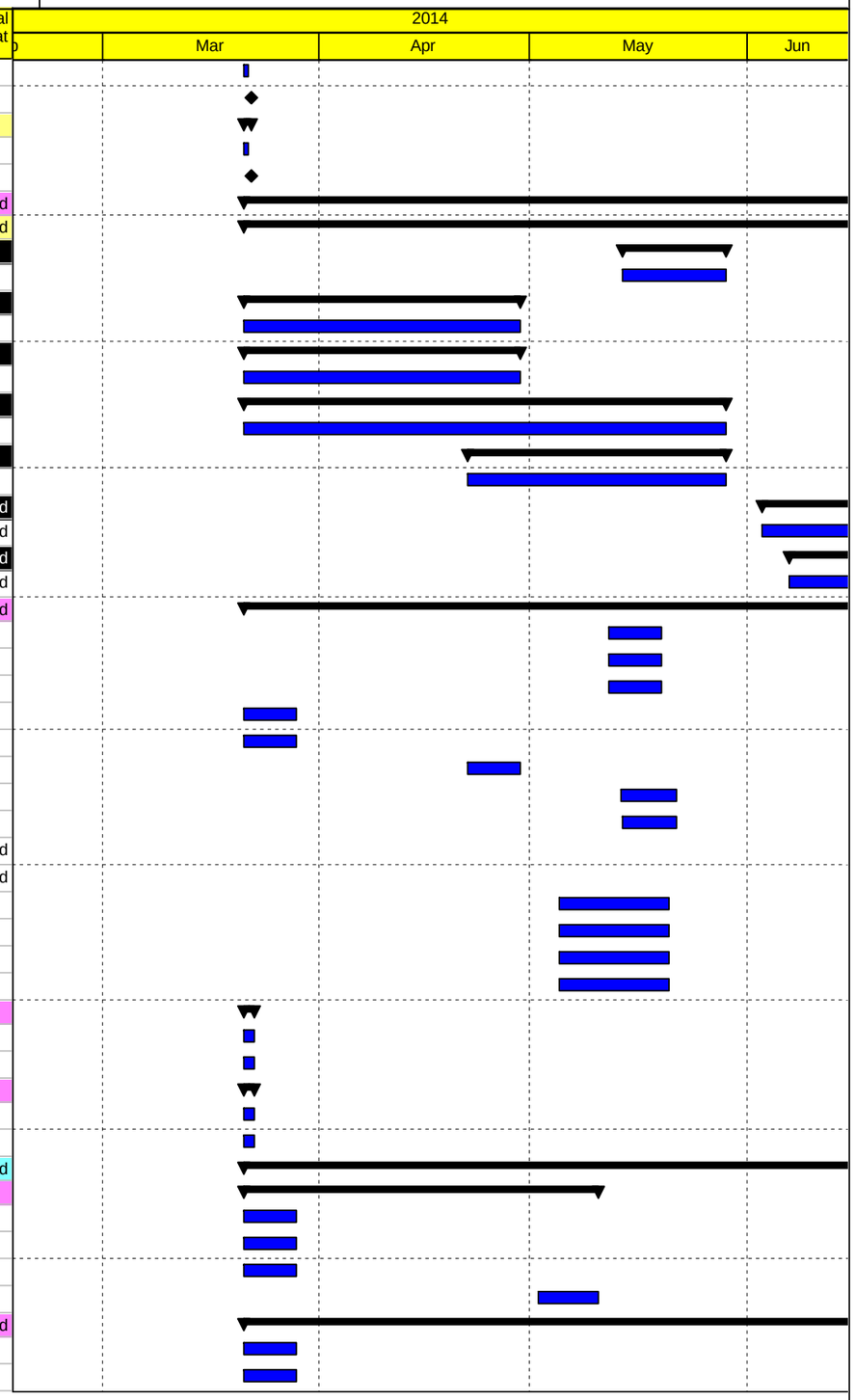
Milestone
Summary

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
CTSC1-010	Installation of SC-1 K044 PB	1d	21-Mar-14 A	21-Mar-14 A	
CTSC1-020	Commencement of Monitoring of SC-1 K044 PB	0d	22-Mar-14 A		
SC-2 C074 Portion E1		1d	21-Mar-14 A	22-Mar-14 A	
CTSC2-010	Installation of SC-2 C074 PE1	1d	21-Mar-14 A	21-Mar-14 A	
CTSC2-020	Commencement of Monitoring of SC-2 C074 PE1	0d	22-Mar-14 A		
Cluster Type SD 26nrs Instrumentation and CPT Cluster behind cells		104d	21-Mar-14 A	12-Jul-14	-153d
Portion B		104d	21-Mar-14 A	12-Jul-14	-153d
SD-01 K014		13d	14-May-14 A	29-May-14 A	
CTSD-010	Installation of SD-01 (K014) PB	13d	14-May-14 A	29-May-14 A	
SD-04 K028		32d	21-Mar-14 A	29-Apr-14 A	
CTSD-040	Installation of SD-04 (KC028) PB	30d	21-Mar-14 A	29-Apr-14 A	
SD-05 K033		32d	21-Mar-14 A	29-Apr-14 A	
CTSD-050	Installation of SD-05 (K033) PB	30d	21-Mar-14 A	29-Apr-14 A	
SD-06 K038		32d	21-Mar-14 A	29-May-14 A	
CTSD-060	Installation of SD-06 (K038) PB	30d	21-Mar-14 A	29-May-14 A	
SD-07 K042		30d	22-Apr-14 A	29-May-14 A	
CTSD-070	Installation of SD-07 (K042) PB	30d	22-Apr-14 A	29-May-14 A	
SD-08 K047		30d	03-Jun-14 A	08-Jul-14	-153d
CTSD-080	Installation of SD-08 (K047) PB	30d	03-Jun-14 A	08-Jul-14	-153d
SD-09 K051		30d	07-Jun-14 A	12-Jul-14	-153d
CTSD-090	Installation of SD-09 (K051) PB	30d	07-Jun-14 A	12-Jul-14	-153d
Cluster Type SE 26nrs Surface movement marker cluster at top of cell and sloping seawall		78d	21-Mar-14 A	25-Jun-14	109d
CTSE-010	Installation of SE-01 (K017) PB	7d	12-May-14 A	19-May-14 A	
CTSE-020	Installation of SE-02 (K021) PB	7d	12-May-14 A	19-May-14 A	
CTSE-030	Installation of SE-03 (K026) PB	7d	12-May-14 A	19-May-14 A	
CTSE-040	Installation of SE-04 (K031) PB	7d	21-Mar-14 A	28-Mar-14 A	
CTSE-050	Installation of SE-05 (K035) PB	7d	21-Mar-14 A	28-Mar-14 A	
CTSE-060	Installation of SE-06 (K043) PB	7d	22-Apr-14 A	29-Apr-14 A	
CTSE-090	Installation of SE-09 (K052) PE2	7d	14-May-14 A	22-May-14 A	
CTSE-100	Installation of SE-10 (C059) PE2	7d	14-May-14 A	22-May-14 A	
CTSE-180	Installation of SE-18 (C092) PC2c	7d	18-Jun-14 A	25-Jun-14	109d
CTSE-190	Installation of SE-19 (C097) PC2c	7d	18-Jun-14 A	25-Jun-14	91d
CTSE-200	Installation of SE-20 (C102) PC2a	14d	05-May-14 A	21-May-14 A	
CTSE-210	Installation of SE-21 (C106) PC2a	14d	05-May-14 A	21-May-14 A	
CTSE-220	Installation of SE-22 (C111) PC2a	14d	05-May-14 A	21-May-14 A	
CTSE-230	Installation of SE-23 (C116) PC2a	14d	05-May-14 A	21-May-14 A	
Cluster Type DV 4nrs Surface movement marker and inclinometer cluster at V2 seawall		2d	21-Mar-14 A	22-Mar-14 A	
CTDV-010	Installation of combined inclinometer and extensometer at seawall V2 PD	2d	21-Mar-14 A	22-Mar-14 A	
CTDV-020	Installation of surface movement markers at seawall V2 PD	2d	21-Mar-14 A	22-Mar-14 A	
Cluster Type DS 4nrs Surface movement marker and inclinometer cluster at S1 seawall		2d	21-Mar-14 A	22-Mar-14 A	
CTDS-010	Installation of DS-1 to DS2 PD	2d	21-Mar-14 A	22-Mar-14 A	
CTDS-020	Installation of DS-3 to DS4 PD	2d	21-Mar-14 A	22-Mar-14 A	
Geotechnical Instrumentation Works for Reclamation RA & RB		79d	21-Mar-14 A	26-Jun-14	825d
RA		40d	21-Mar-14 A	10-May-14 A	
CTRA-010	Installation of RA 5sets at PA	7d	21-Mar-14 A	28-Mar-14 A	
CTRA-020	Installation of RA 2sets at PD (CH0 - 225)	7d	21-Mar-14 A	28-Mar-14 A	
CTRA-030	Installation of RA 2sets at PD (CH225 - 450)	7d	21-Mar-14 A	28-Mar-14 A	
CTRA-050	Installation of RA 8sets at PC1a	7d	02-May-14 A	10-May-14 A	
RB		79d	21-Mar-14 A	26-Jun-14	825d
SMT1-020	Installation of RB at PD (CH0 - 225)	7d	21-Mar-14 A	28-Mar-14 A	
SMT1-030	Installation of RB at PD (CH225 - 450)	7d	21-Mar-14 A	28-Mar-14 A	



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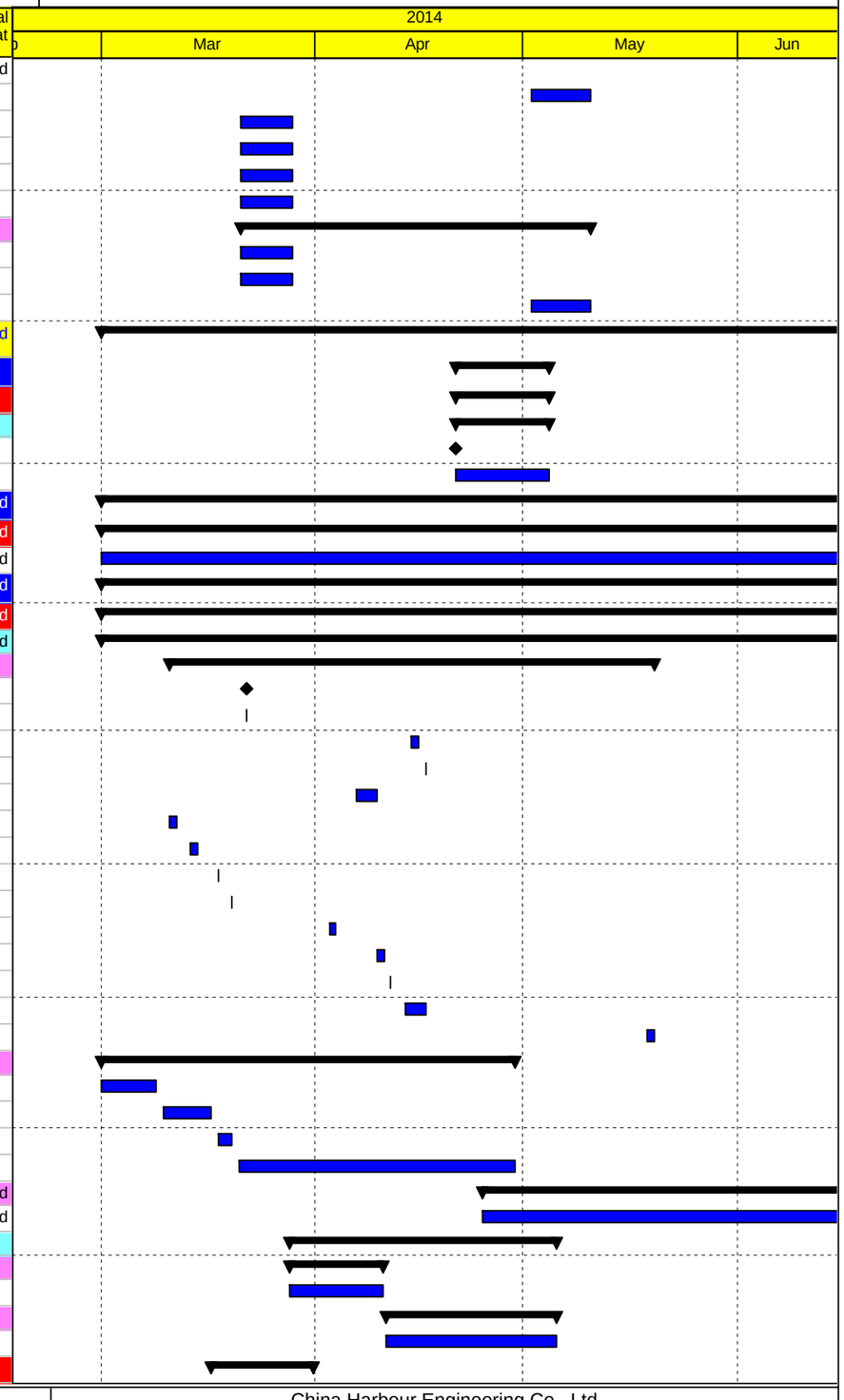
Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
SMT1-040	Installation of RB at PB	7d	19-Jun-14 A	26-Jun-14	825d
SMT1-050	Installation of RB at PC1a	7d	02-May-14 A	10-May-14 A	
SMT1-070	Installation of RB at PC2a	7d	21-Mar-14 A	28-Mar-14 A	
SMT1-080	Installation of RB at PC2b	7d	21-Mar-14 A	28-Mar-14 A	
SMT1-090	Installation of RB at PC2c	7d	21-Mar-14 A	28-Mar-14 A	
SMT1-100	Installation of RB at PE1	7d	21-Mar-14 A	28-Mar-14 A	
Settlement Marker Type 2		40d	21-Mar-14 A	10-May-14 A	
SMT2-020	M2 - Installation of Settlement Marker Type2 at PD (CH0 - 225)	7d	21-Mar-14 A	28-Mar-14 A	
SMT2-030	M2 - Installation of Settlement Marker Type2 at PD (CH225 - 450)	7d	21-Mar-14 A	28-Mar-14 A	
SMT2-050	M2 - Installation of Settlement Marker Type2 at PC1a	7d	02-May-14 A	10-May-14 A	
Portion D		129d	01-Mar-14 A	09-Jul-14	-99d
Submission		14d	21-Apr-14 A	04-May-14 A	
Method Statement Submission		14d	21-Apr-14 A	04-May-14 A	
Extension Culvert EC1		14d	21-Apr-14 A	04-May-14 A	
PD-MTD-06010	MTD for culvert EC1 - Preparation & Submission	0d	21-Apr-14 A		
PD-MTD-06020	MTD for culvert EC1- Approval	14d	21-Apr-14 A	04-May-14 A	
Precast Yard for Seawall Blocks & Culverts		92d	01-Mar-14 A	01-Jul-14	-123d
Culverts		92d	01-Mar-14 A	01-Jul-14	-123d
PD-PY-0100	Precast Yard Setup	92d	01-Mar-14 A	01-Jul-14	-123d
Site Construction		129d	01-Mar-14 A	09-Jul-14	-99d
Seawall Construction		85d	01-Mar-14 A	09-Jul-14	-99d
Access at Portion D		85d	01-Mar-14 A	09-Jul-14	-99d
Existing Road to Portion D		36d	11-Mar-14 A	20-May-14 A	
AA0010	Approval of TTA	0d	22-Mar-14 A		
AA0020	Set up the TTA (Stage 1)	1d	22-Mar-14 A	22-Mar-14 A	
AA0030	Remove the Existing Steel Vehicle Parapet	2d	15-Apr-14 A	16-Apr-14 A	
AA0040	Saw Cutting the Top Part of the Footing of the Parapet and Profile Barrier	1d	17-Apr-14 A	17-Apr-14 A	
AA0050	Place the Precast Concrete Block along both side of the Access	4d	07-Apr-14 A	10-Apr-14 A	
AA0060	Excavate the Footing of the Temproary Bridge	2d	11-Mar-14 A	12-Mar-14 A	
AA0070	Shuttering Formworks for the Footing	2d	14-Mar-14 A	15-Mar-14 A	
AA0080	Concrete the Footing	1d	18-Mar-14 A	18-Mar-14 A	
AA0090	Remove Formworks from Footing	1d	20-Mar-14 A	20-Mar-14 A	
AA0100	Laying and Compact the Aggregate	2d	03-Apr-14 A	04-Apr-14 A	
AA0110	Laying and Compact the Sub-base Material	2d	10-Apr-14 A	11-Apr-14 A	
AA0120	Concreting the Pavement	1d	12-Apr-14 A	12-Apr-14 A	
AA0130	Curing the Pavement	4d	14-Apr-14 A	17-Apr-14 A	
AA0140	Set up the TTA (Stage 3 and Stage 4) for access opening	2d	19-May-14 A	20-May-14 A	
Construction of Temporary Bridge		50d	01-Mar-14 A	30-Apr-14 A	
AA1030	Erection of Concrete Block Footing	7d	01-Mar-14 A	09-Mar-14 A	
AA1040	Installation of Hinge Joint	7d	10-Mar-14 A	17-Mar-14 A	
AA1050	Delivery of Steelworks	3d	18-Mar-14 A	20-Mar-14 A	
AA1060	Installation of Steel Brdige	31d	21-Mar-14 A	30-Apr-14 A	
WaterMain Construction		24d	25-Apr-14 A	09-Jul-14	-79d
A30010	PD - Temp Watermain Construction approved by AA & WSD	24d	25-Apr-14 A	09-Jul-14	-79d
Temporary Seawall		35d	28-Mar-14 A	06-May-14 A	
Temporary Seawall CH5+900 - CH5+800 (100m)		12d	28-Mar-14 A	10-Apr-14 A	
PDTS-30060	V2 East1 Temporary Seawall Seawall blocks installation 350nrs	12d	28-Mar-14 A	10-Apr-14 A	
Temporary Seawall CH5+800 - CH5+650 (150m)		23d	11-Apr-14 A	06-May-14 A	
PDTS-40060	V2 East2 Temporary Seawall Seawall blocks installation 350nrs	23d	11-Apr-14 A	06-May-14 A	
Reclamation below +2.5mPD		14d	17-Mar-14 A	31-Mar-14 A	



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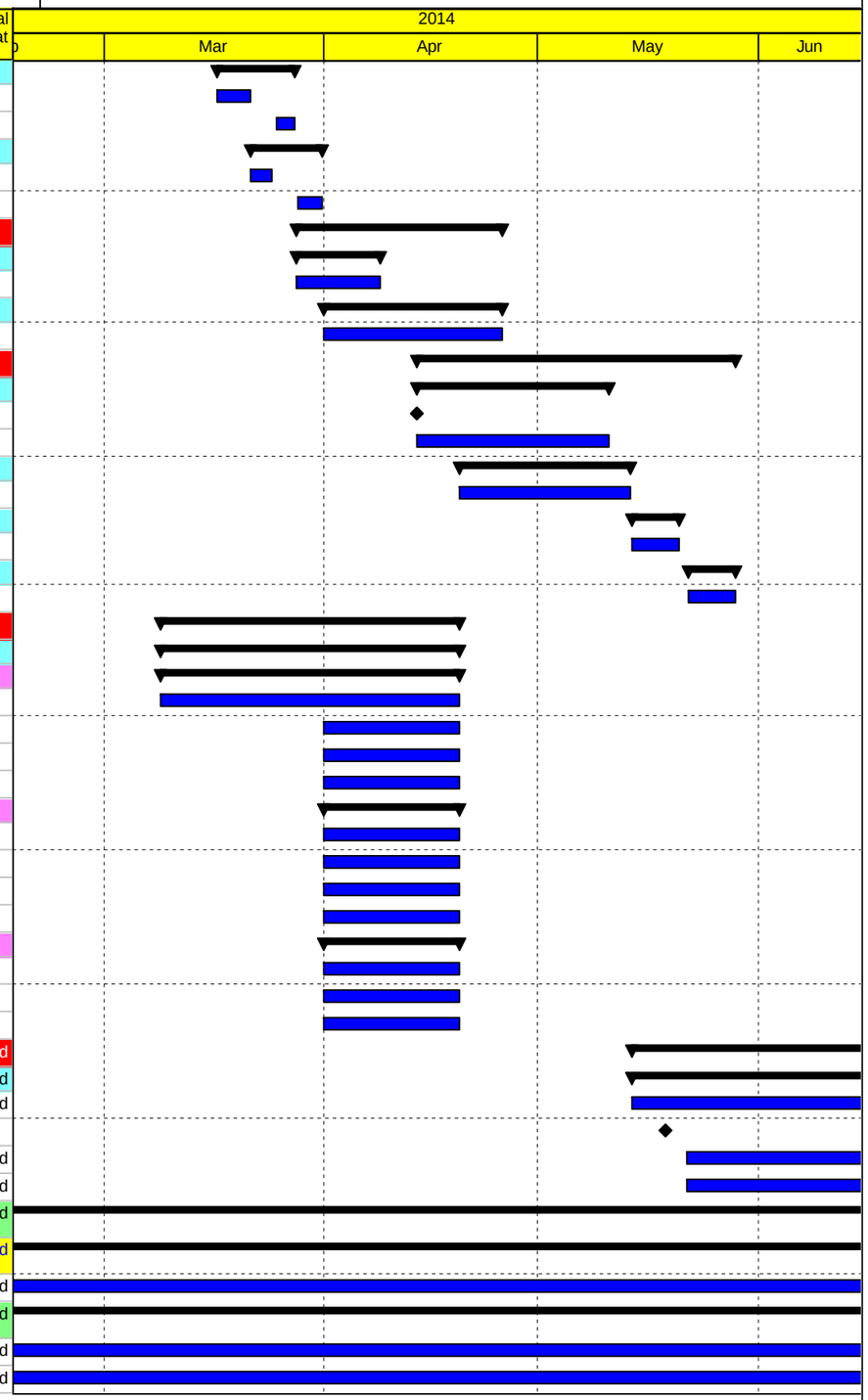
Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
East1 (South CH 225 - 325 & North CH 5900 - 5800)		11d	17-Mar-14 A	27-Mar-14 A	
A1635b	PD - Marine Fill Type A Sand 100% upto +0mPD at East1 30,540m3 10,000m3/day	5d	17-Mar-14 A	21-Mar-14 A	
A1635c	PD - Marine Fill Type A sand 100% upto +2.5mPD at East1 30,540m3 10,000m3/day	3d	25-Mar-14 A	27-Mar-14 A	
East2 (South CH 325 - 450 & North CH 5800 - 5650)		9d	21-Mar-14 A	31-Mar-14 A	
A1635b10	PD - Marine Fill Type A Sand 100% upto +0mPD at East2 30,537m3 10,000m3/day	3d	21-Mar-14 A	24-Mar-14 A	
A1635c10	PD - Marine Fill Type A sand 100% upto +2.5mPD at East2 30,540m3 10,000m3/day	3d	28-Mar-14 A	31-Mar-14 A	
Vertical Band Drain by Land Base		29d	28-Mar-14 A	26-Apr-14 A	
Zone B2 4,480nrs		13d	28-Mar-14 A	09-Apr-14 A	
A1636	PD - Install vertical band drain 4,480nrs by Land Plant 350nrs/day (1HP)	13d	28-Mar-14 A	09-Apr-14 A	
Zone BA 5,440nrs		25d	01-Apr-14 A	26-Apr-14 A	
A2160	PD - Install vertical band drain 5,440nrs by Land Plant 300nrs/day (4VP + 2HP (NS))	25d	01-Apr-14 A	26-Apr-14 A	
Reclamation Above +2.5mPD		45d	14-Apr-14 A	28-May-14 A	
West1 (South CH 0 -100 & North CH6136 - 6000)		27d	14-Apr-14 A	11-May-14 A	
A1621	PD - Allow Earthwork fill refer to Vane Shear Test Result	0d	14-Apr-14 A		
A1633	PD - Earthwork Fill upto + 5.5 mPD at West1 47,269m3 5,000m3/day	25d	14-Apr-14 A	11-May-14 A	
West2 (South CH 100 -225 & North CH6000 - 5900)		22d	20-Apr-14 A	14-May-14 A	
A2120	PD - Earthwork Fill upto + 5.5 mPD at West2 47,269m3 5,000m3/day	22d	20-Apr-14 A	14-May-14 A	
East1 (North CH 225 - 325 & CH 5900 - 5800)		7d	14-May-14 A	21-May-14 A	
A1665	PD - Earthwork Fill upto + 5.5 mPD at East1 47,269m3 10,000m3/day	7d	14-May-14 A	21-May-14 A	
East2 (North CH 325 - 450 & CH 5800 - 5700)		7d	22-May-14 A	28-May-14 A	
A2170	PD - Earthwork Fill upto + 5.5 mPD at East2 47,268m3 10,000m3/day	7d	22-May-14 A	28-May-14 A	
Instrumentation & Monitoring Requirements		43d	09-Mar-14 A	20-Apr-14 A	
East Portion		43d	09-Mar-14 A	20-Apr-14 A	
Vertical Seawalls - Cluster Type DV-3 & DV-4		43d	09-Mar-14 A	20-Apr-14 A	
DV-1050	PD - Surface Movements Marker (Type 3B) 4nrs east	43d	09-Mar-14 A	20-Apr-14 A	
DV-1060	PD - Combine Inclinometer and Extensometer 2nrs east	20d	01-Apr-14 A	20-Apr-14 A	
DV-1070	PD - Sub-surface Settlement Marker 2nrs east	20d	01-Apr-14 A	20-Apr-14 A	
DV-1080	PD - Settlement Marker (Type 2) 2nrs east	20d	01-Apr-14 A	20-Apr-14 A	
Sloping Seawalls - Cluster Type DS-3 & DS-4		20d	01-Apr-14 A	20-Apr-14 A	
DS-1050	PD - Surface Movement Marker (Type 3B) 4nrs east	20d	01-Apr-14 A	20-Apr-14 A	
DS-1060	PD - Combine Inclinometer and Extensiometer 2nrs east	20d	01-Apr-14 A	20-Apr-14 A	
DS-1070	PD - Sub-surface Settlement Marker 2nrs east	20d	01-Apr-14 A	20-Apr-14 A	
DS-1080	PD - Settlement Marker (Type 2) 2nrs east	20d	01-Apr-14 A	20-Apr-14 A	
Reclamation - Cluster Type RA 1set		20d	01-Apr-14 A	20-Apr-14 A	
RA-1060	PD - Extensometer 1nr	20d	01-Apr-14 A	20-Apr-14 A	
RA-1070	PD - Standpiipe / Casagrande Piezometer 1nr	20d	01-Apr-14 A	20-Apr-14 A	
RA-1080	PD - Double Tip Virbrating Wire Piezometer 3nrs	20d	01-Apr-14 A	20-Apr-14 A	
Surcharge		55d	14-May-14 A	05-Jul-14	-188d
West1 Portion		55d	14-May-14 A	05-Jul-14	-188d
A1628	PD West1 - Vent Shear Test after +5.5mPD 6nrs	12d	14-May-14 A	02-Jul-14	-155d
A1638	PD - Allow to surcharge upto 8.5mPD by result of Vent Shear Test	0d		19-May-14 A	
A1640	PD West1 - Surcharge Laying upto 8.5mPD 42,843m3 5,000m3/day outstanding	15d	22-May-14 A	04-Jul-14	-170d
A1650	PD West1 - Surcharge compaction upto 8.5mPD	15d	22-May-14 A	05-Jul-14	-188d
Works Area WA2 (Tung Chung)		1435d	21-May-12 A	28-Feb-17	1d
Zone A		1435d	21-May-12 A	28-Feb-17	1d
A1880	Maintenance of Engineer's Accommodation	1431d	21-May-12 A	28-Feb-17	0d
Works Area TKO Fill Bank		1255d	25-Sep-12 A	29-Nov-16	1d
WA-TKO-1040	Operate and Maintain Public Fill Sorting Facilities in Zone A, B1 & B2	1251d	25-Sep-12 A	29-Nov-16	1d
WA-TKO-1050	Maintainance of Site in Zone C	568d	25-Sep-12 A	22-Aug-14	0d



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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: • 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
		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; • 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
		audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • 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: • 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
		• 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: • 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: • 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; • 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	*Construction and Demolition Material* The following mitigation measures should be implemented in handling the waste: • 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
		• 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	*C&D Waste* • 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
		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.		
S8.2.12-S8.3.15 of HKBCFEIA and S12.6 of TMCLKLEIA	WM6	*Chemical Waste* • 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	All construction sites	V

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	*Sewage* • 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	*General Refuse* • 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
		considered by the Contractor. In addition, waste separation facilities for paper, aluminum cans, plastic bottles etc., should be provided. • 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	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:	During filling	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		• 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
		to prevent sediment loss at navigation accesses. The length of each staggered layers shall be at least 200m; • 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	<u>Land Works</u> 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:	All land-based construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
TMCLKLEIA		• 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
		should be covered with tarpaulin or similar fabric during rainstorms; • 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
		• 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	• 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
		• Good site practices • Strict enforcement of no marine dumping • Site runoff control • Spill response plan		
S10.7 of HKBCFEIA	E2	• 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	• 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	• Dolphin Exclusion Zone • Dolphin watching plan	Marine works	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E5	• 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	• Control vessel speed	Marine traffic	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
HKBCFEIA and S8.14 of TMCLKLEIA		• Skipper training • Predefined and regular routes for working vessels; avoid Brothers Islands		
S10.10 of HKBCFEIA and S8.14 of TMCLKLEIA	E7	• Vessel based dolphin monitoring	Northeast and Northwest Lantau	V
Fisheries				
S11.7 of HKBCFEIA	F1	• 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	• 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	*Mitigate Landscape Impacts* G1/CM4 Grass-hydroseed or sheeting bare soil surface and stock pile areas. 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	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	*Mitigate Landscape Impacts* 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	*Mitigate Visual Impacts* V1 Minimize time for construction activities during construction period.	All construction site areas	V
S10.9 of TMCLKLEIA	LV5	*Mitigate Visual Impacts* 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	• 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 $\mu g/m^3$	500 $\mu g/m^3$
AMS3A*	368 $\mu g/m^3$	500 $\mu g/m^3$
AMS6	360 $\mu g/m^3$	500 $\mu g/m^3$
AMS7	370 $\mu g/m^3$	500 $\mu g/m^3$

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

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

Location	Action Level	Limit Level
AMS2	176 $\mu g/m^3$	260 $\mu g/m^3$
AMS3A*	167 $\mu g/m^3$	260 $\mu g/m^3$
AMS6	173 $\mu g/m^3$	260 $\mu g/m^3$
AMS7	183 $\mu g/m^3$	260 $\mu g/m^3$

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

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

Location	Action Level	Limit Level
NMS2	When one documented complaint, related to 0700 – 1900 hours on normal weekdays, is received from any one of the sensitive receivers	75 dB(A)
NMS3A		*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)	Surface and Middle 5.0 Bottom 4.7	Surface and Middle 4 .2 (except 5 mg/L for FCZ) Bottom 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 and130% 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):

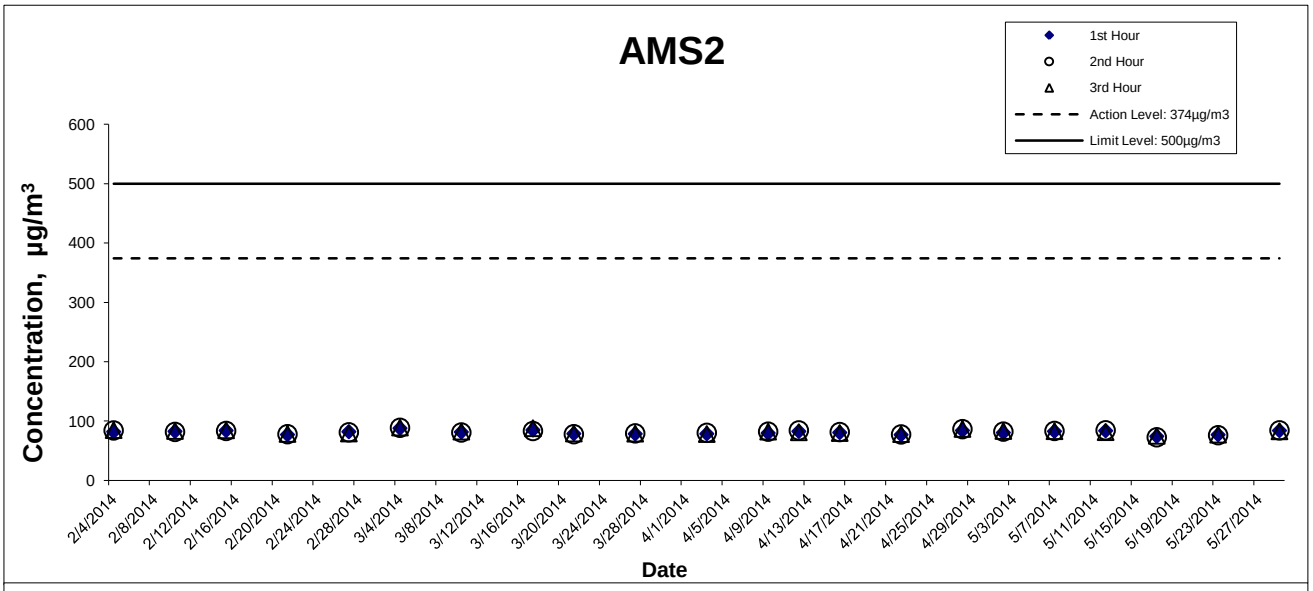
	North Lantau Social Cluster	
	NEL	**NWL**
Action Level	(STG < 70% of baseline) & (ANI < 70% of baseline)	(STG < 70% of baseline) & (ANI < 70% of baseline)
Limit Level	[(STG < 40% of baseline) & (ANI < 40% of baseline)] AND [(STG < 40% of baseline) & (ANI < 40% of baseline)]	

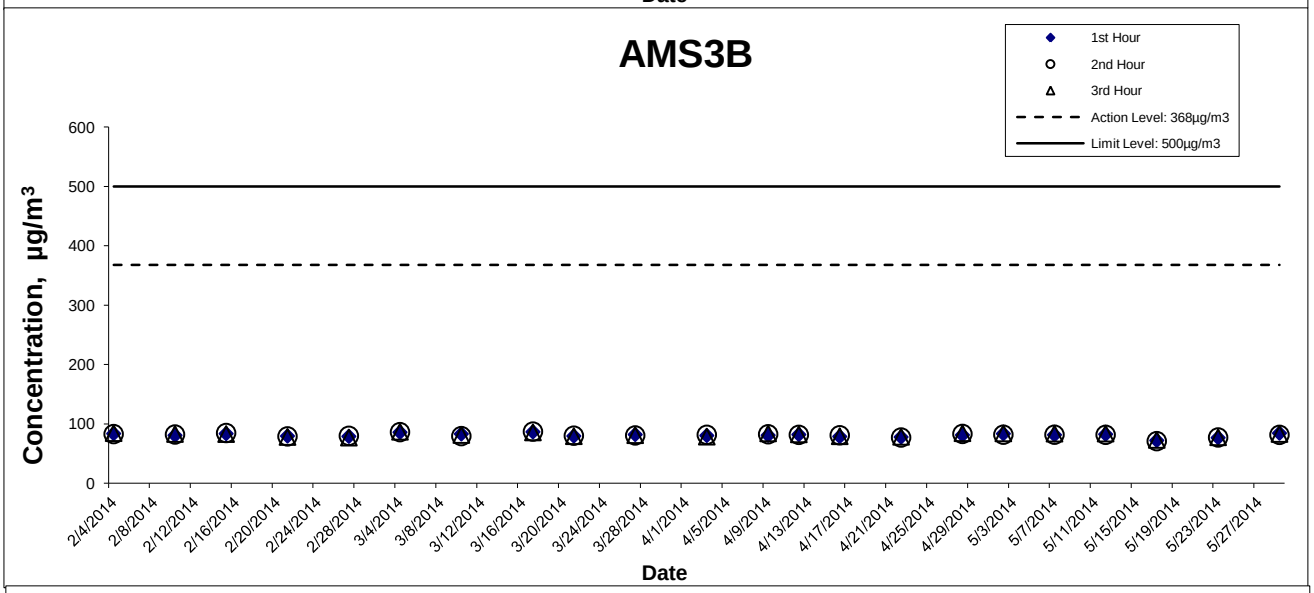
For North Lantau Social Cluster, action level will be trigger if either NEL **or** NWL fall below the criteria; limit level will be triggered if both NEL **and** NWL fall below the criteria.

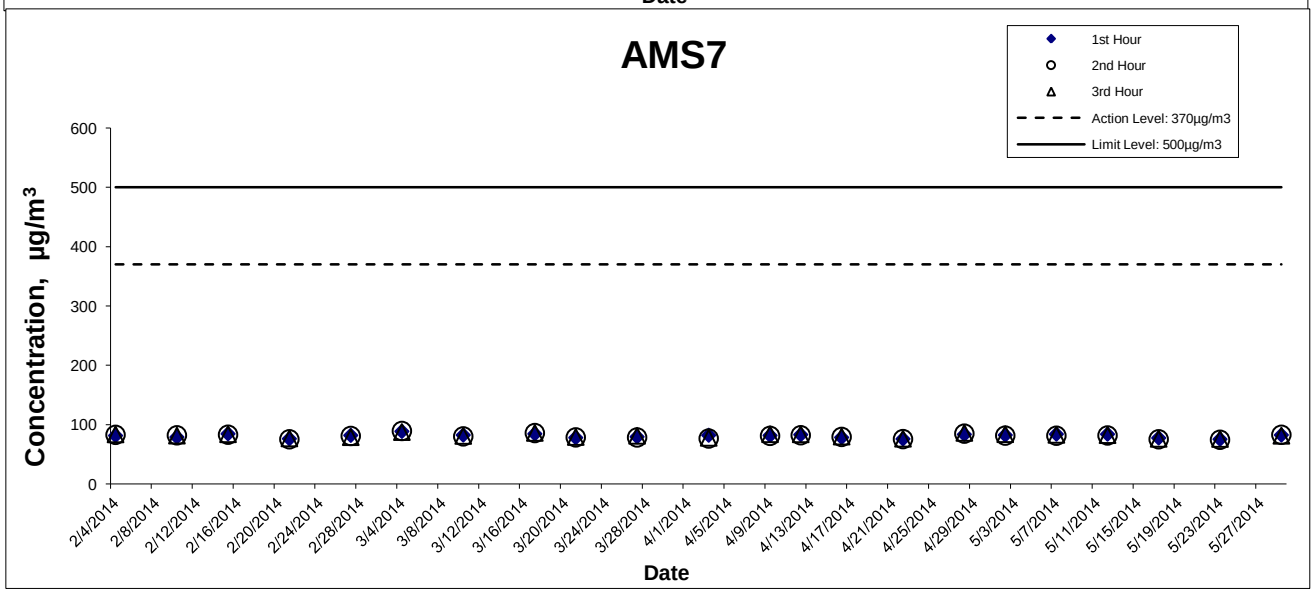
Table 5(b) Derived Value of Action Level (AL) and Limit Level (LL) for Chinese White Dolphin Monitoring

	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)]	

For details of the major activites carried out, weather conditions and other significant factors that might affect the monitoring results during monitoring periods from March 2014 to May 2014, please refer to the Monthly EM&A Reports for March, April and May 2014 and their Appendix G respectively.







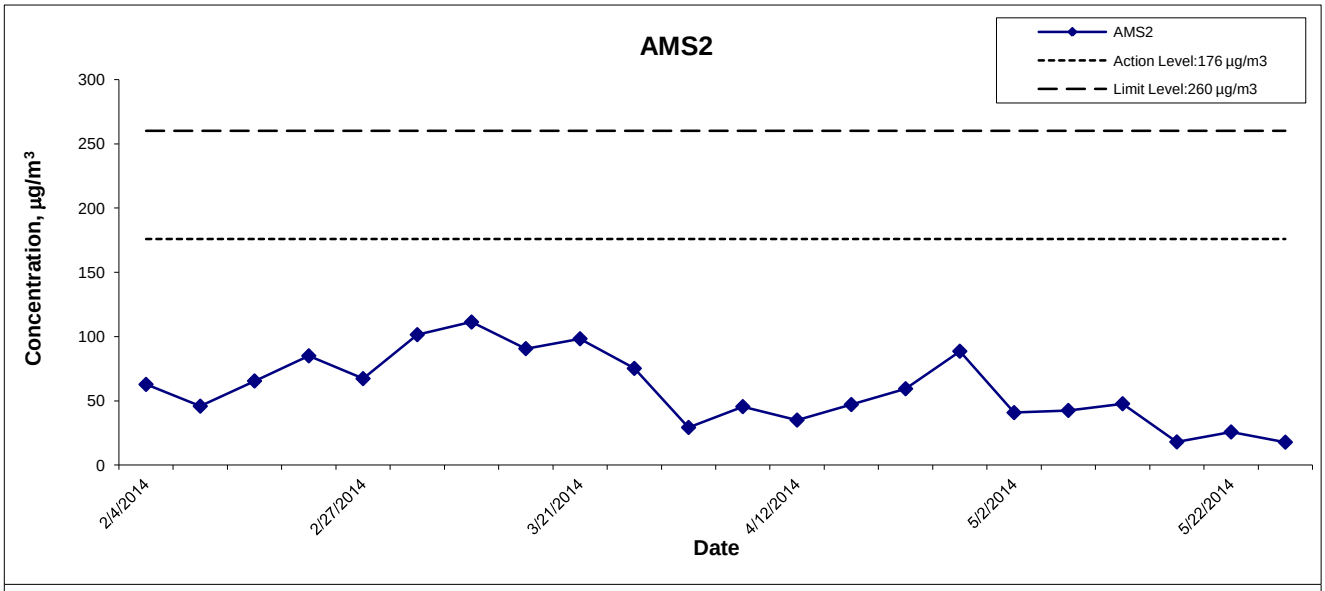
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

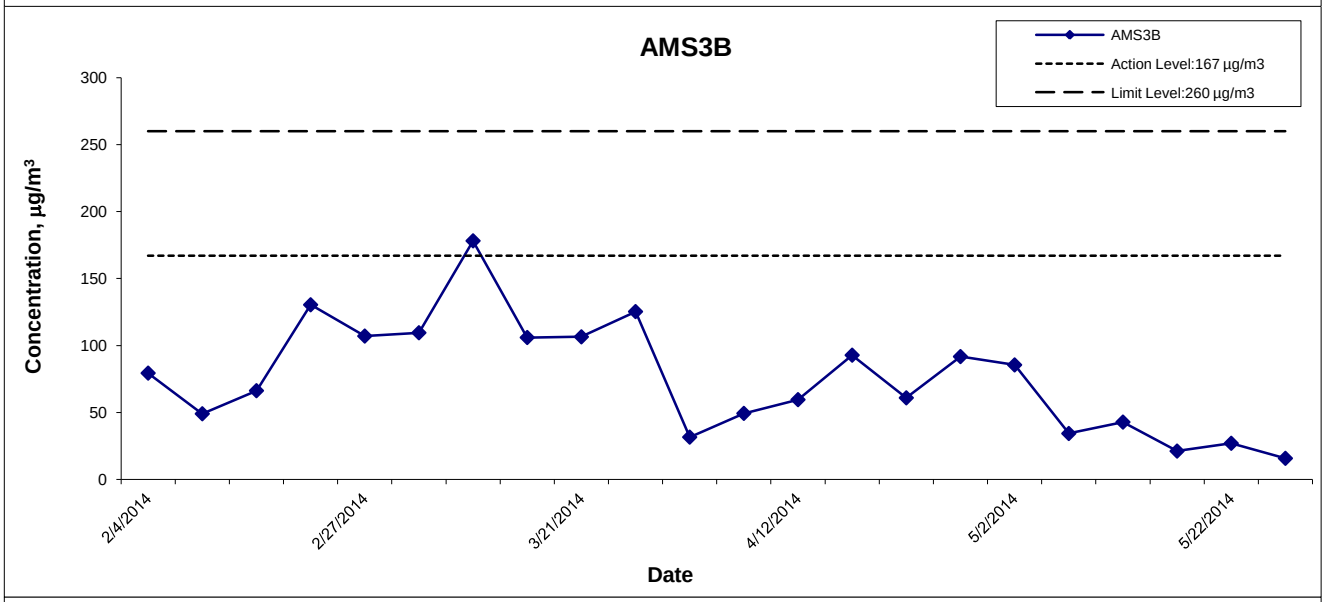
AECOM

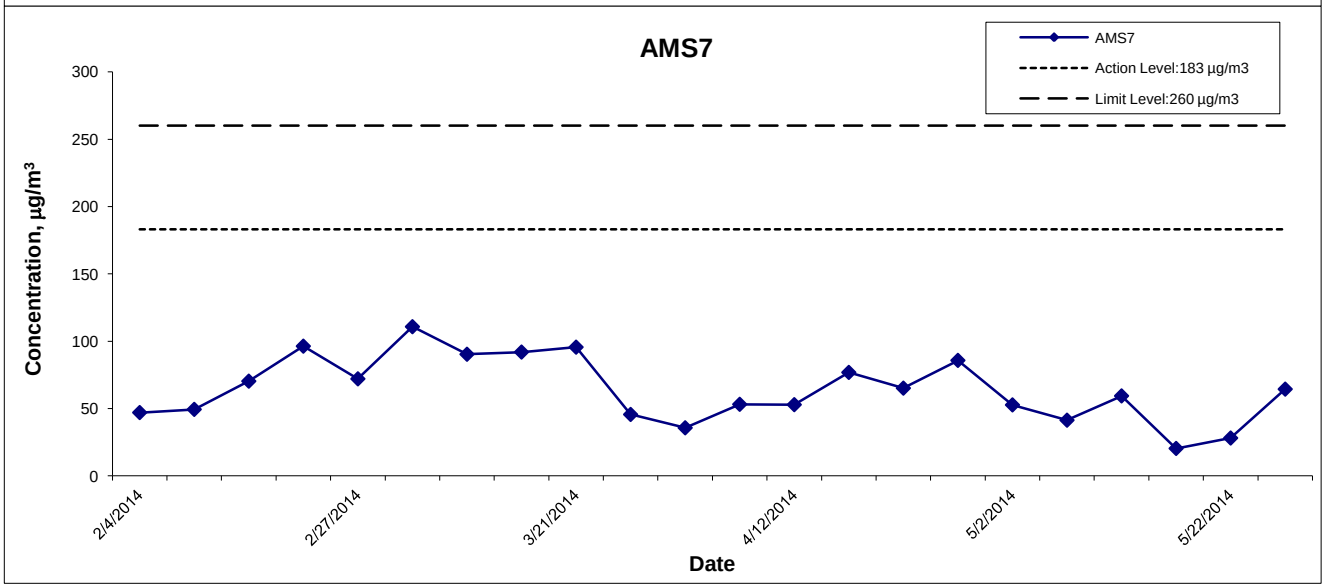
Graphical Presentation of Impact 1-hour TSP Monitoring Results

Project No.: 60249820 **Date: May 2014**

Appendix E







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

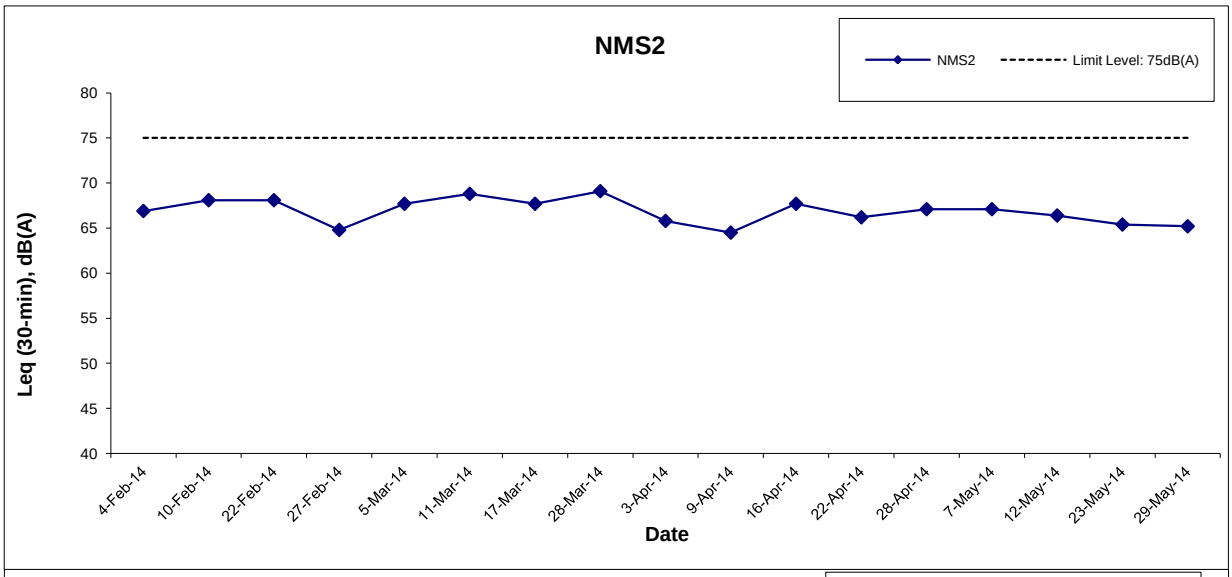
AECOM

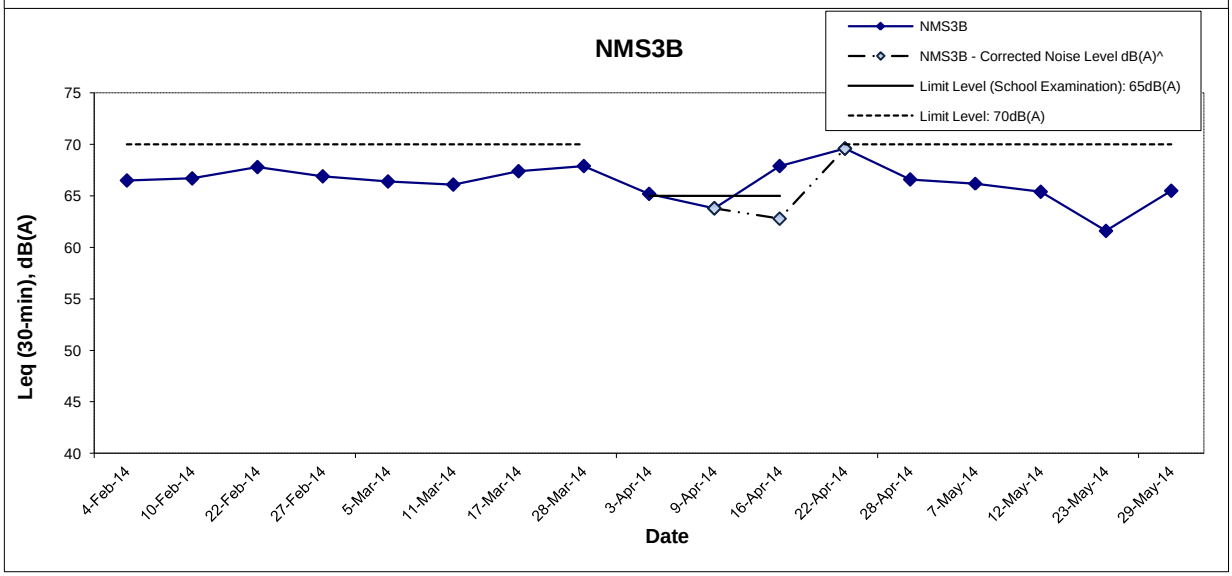
Graphical Presentation of Impact 24-hour TSP Monitoring Results

Project No.: 60249820 **Date: May 2014**

Appendix E

For details of the major activites carried out, weather conditions and other significant factors that might affect the monitoring results during monitoring periods from March 2014 to May 2014, please refer to the Monthly EM&A Reports for March, April and May 2014 and their Appendix I respectively.



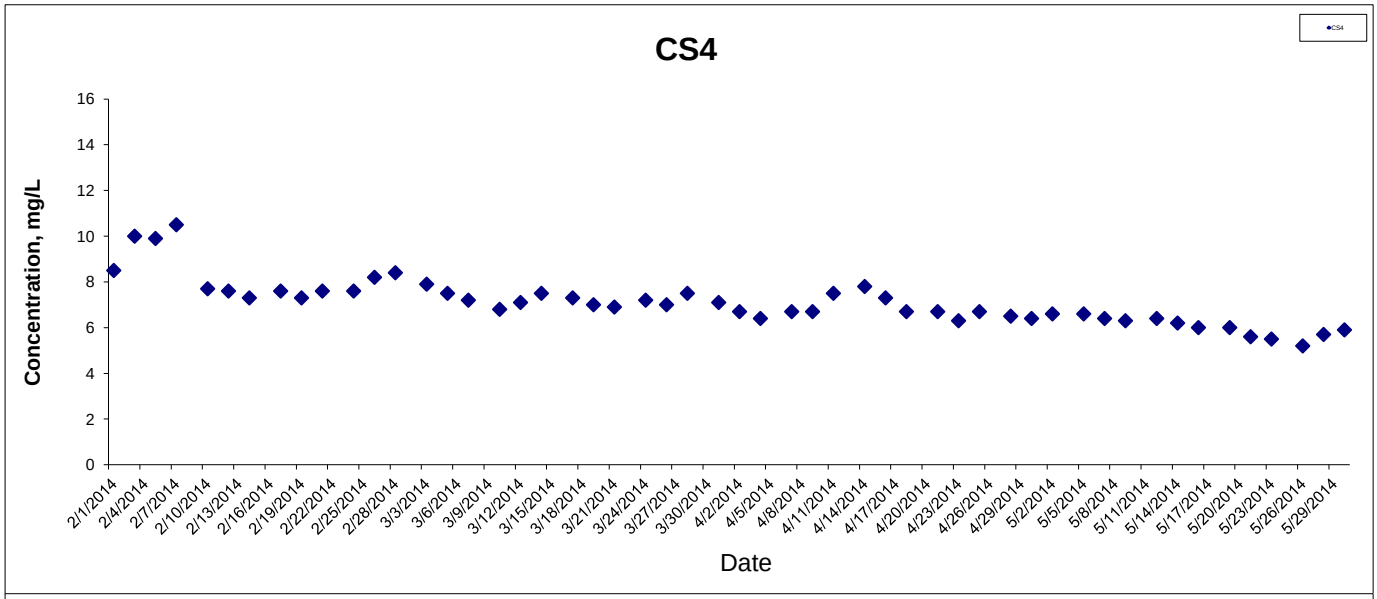


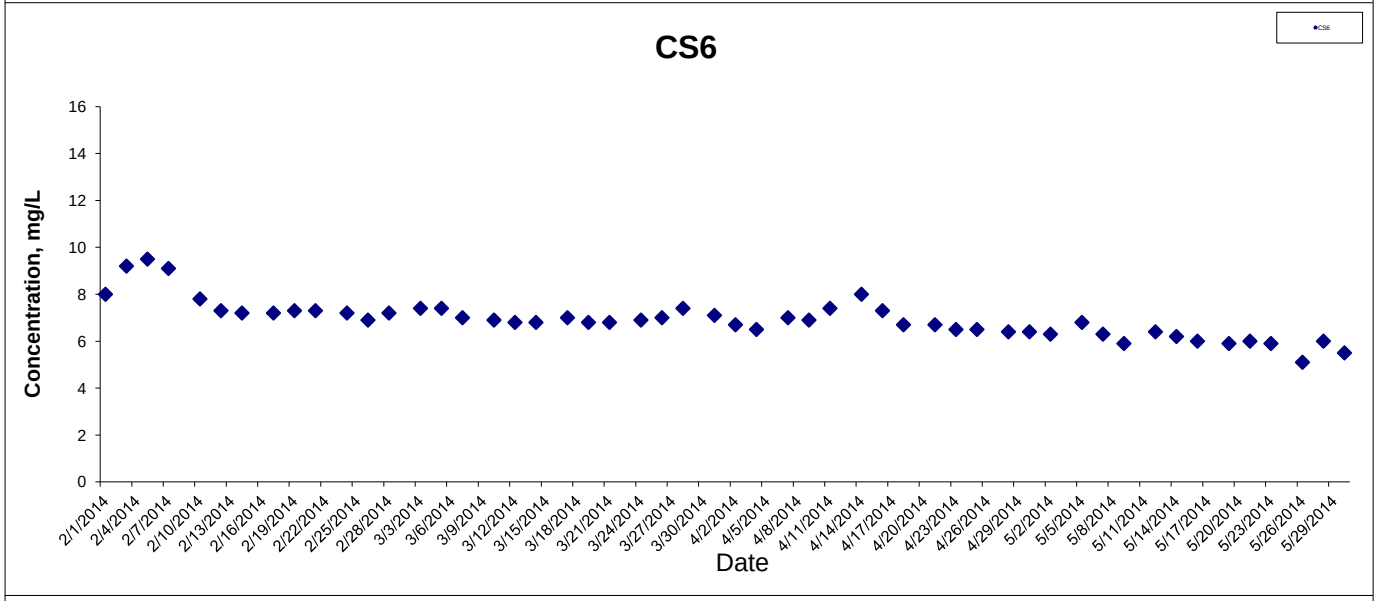
Remarks: Effective from July 2012, the Limit Level at NMS3A was revised to 70dB(A). Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65dB(A) applies during school examination period.

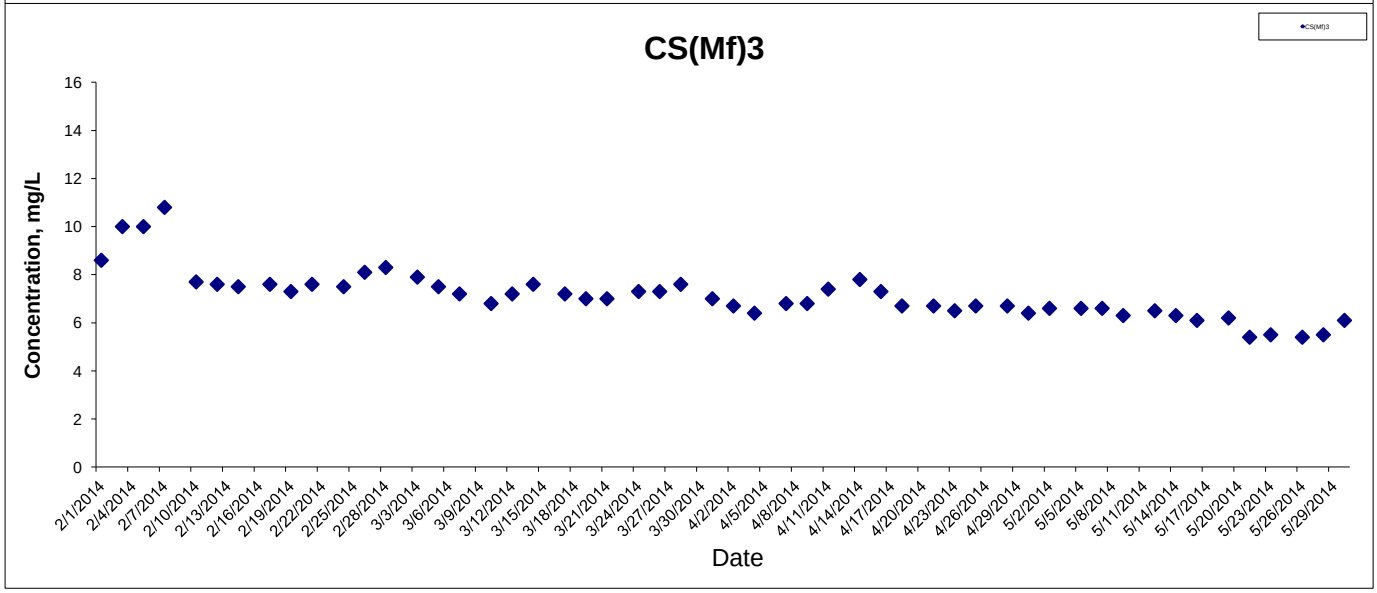
^The measured noise level on 16 April 2014 exceeded the noise level of 65dB(A) during examination period on 16 April 2014 but it is lower than the baseline level. Therefore, baseline correction was carried out and the corrected noise level which solely represent the noise level of Constrcution works is 63 dB(A) which is lower than the exceedance level of 65dB(A) . As such the EAP was not triggered.

For details of the major activites carried out, weather conditions and other significant factors that might affect the monitoring results during monitoring periods from March 2014 to May 2014, please refer to the Monthly EM&A Reports for March, April and May 2014 and their Appendix J respectively.

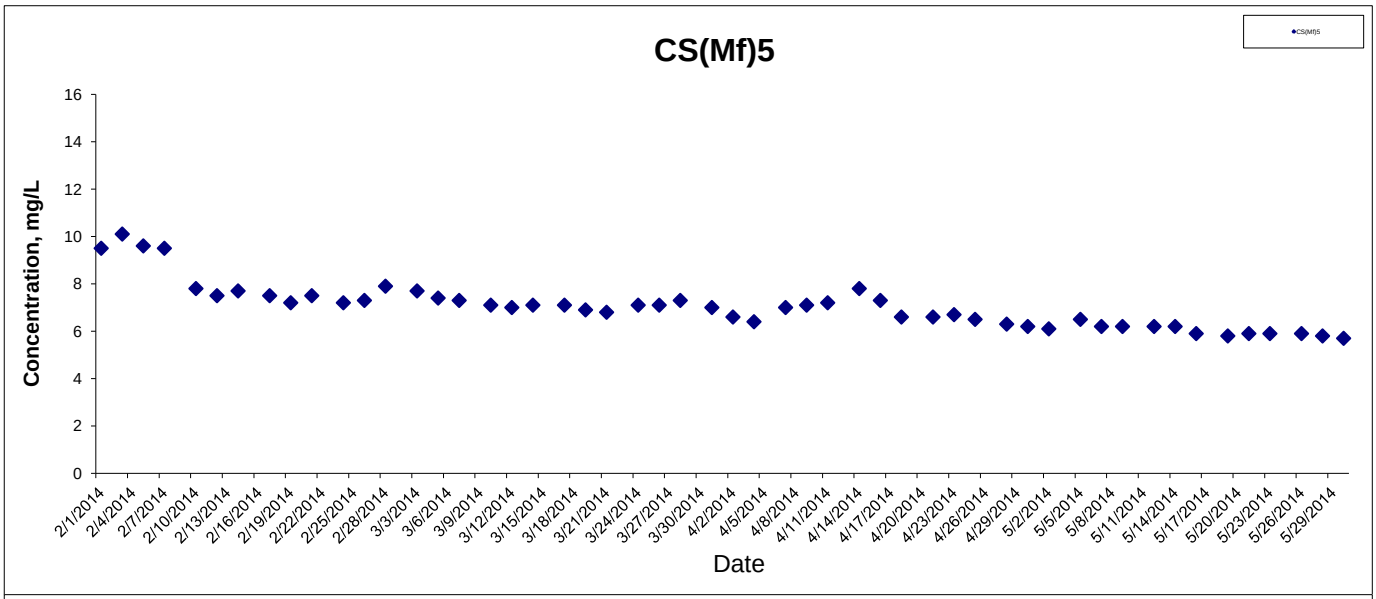
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

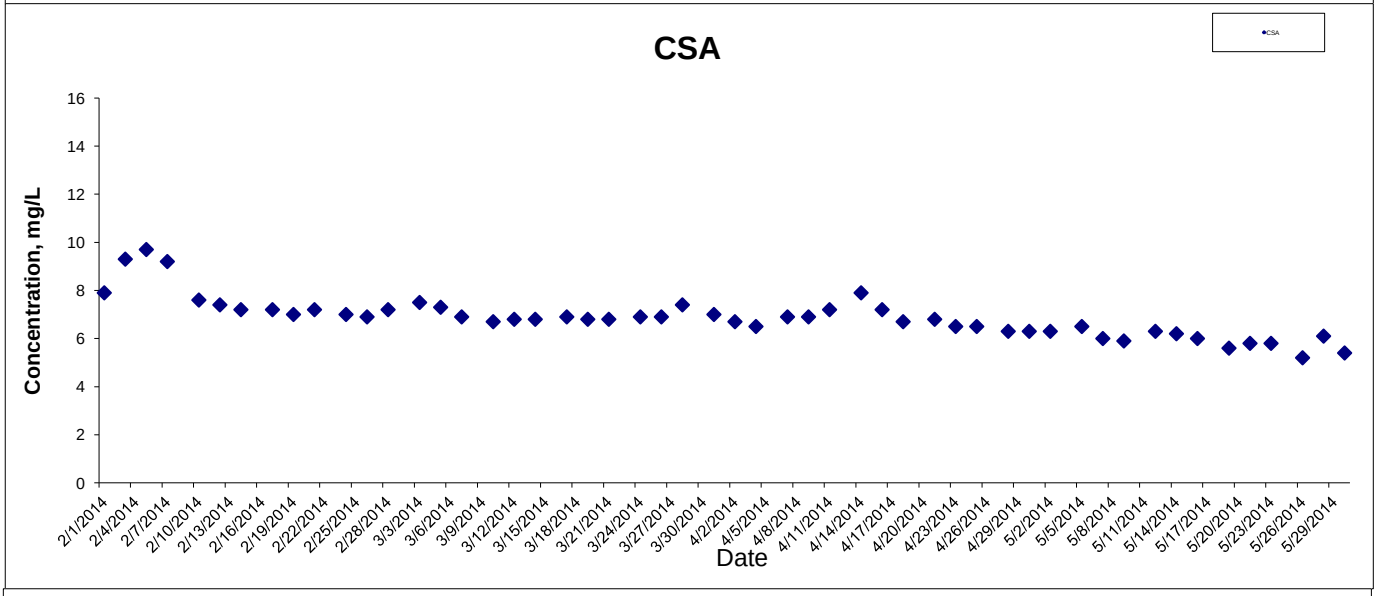


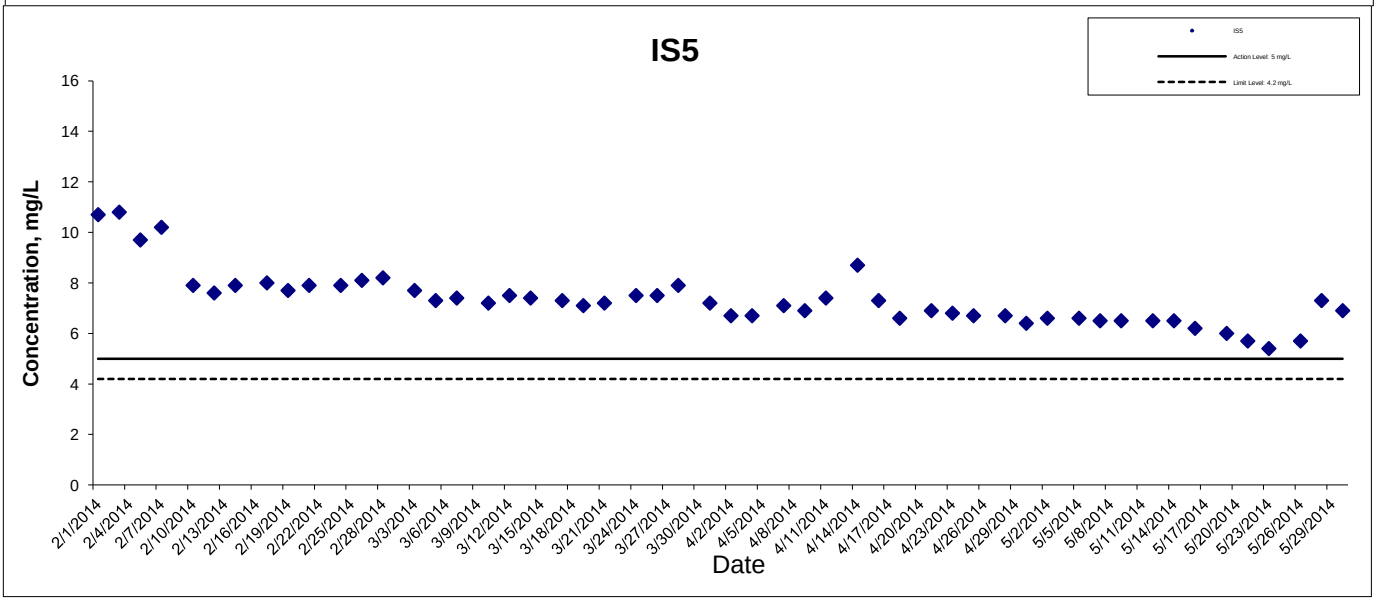




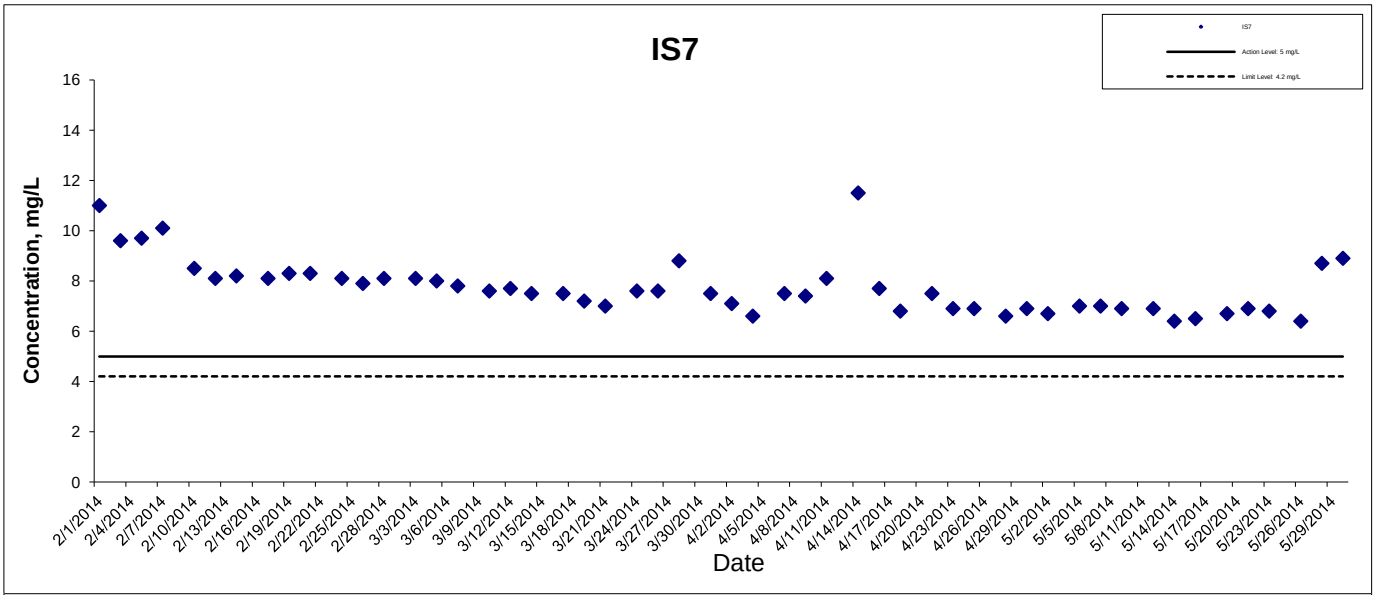
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

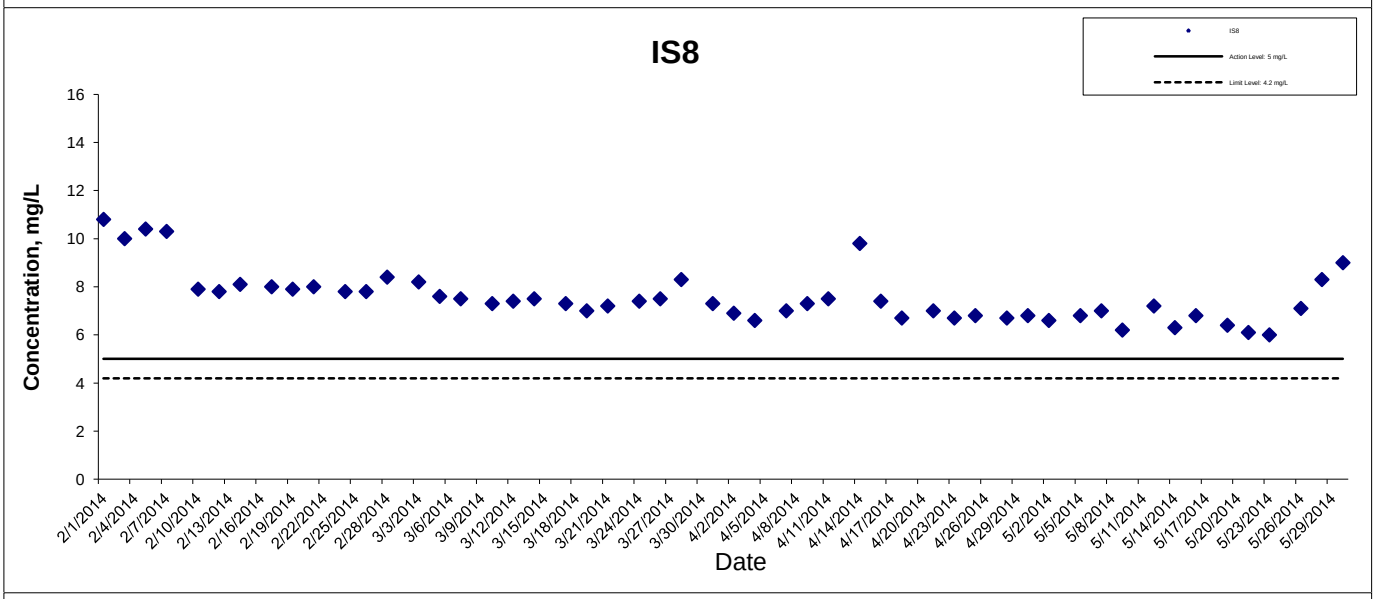


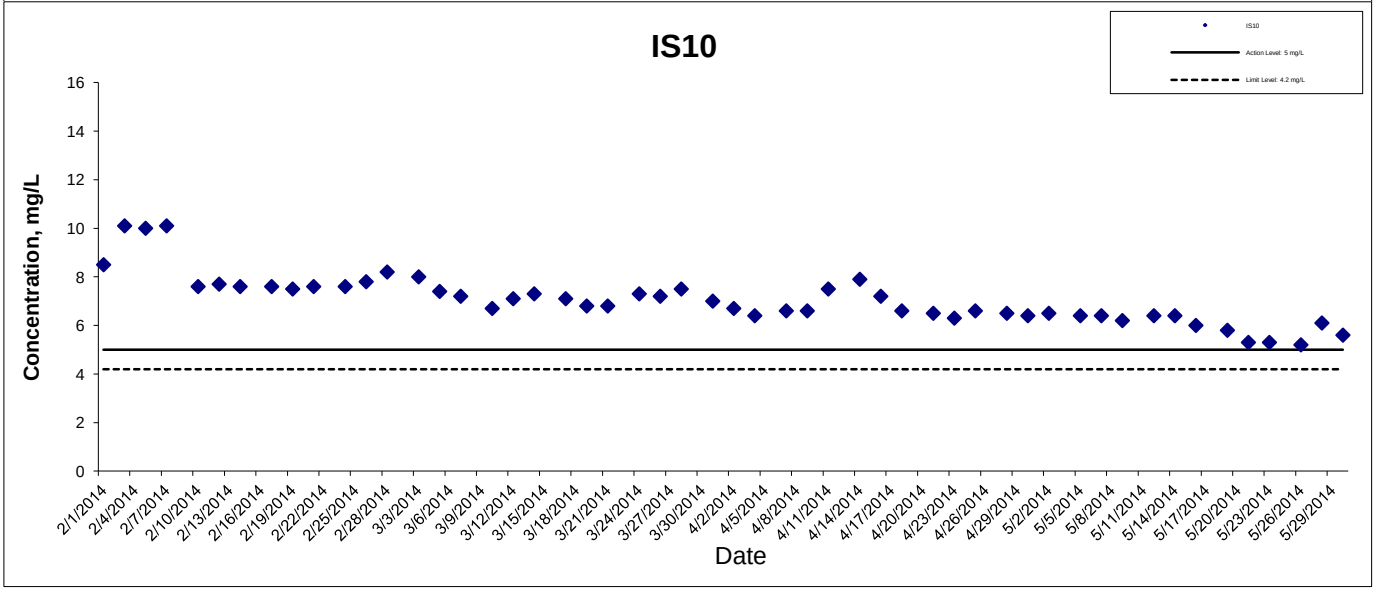




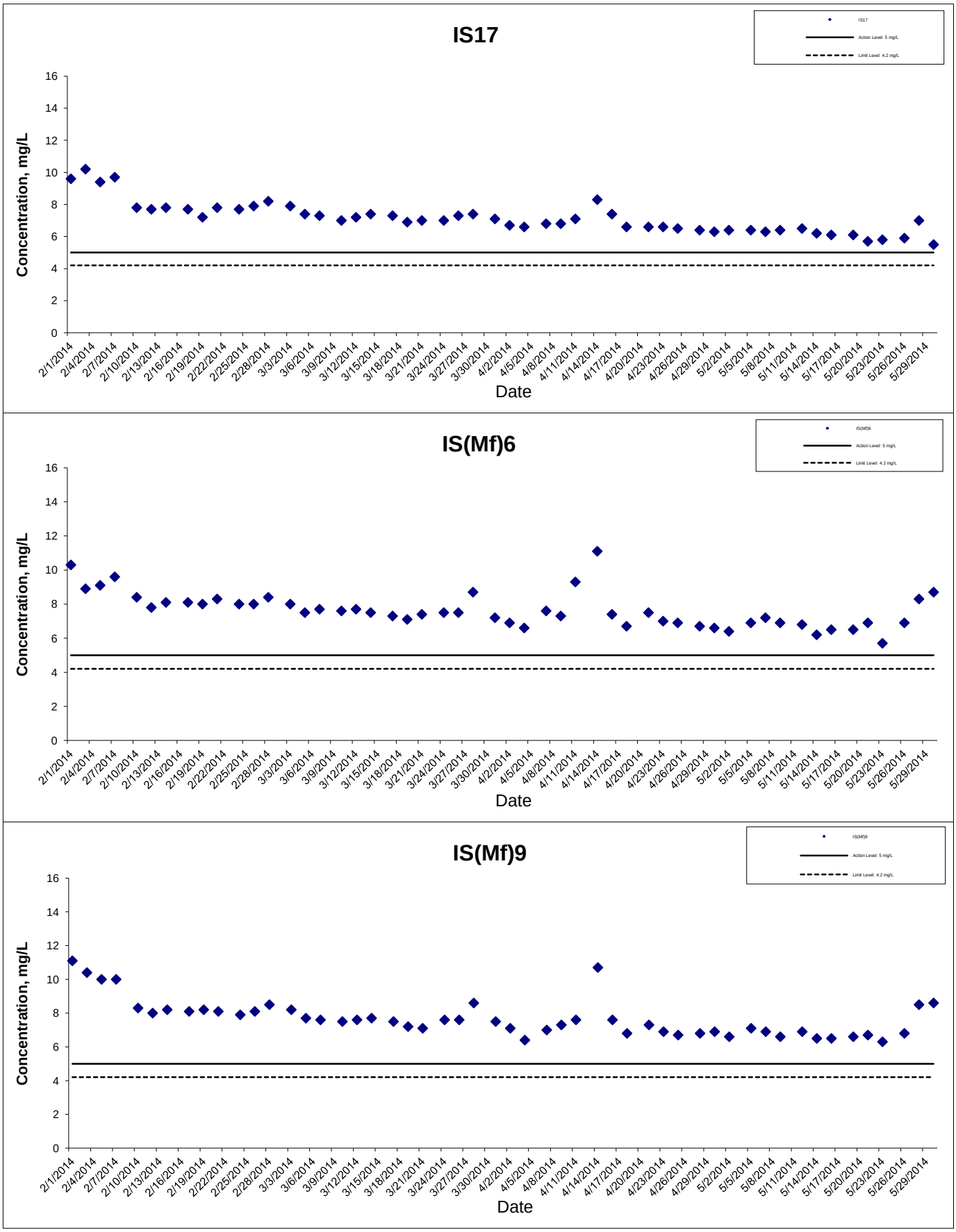
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



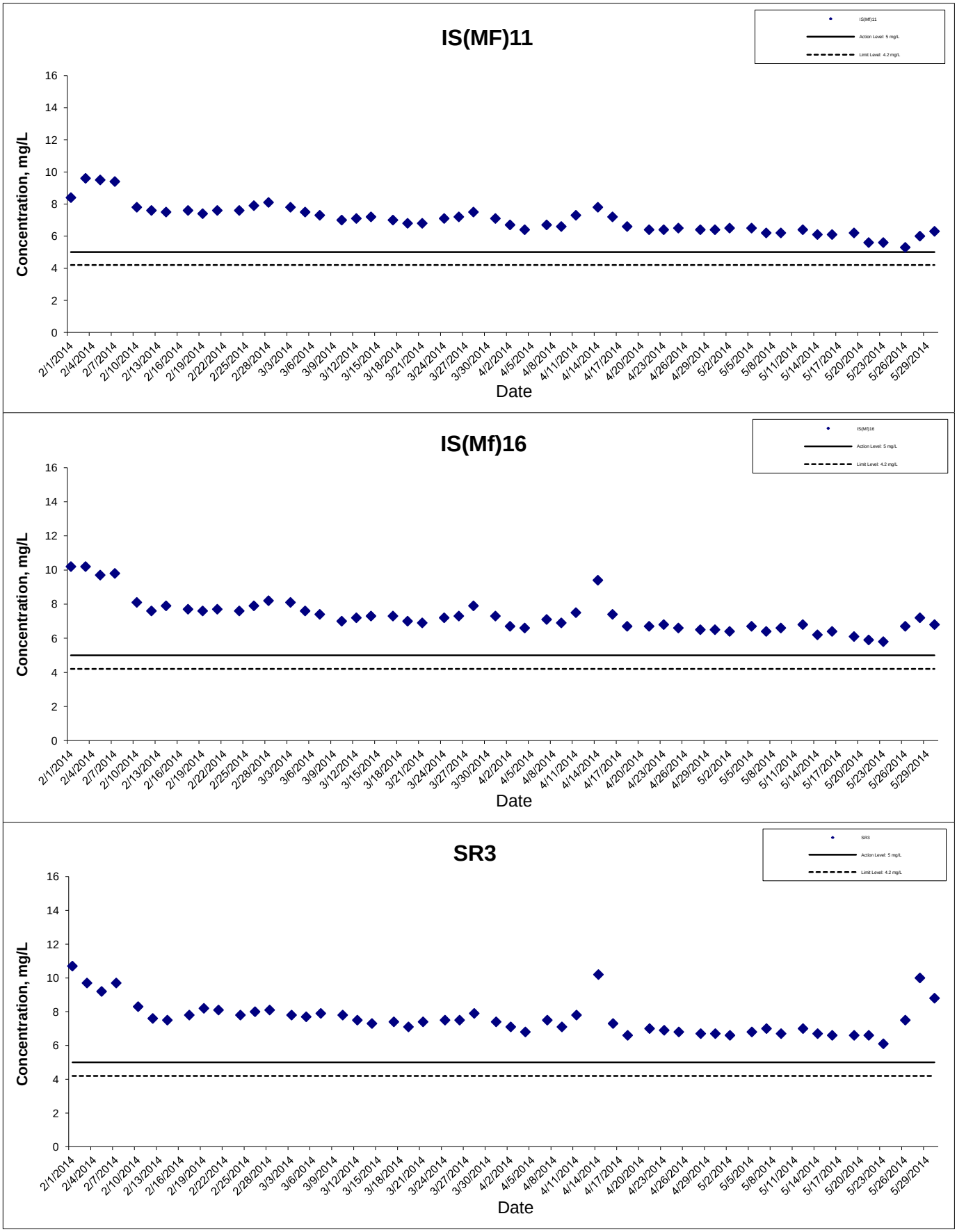




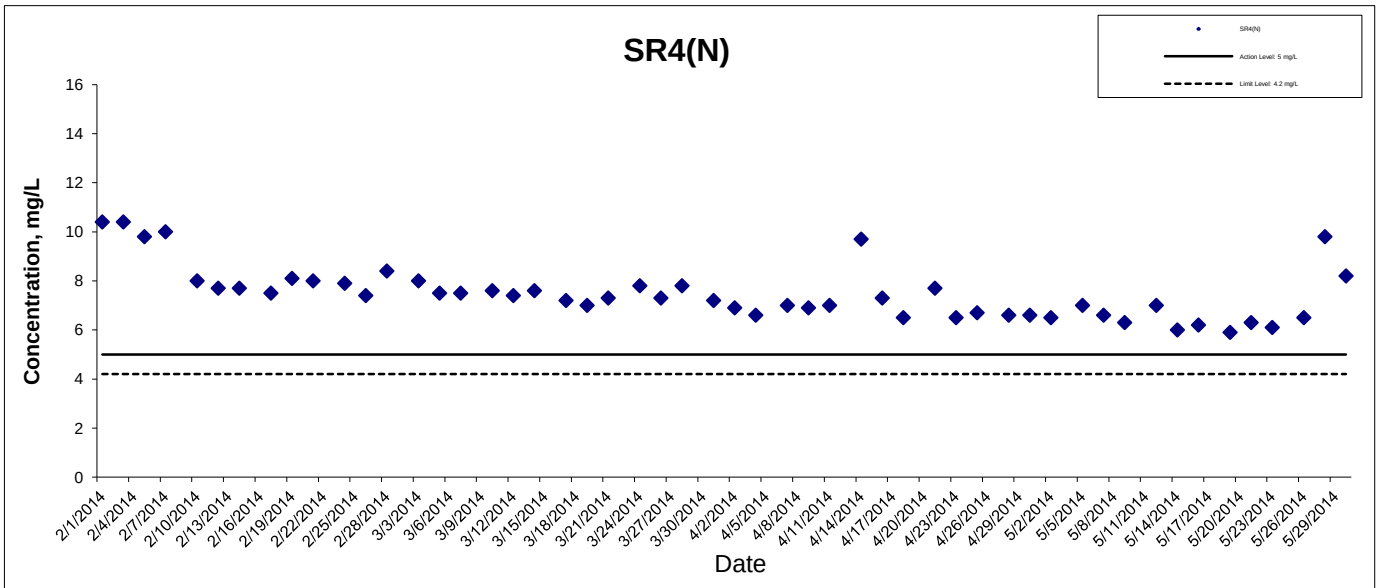
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

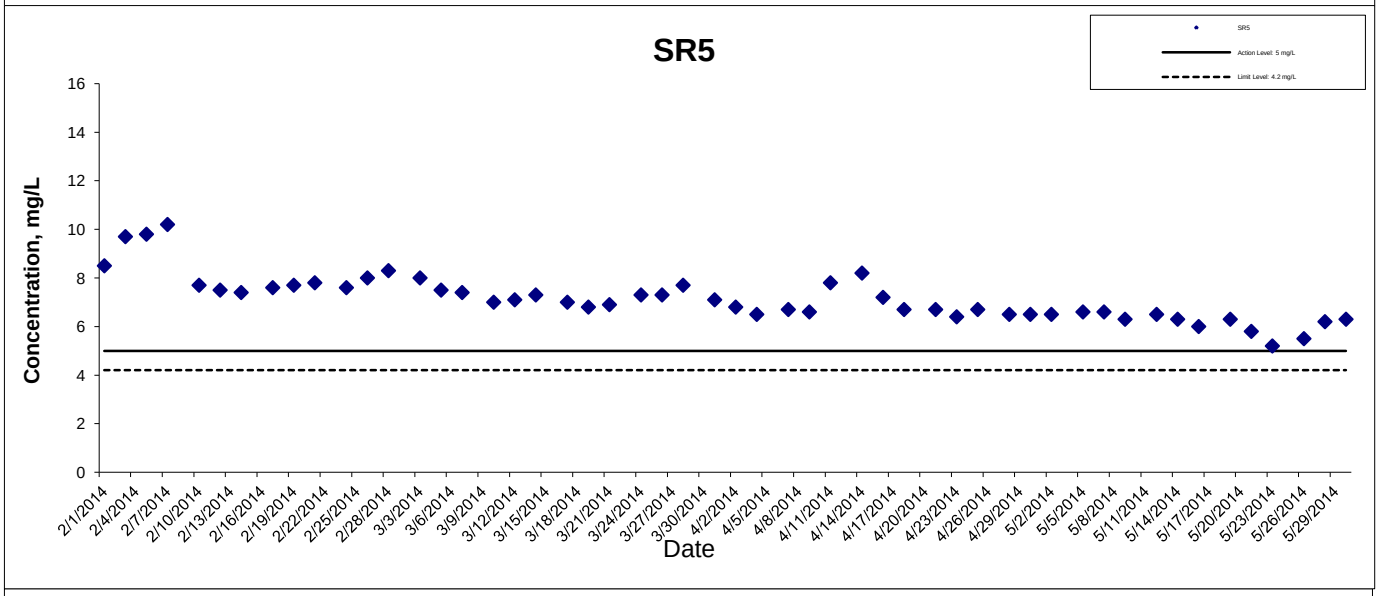


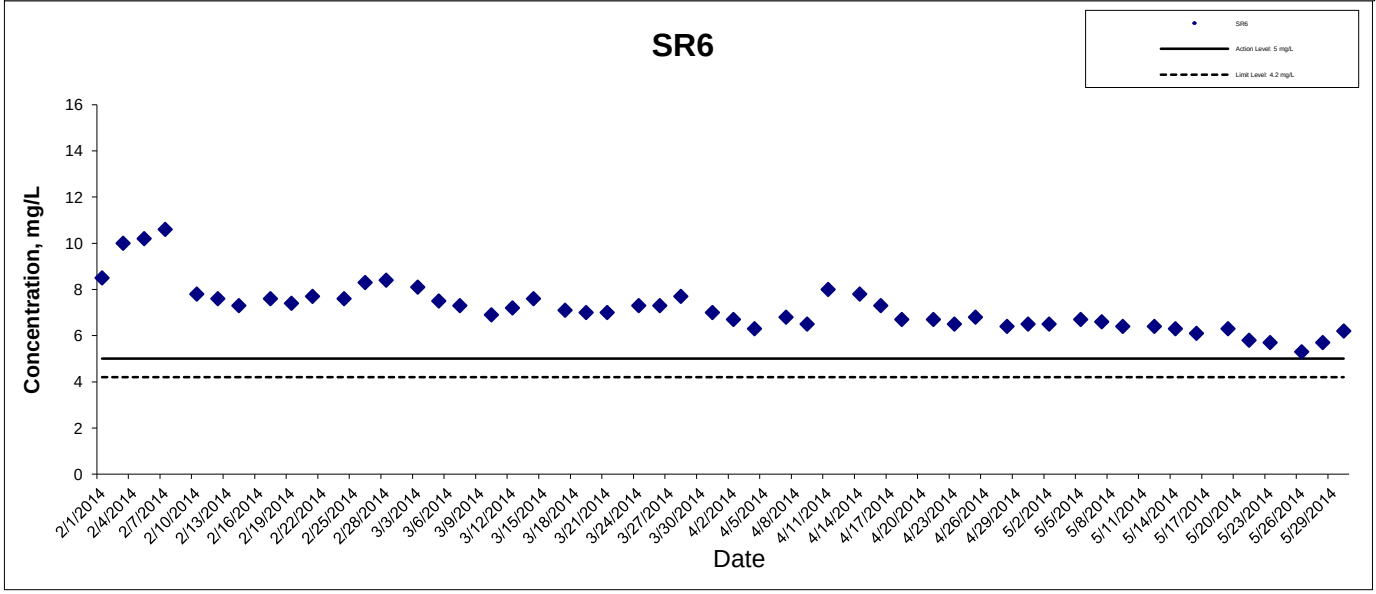
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



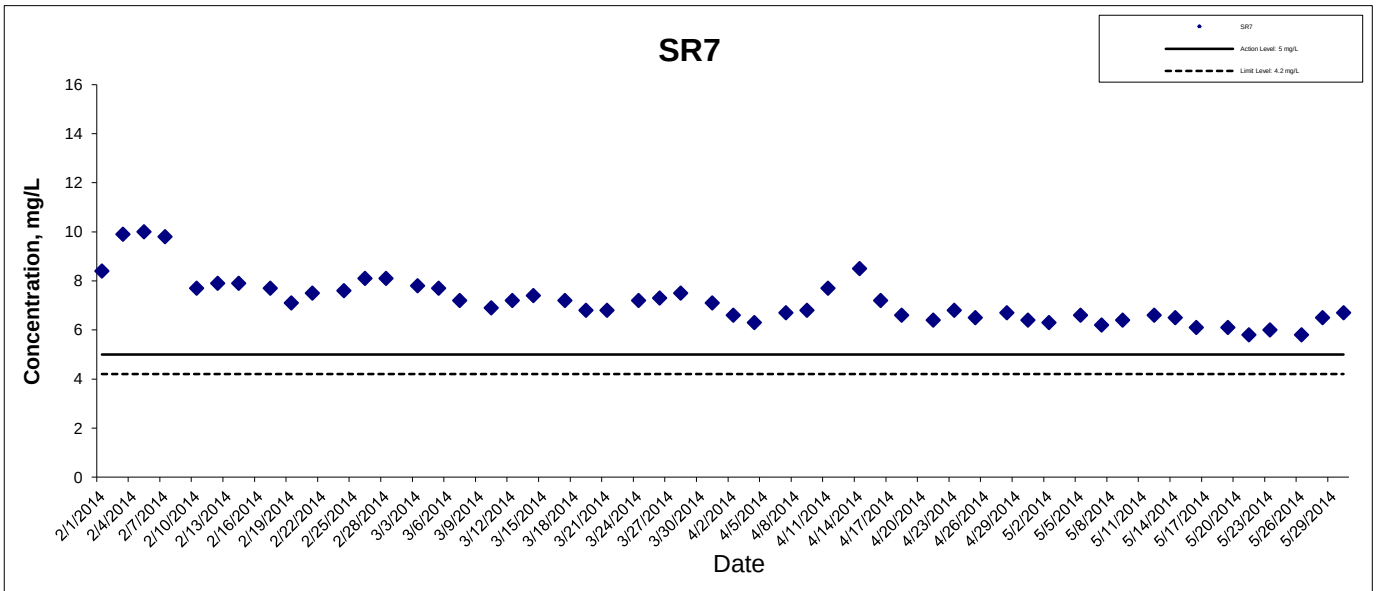
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

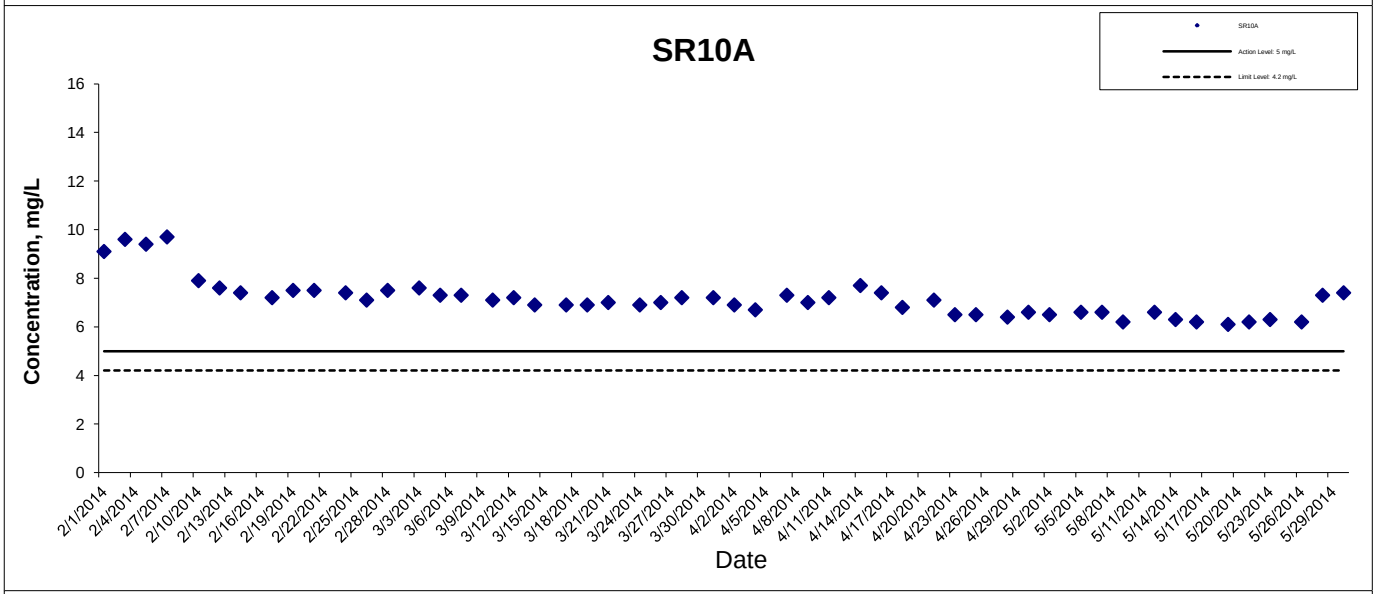


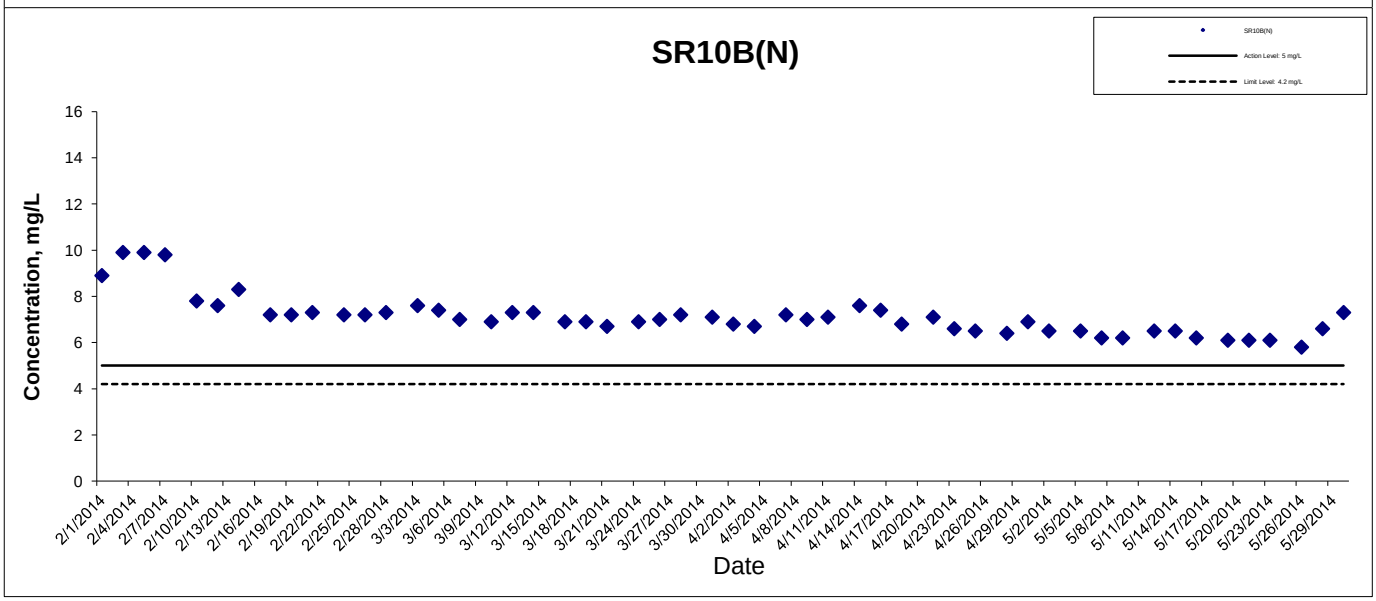




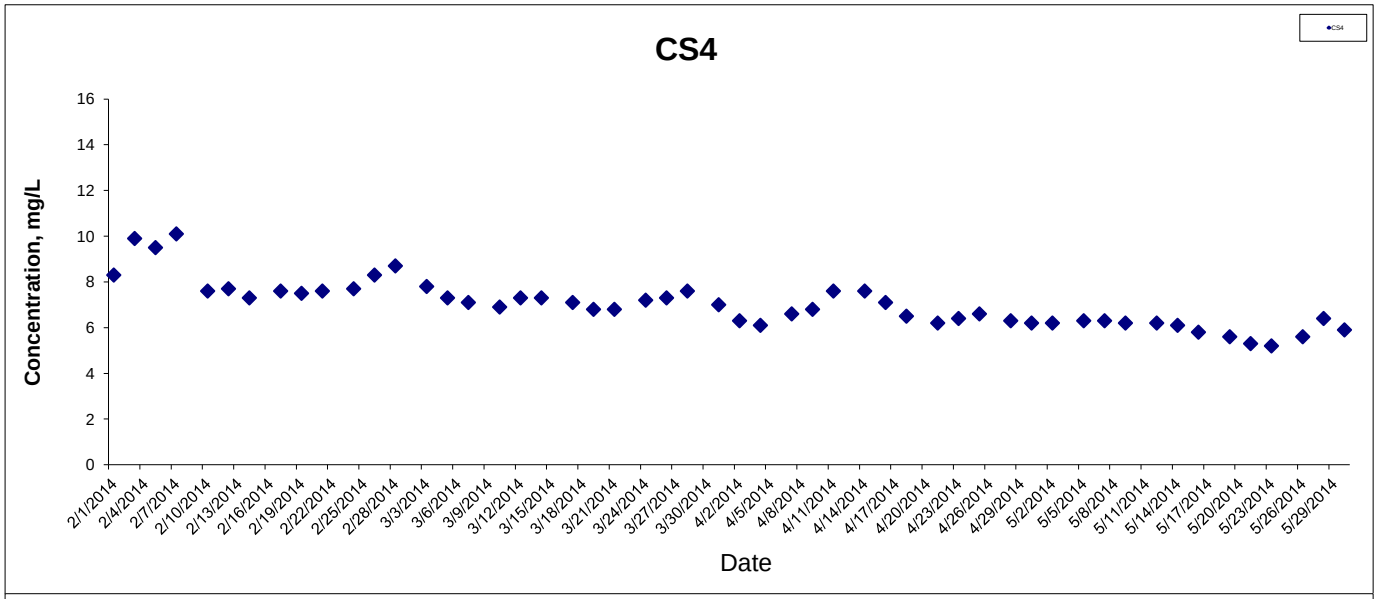
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

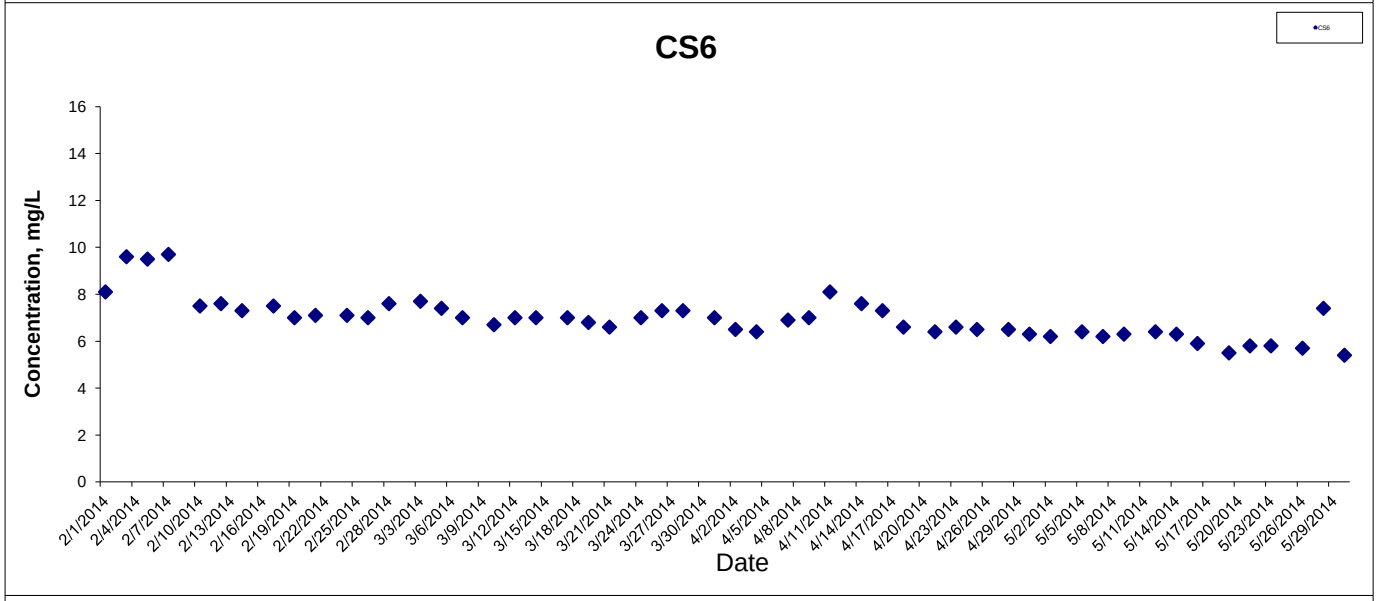


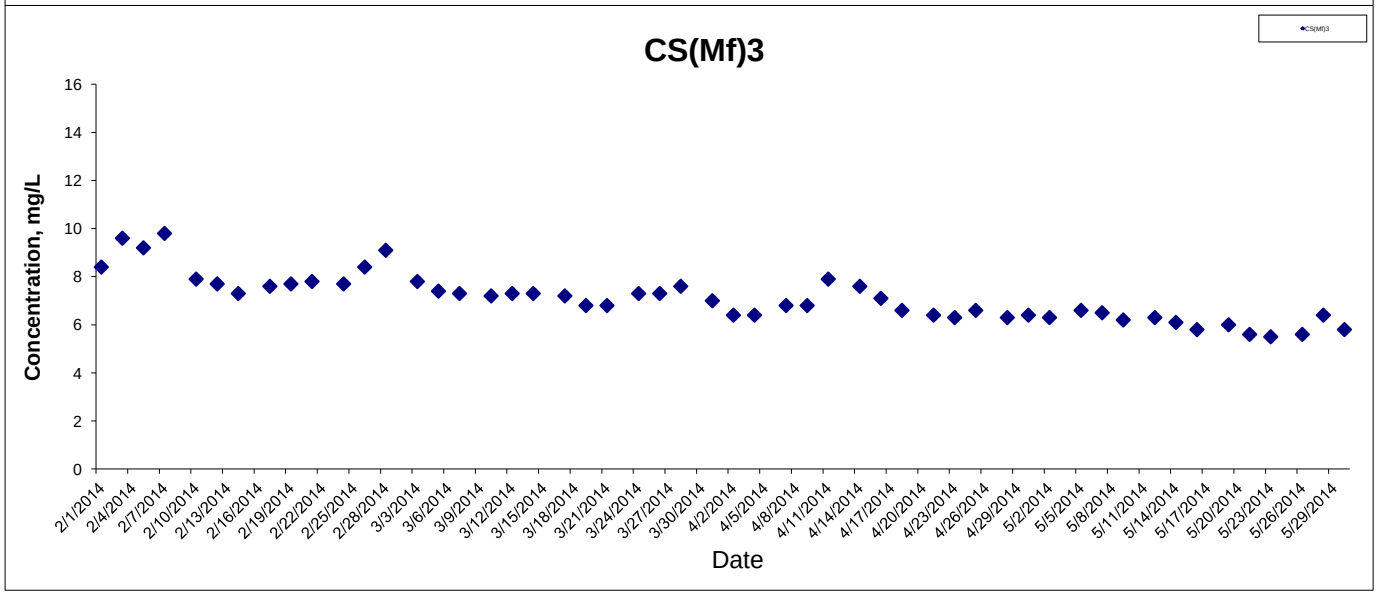




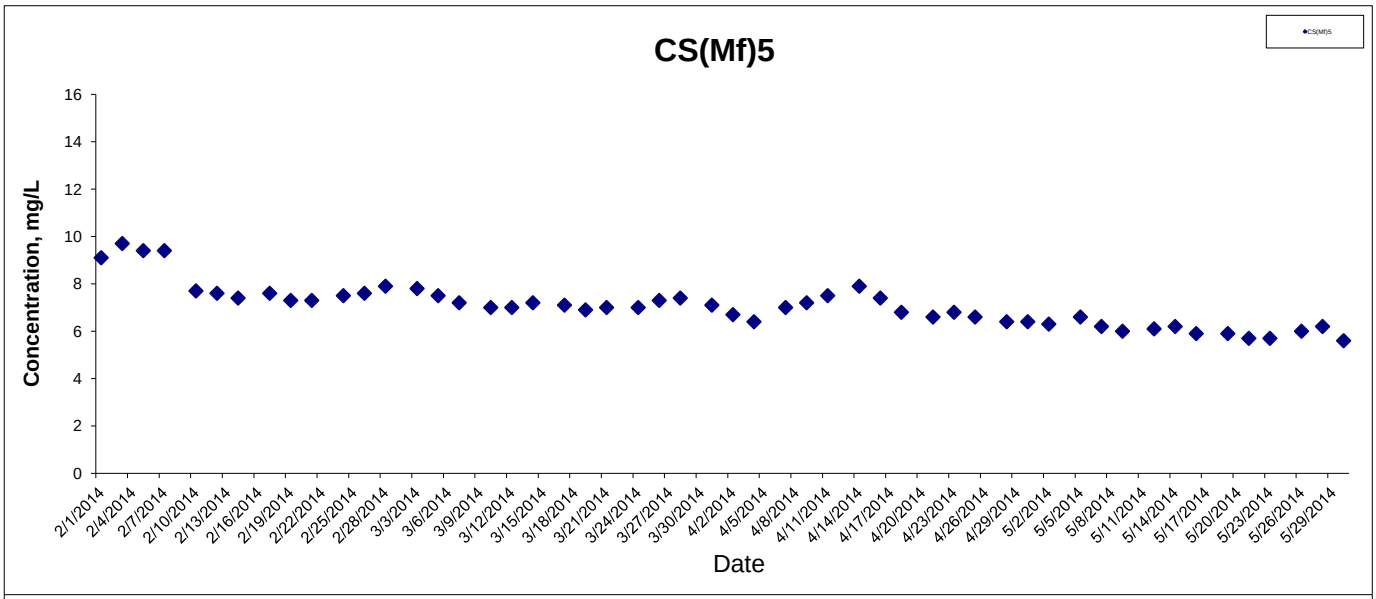
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

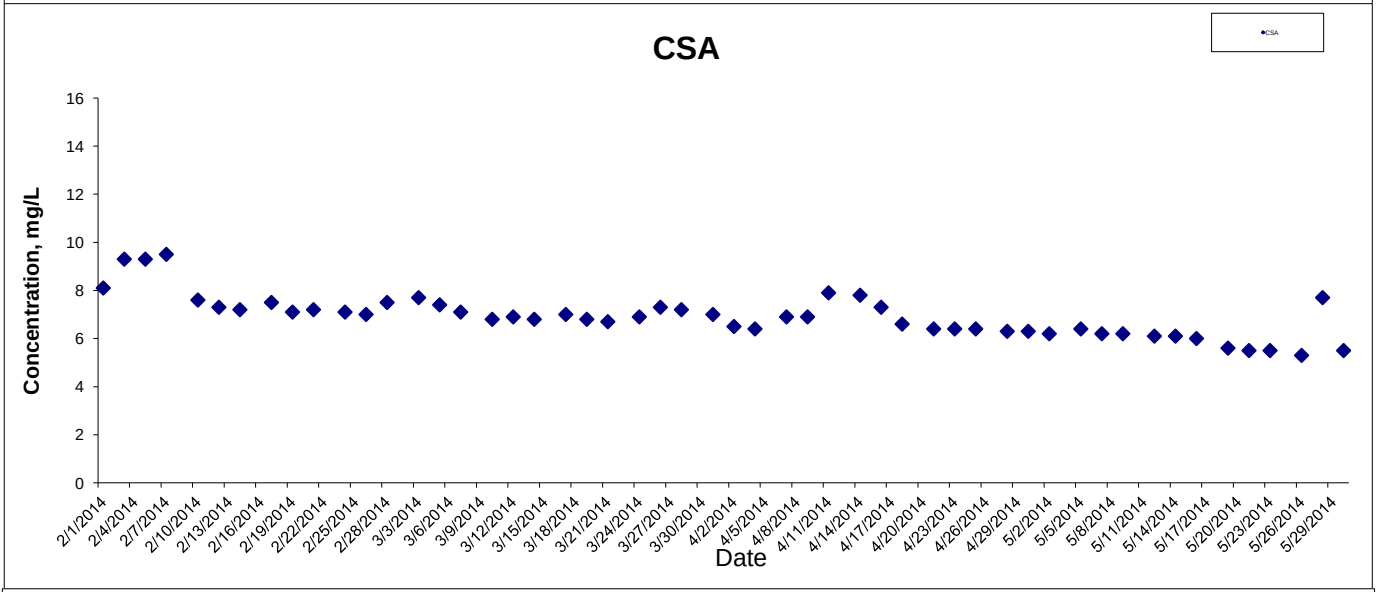


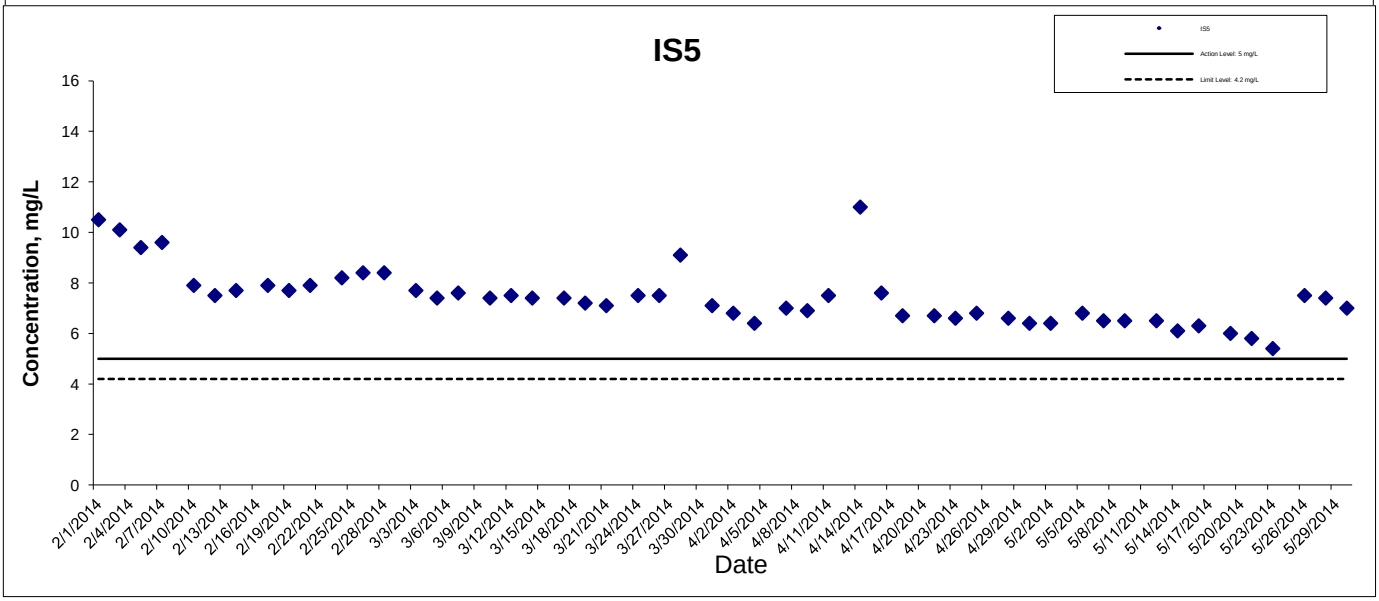




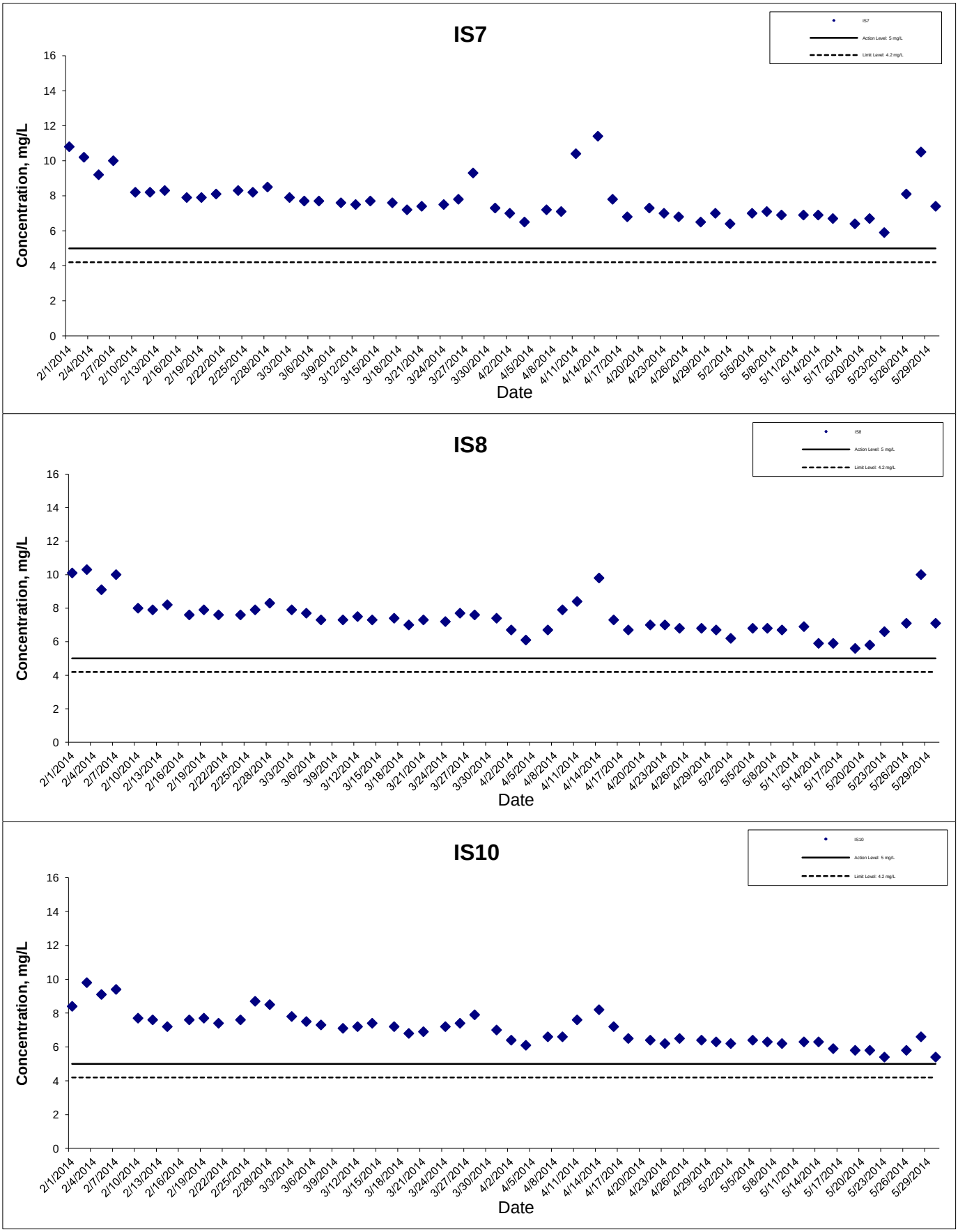
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



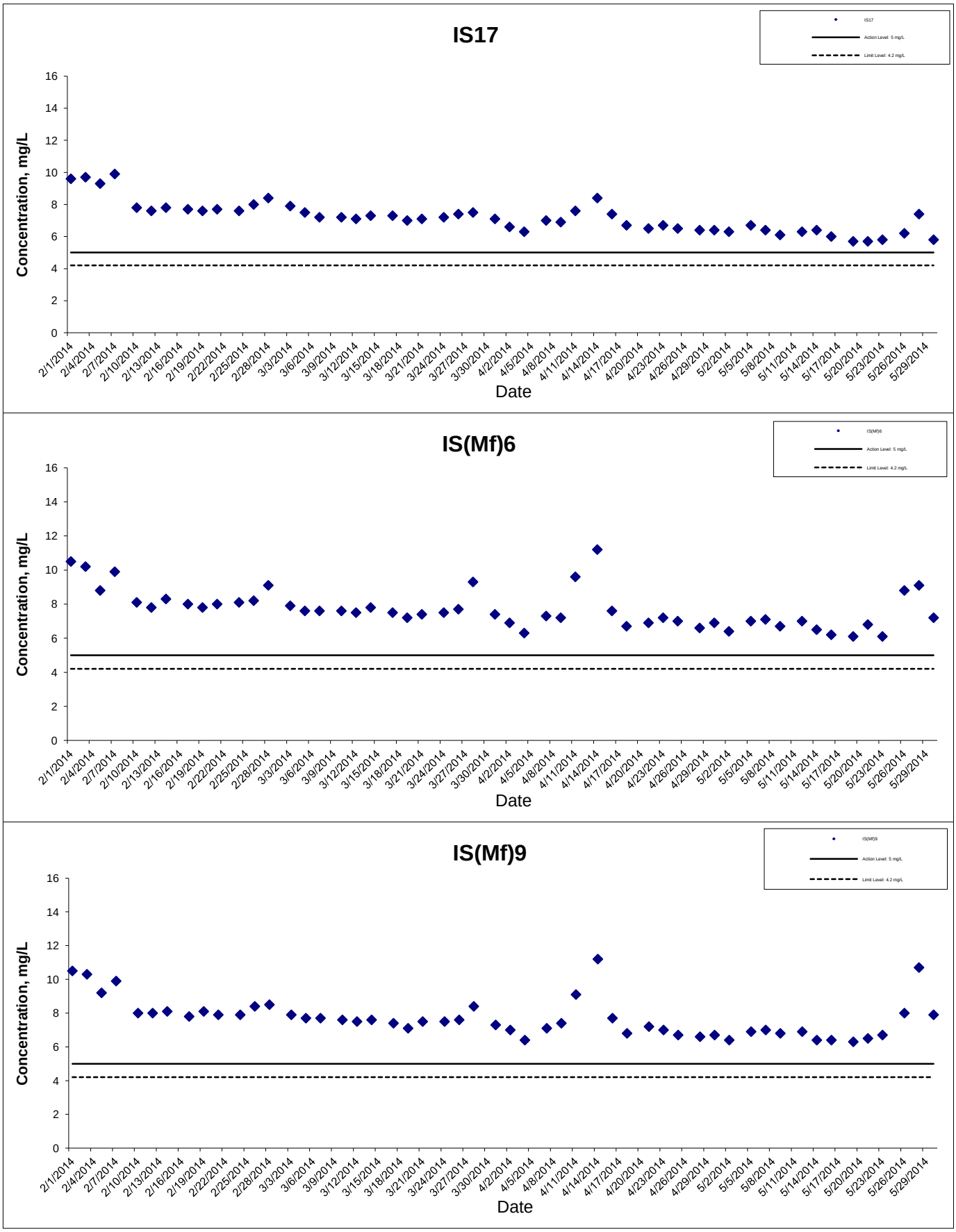




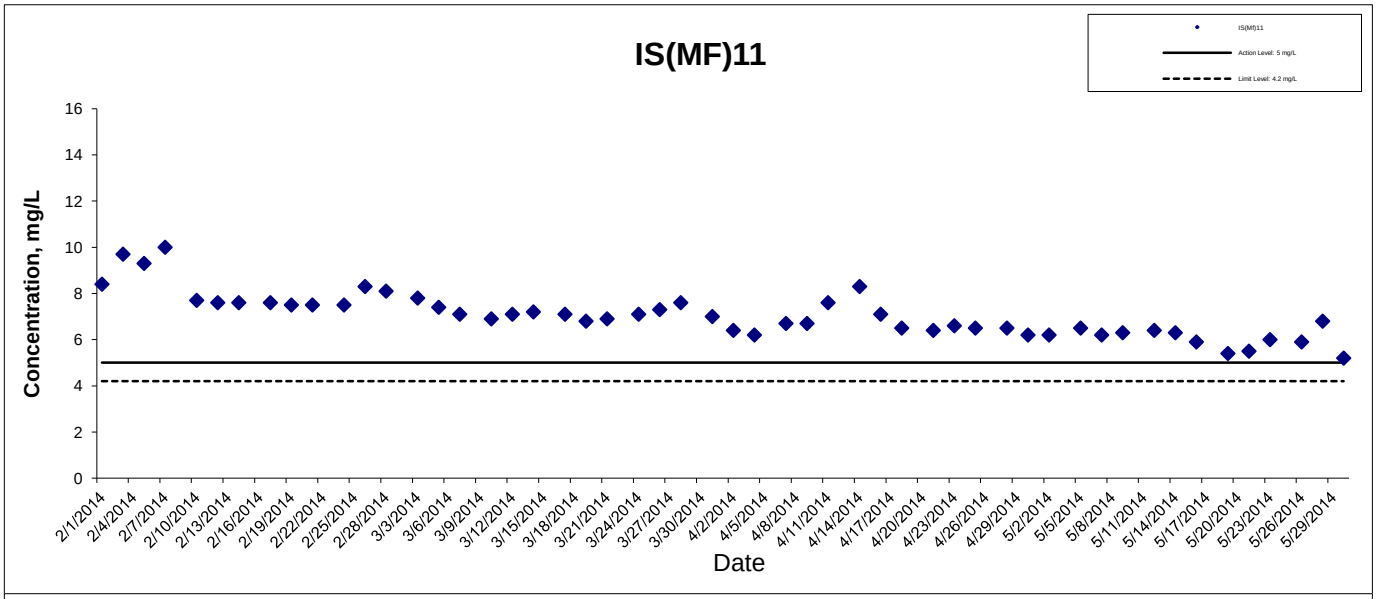
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

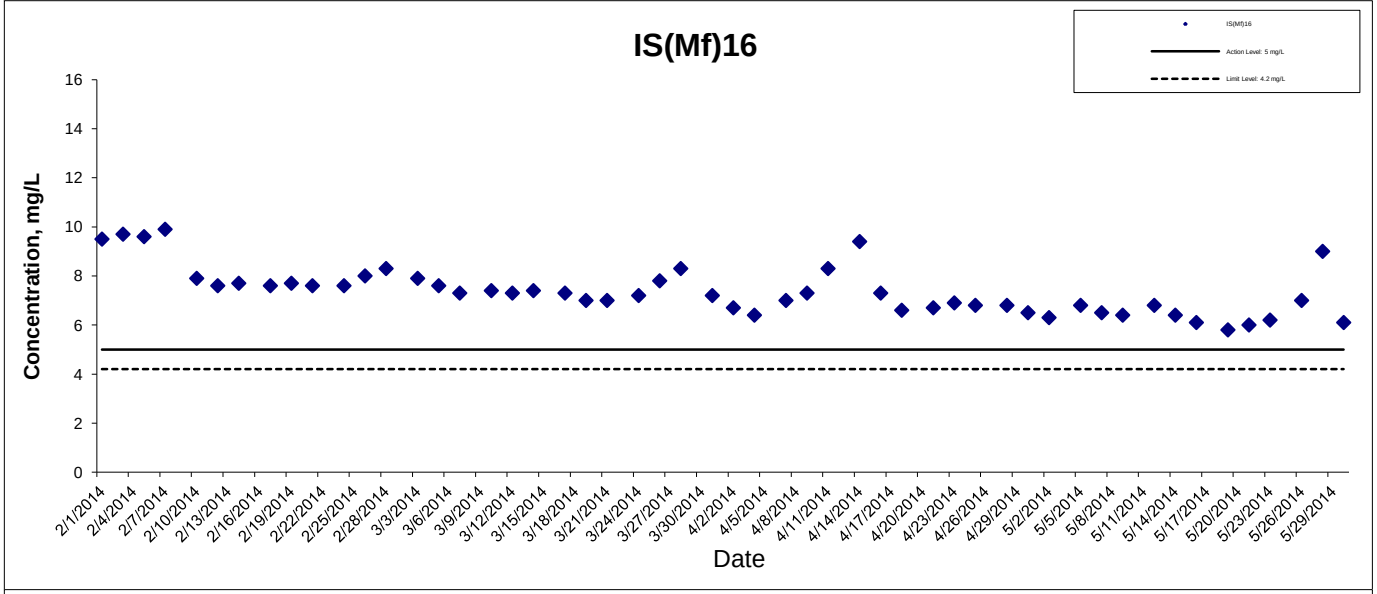


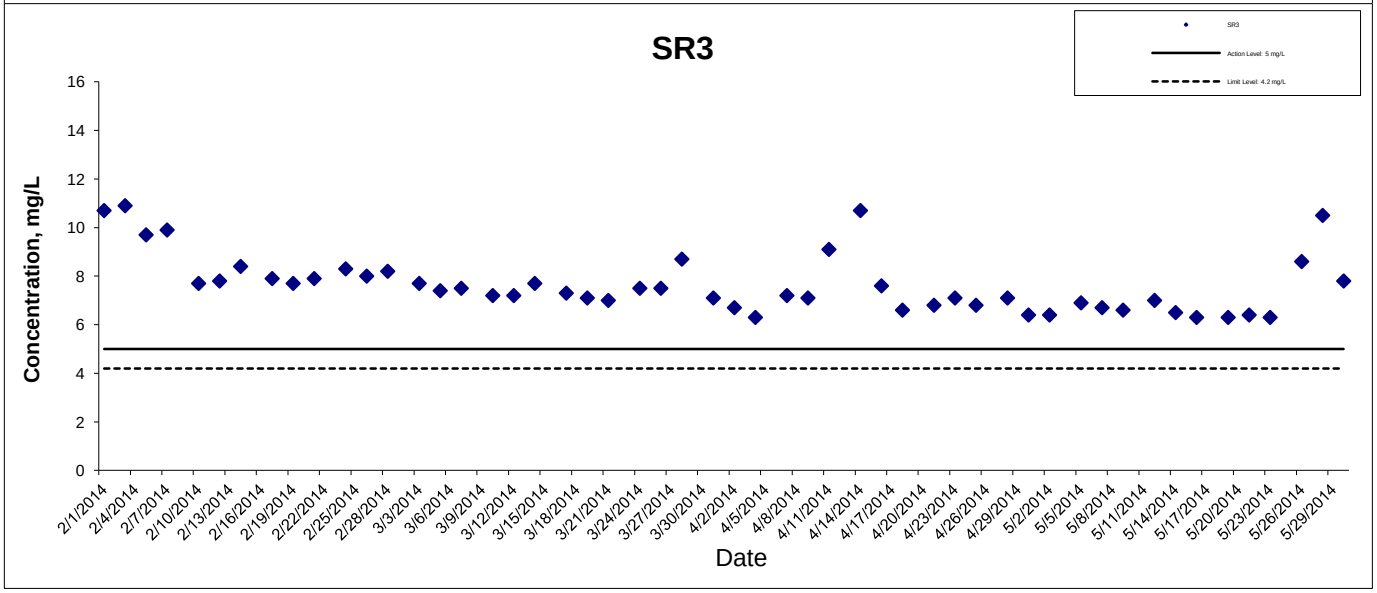
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



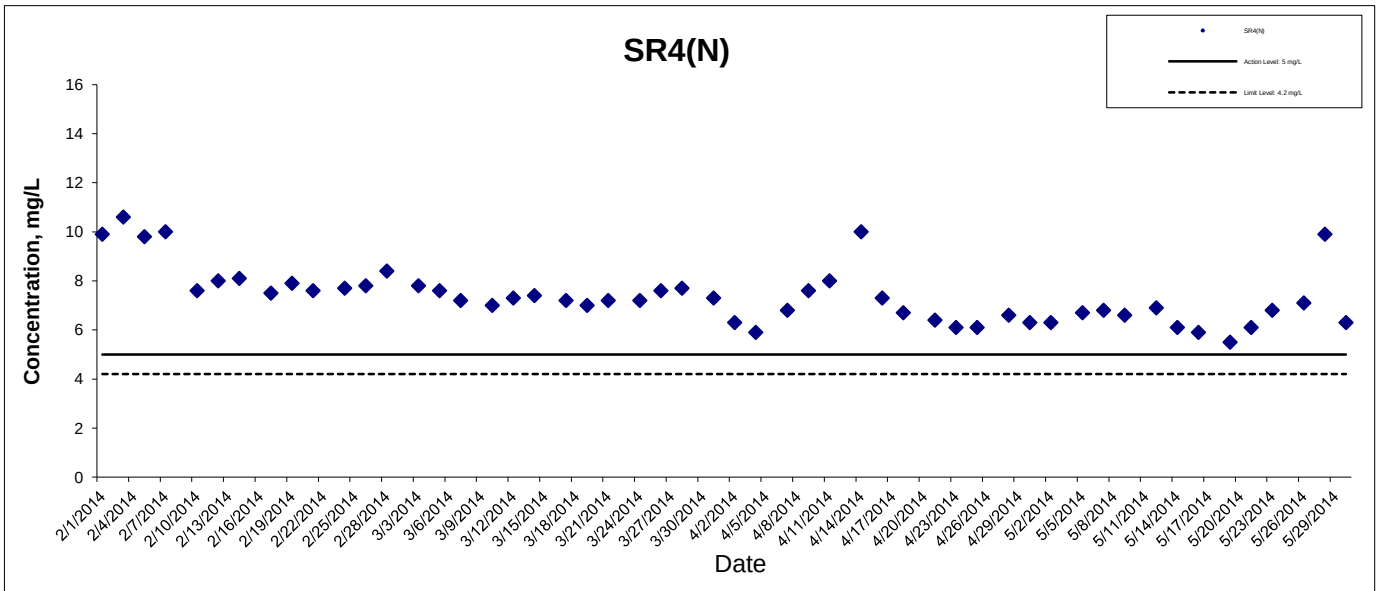
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

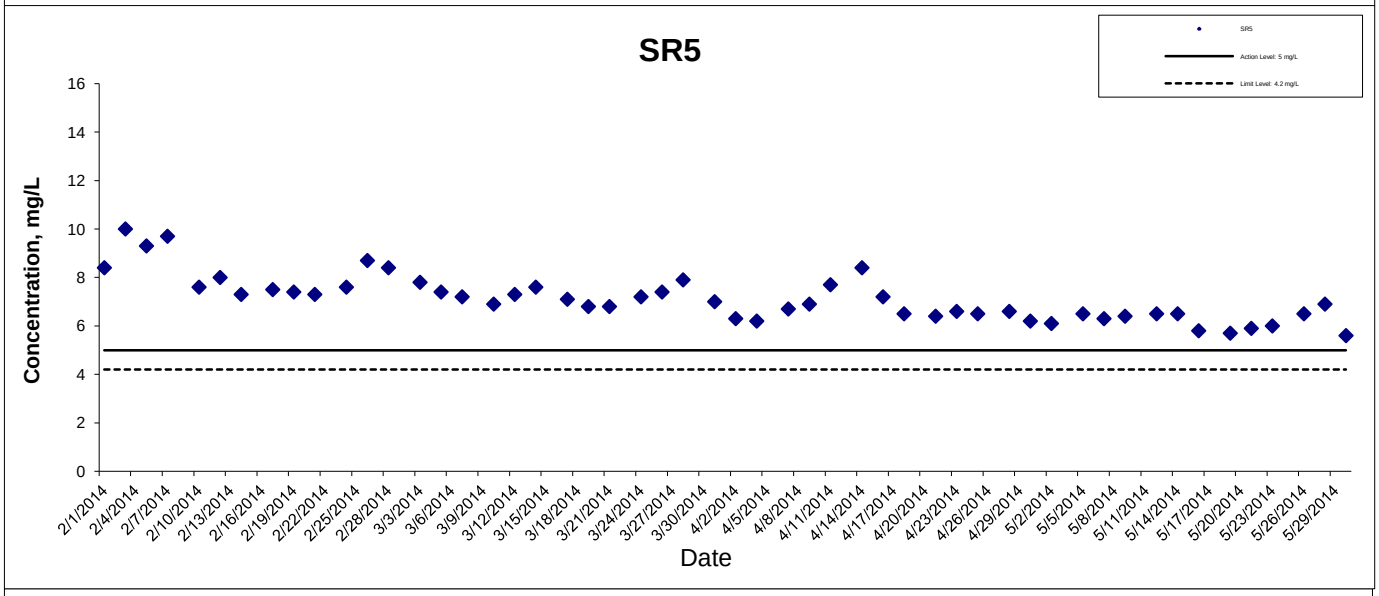


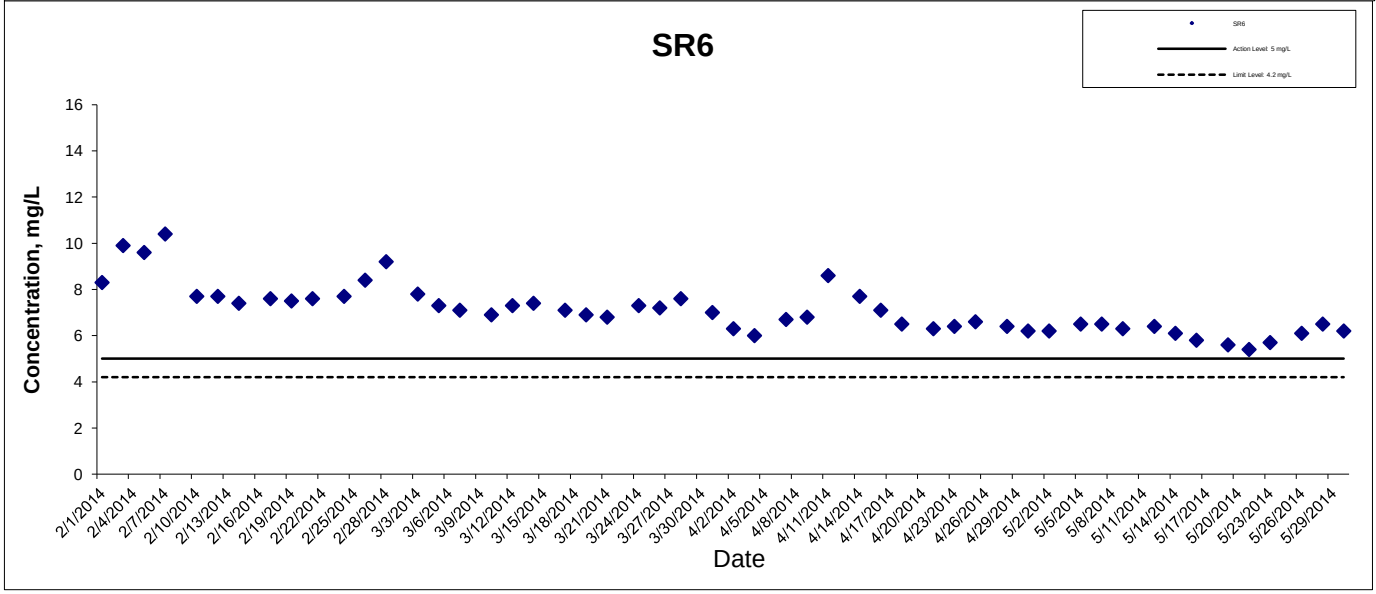




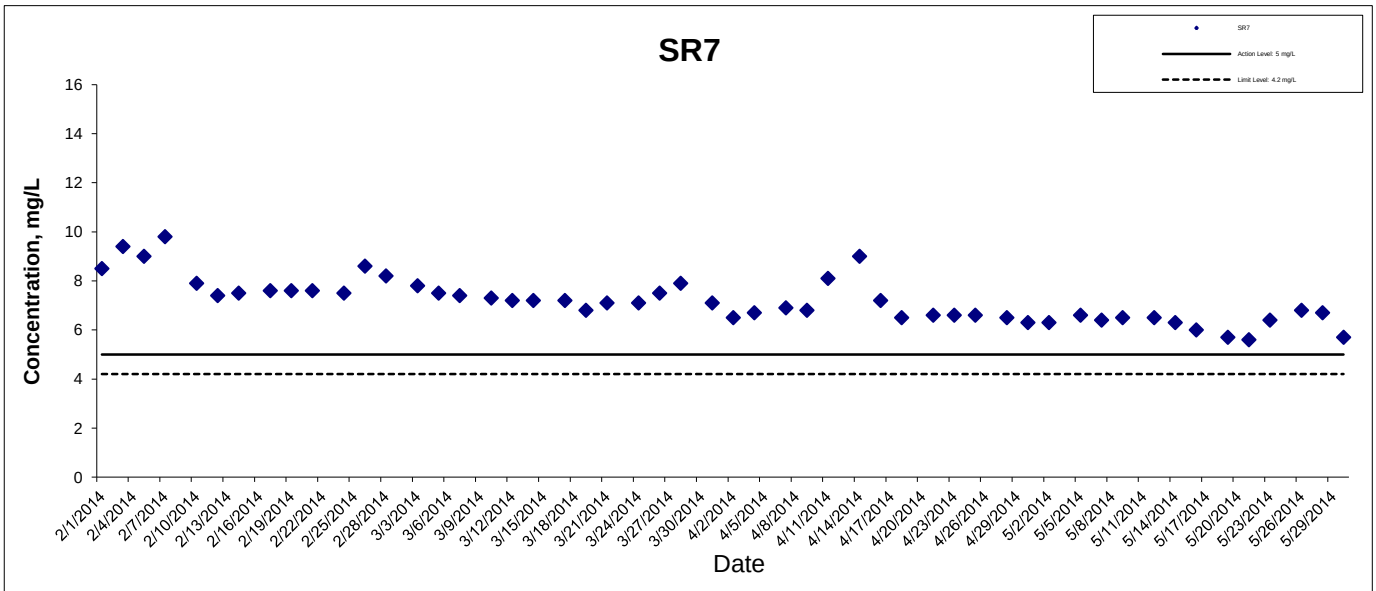
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

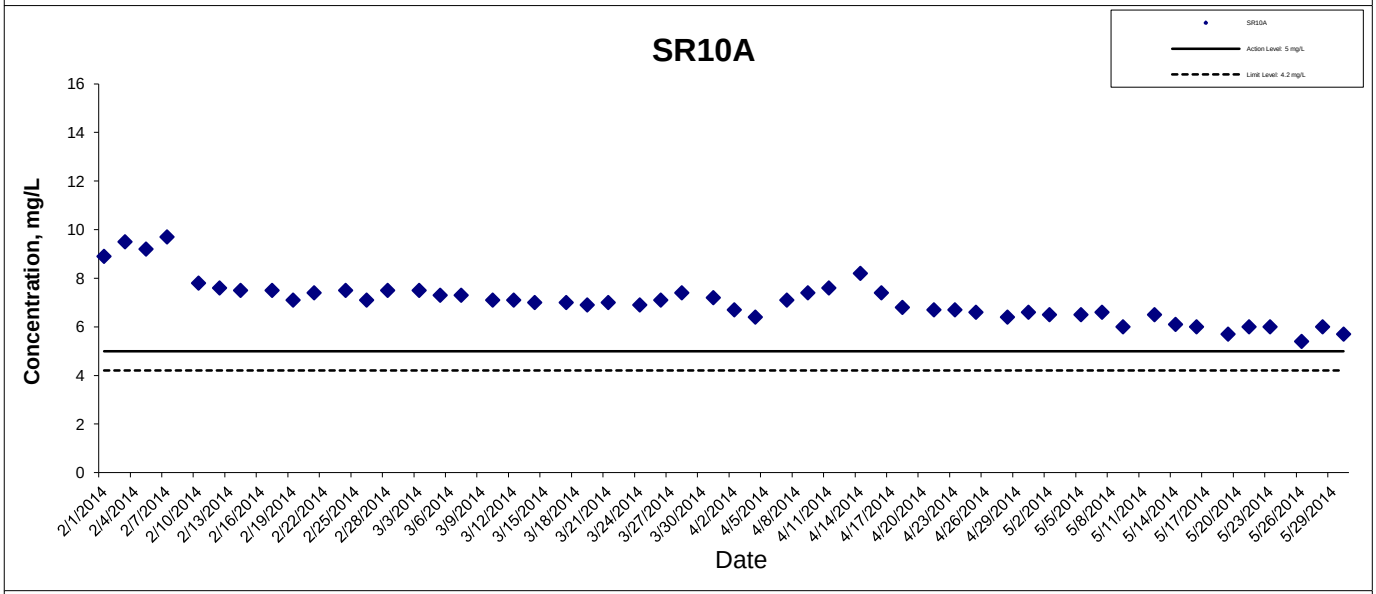


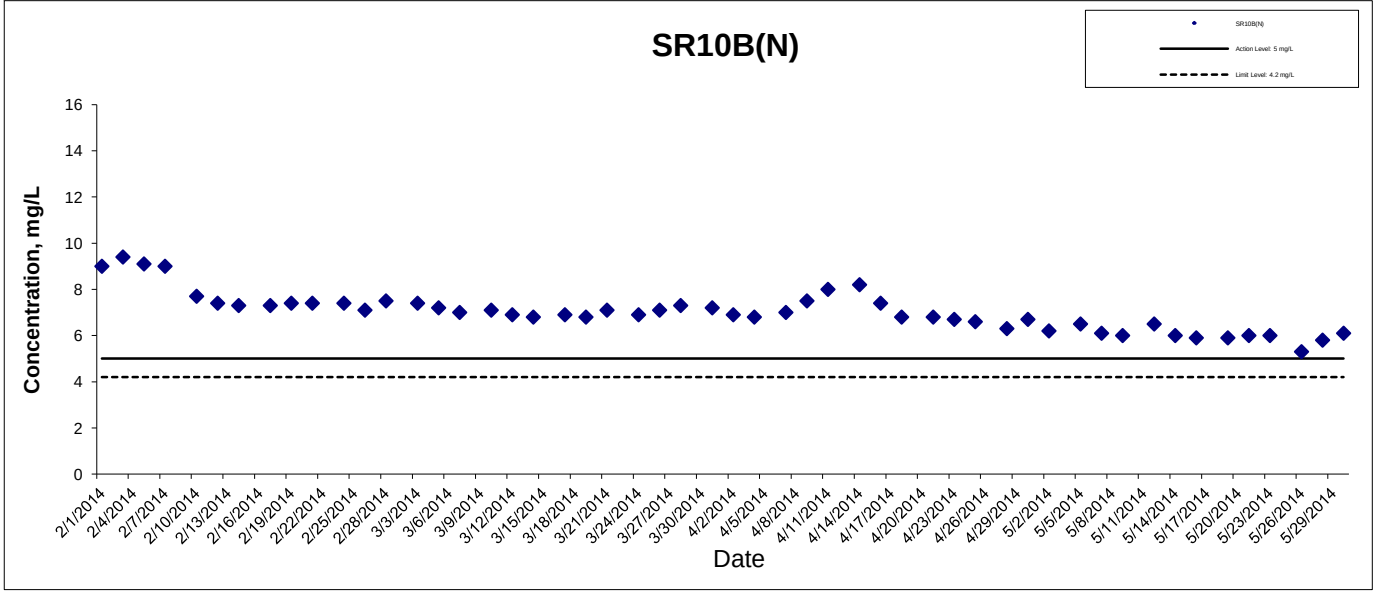




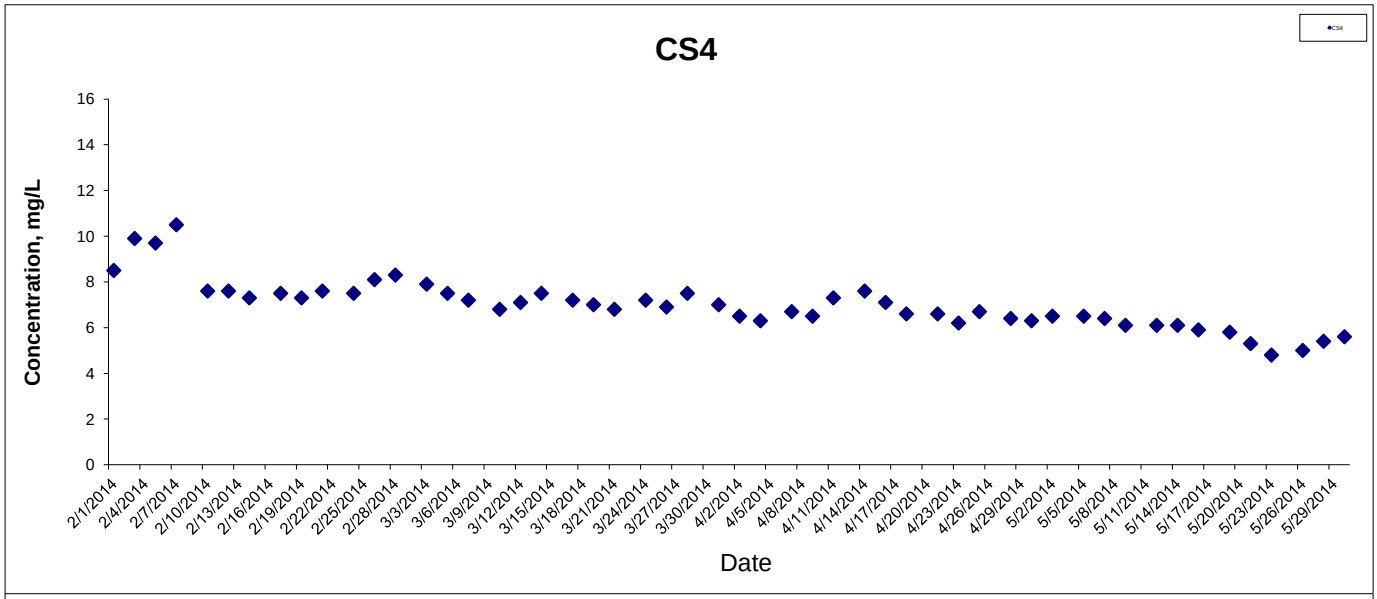
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

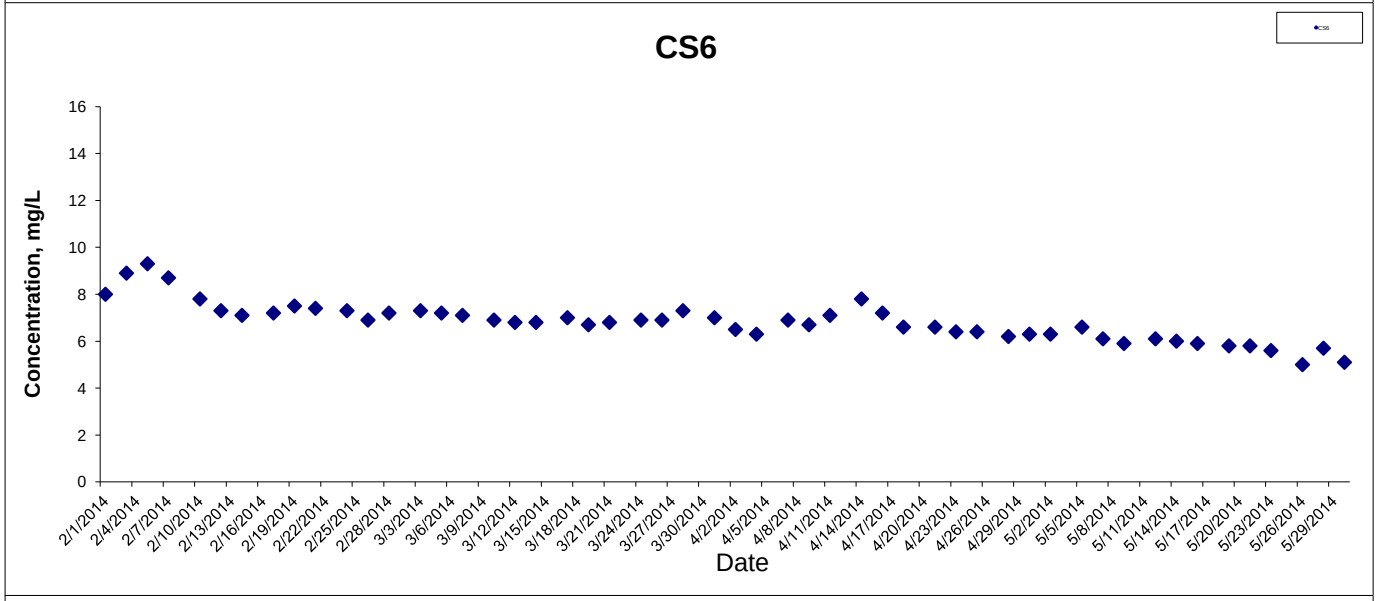


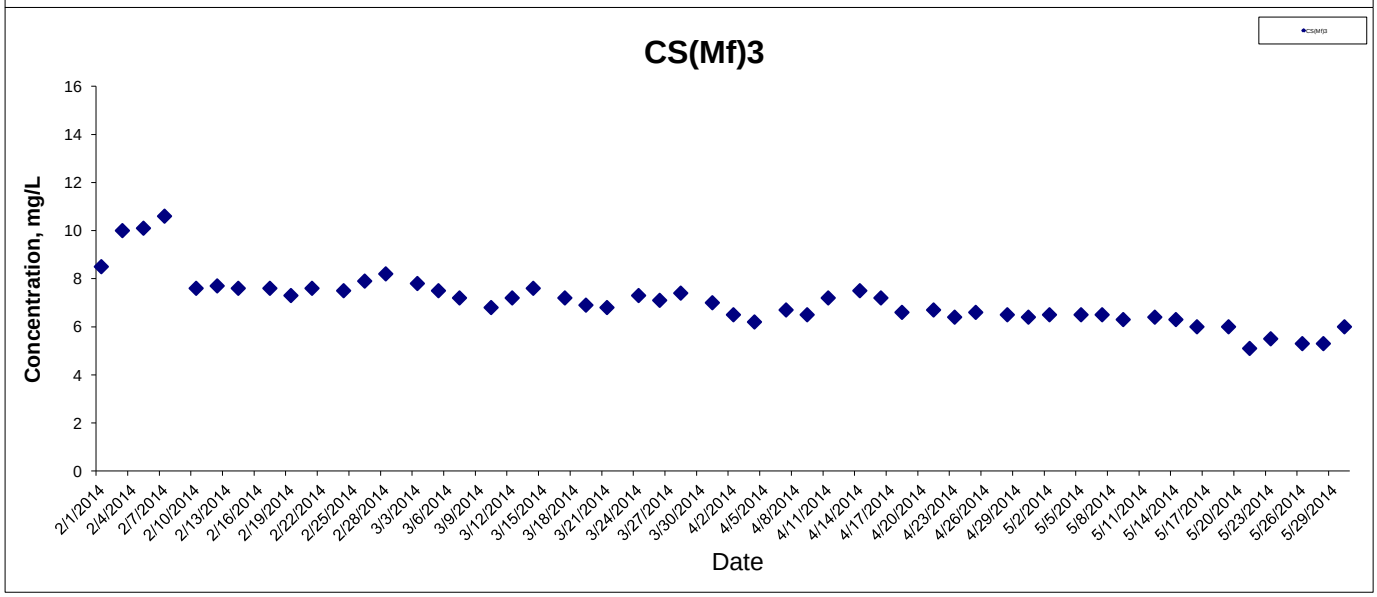




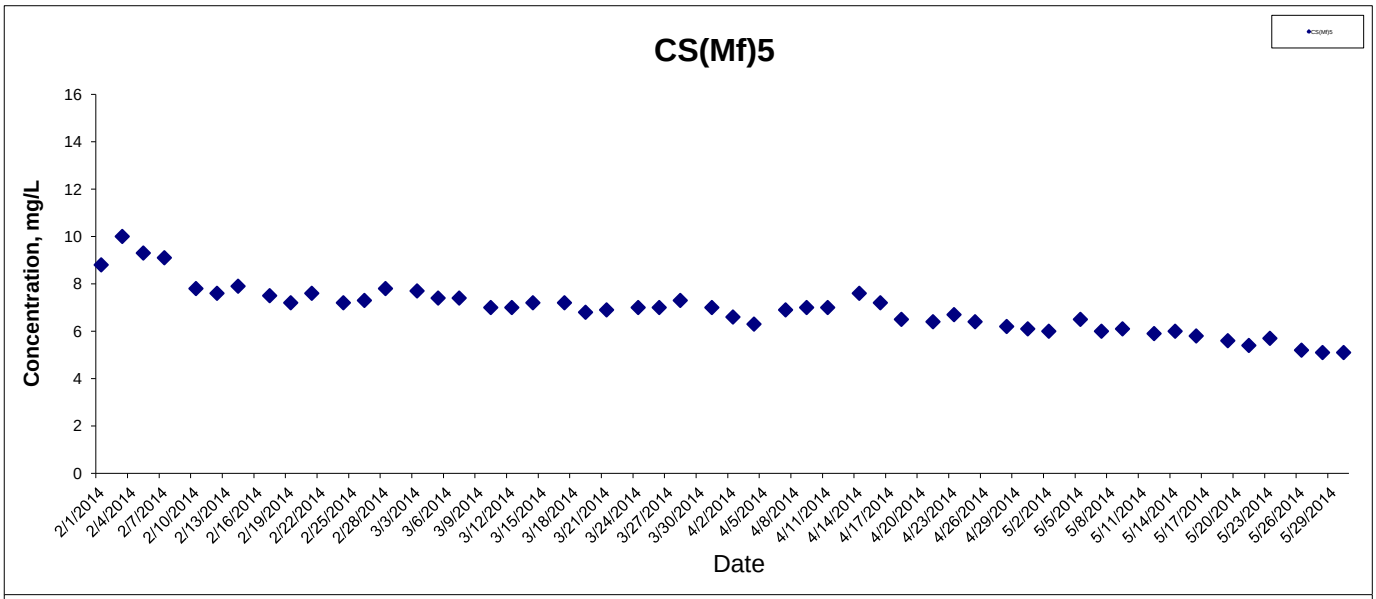
Dissolved Oxygen (Bottom) at Mid-Ebb Tide

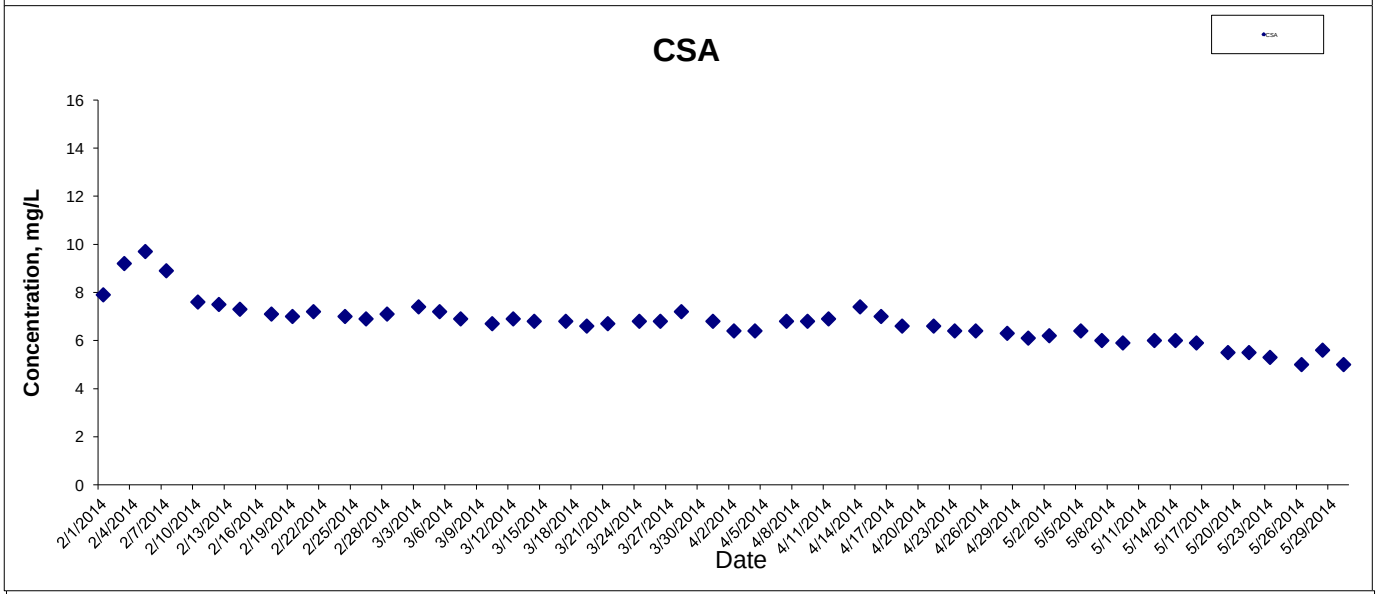


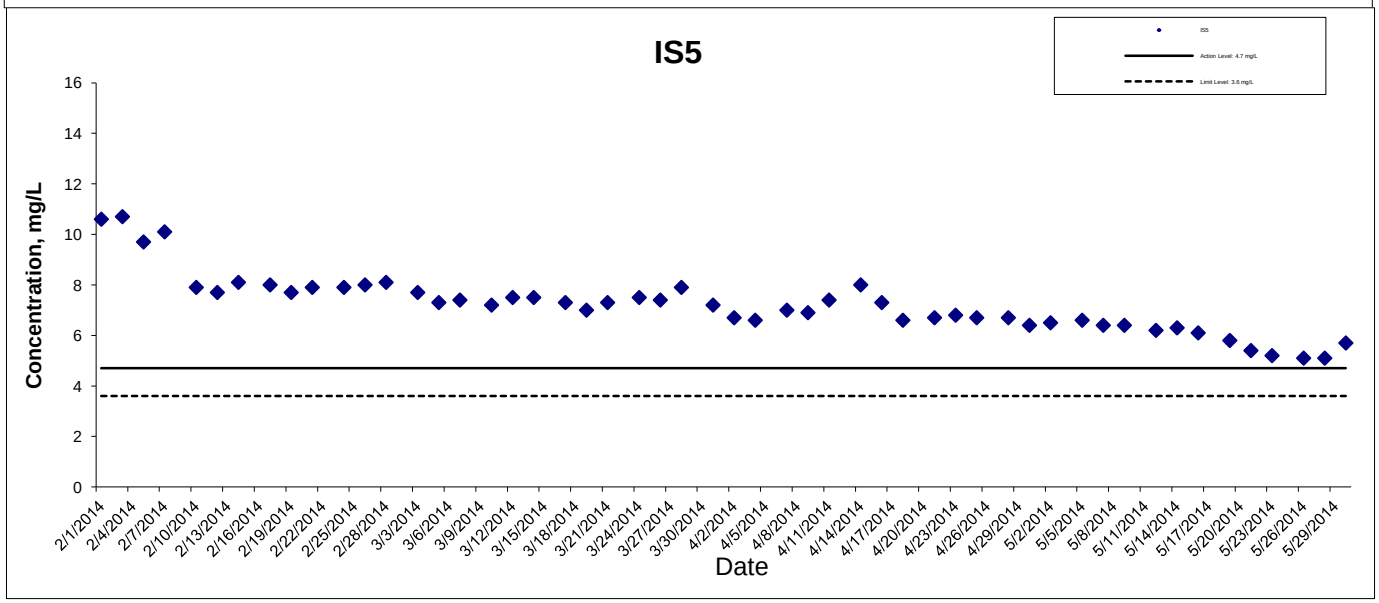




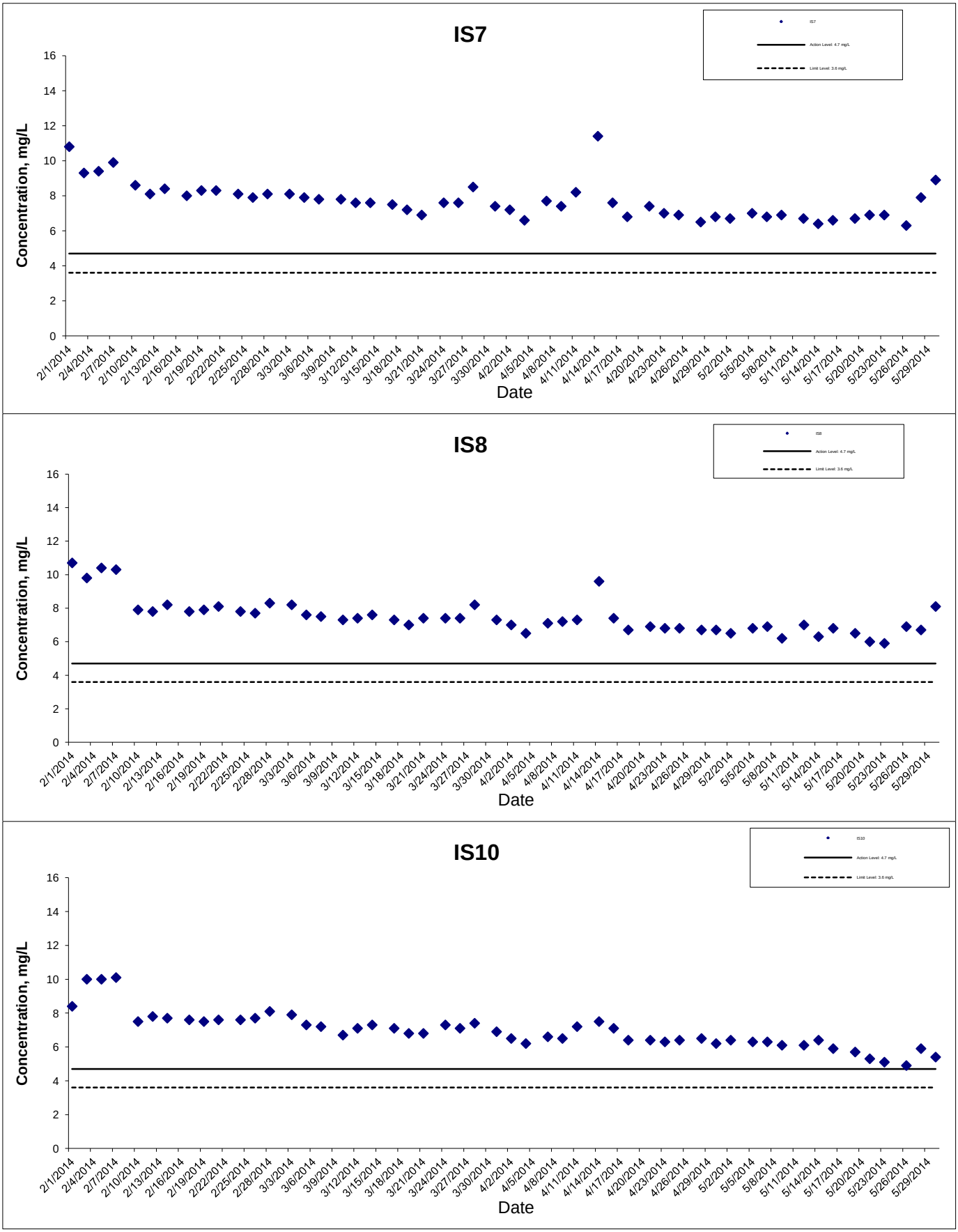
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



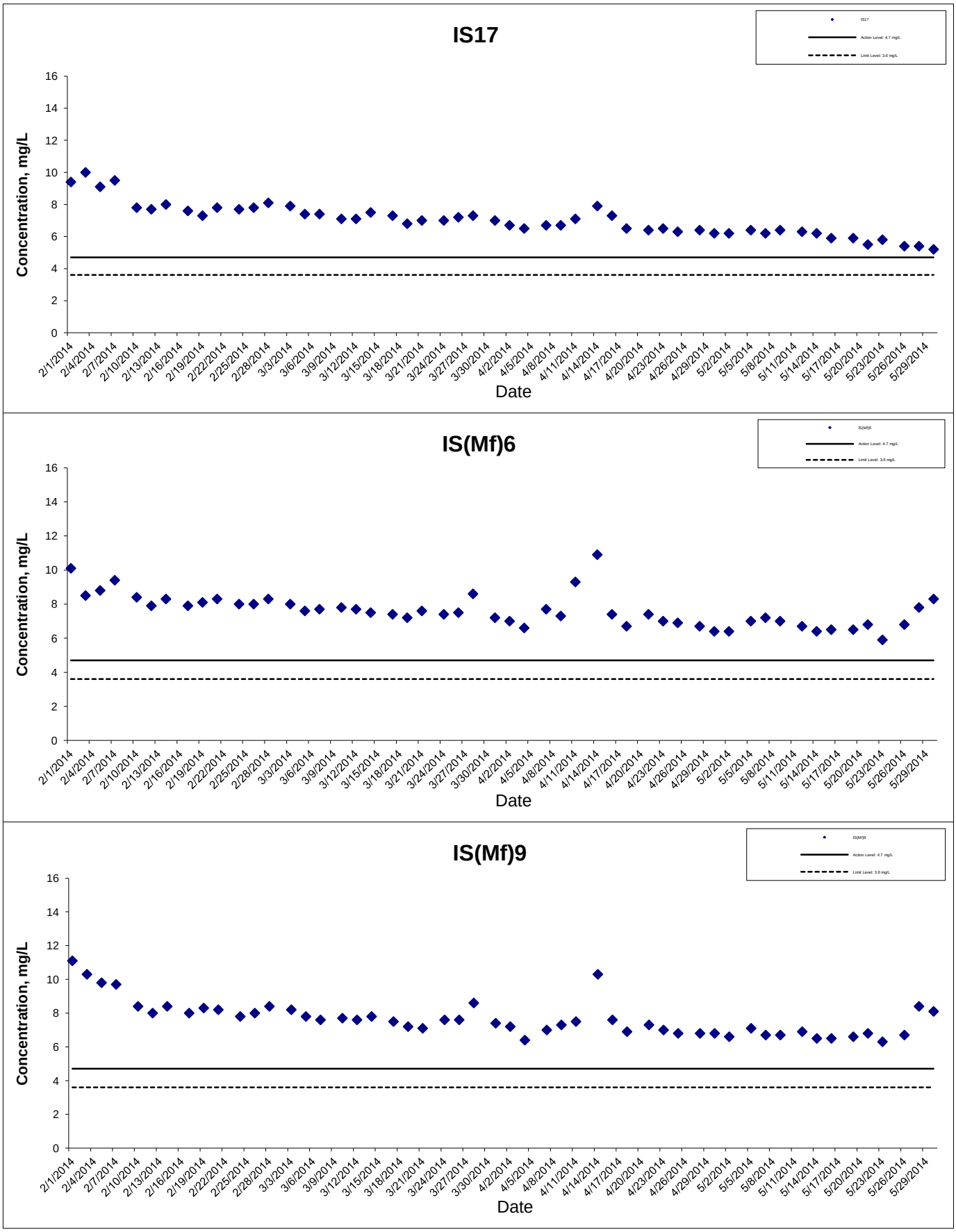




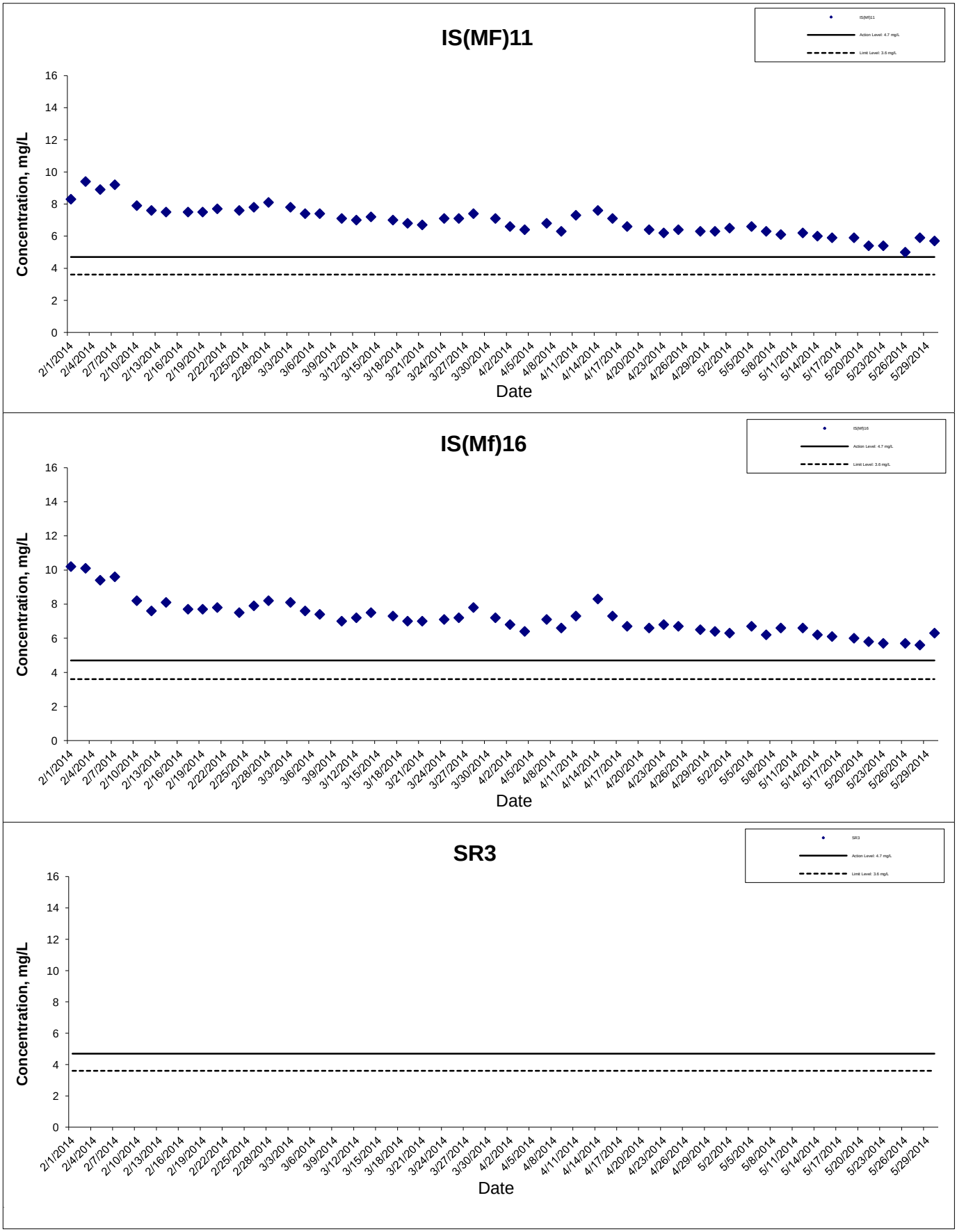
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



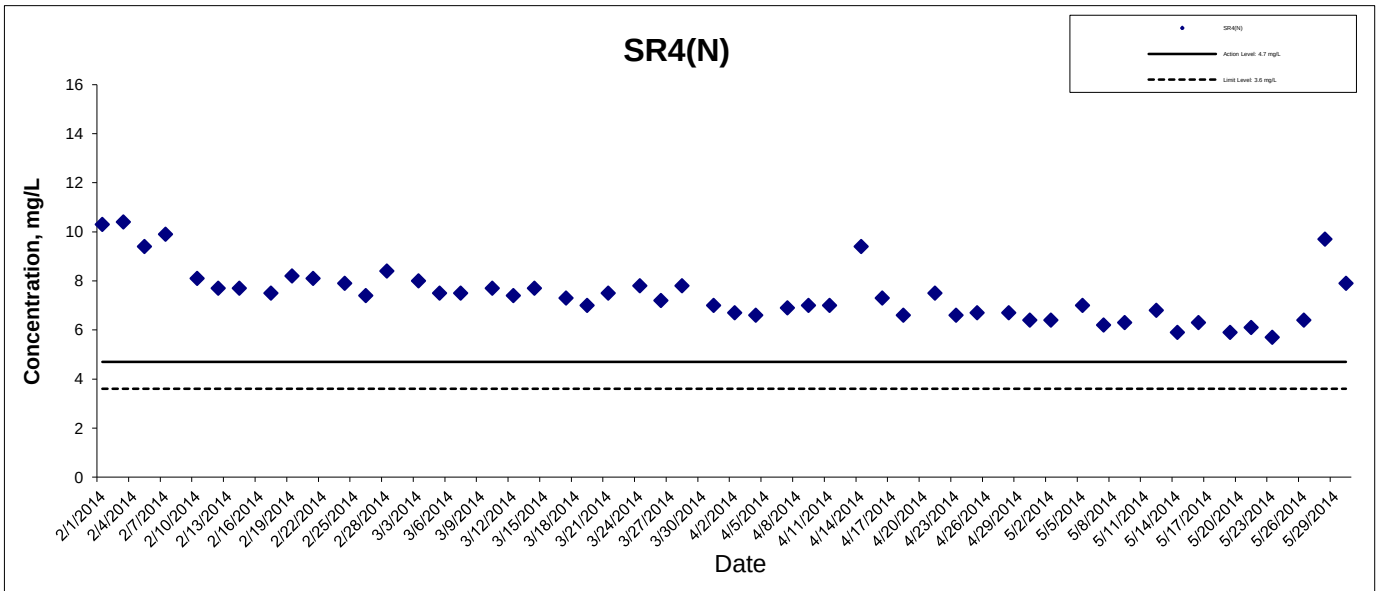
Dissolved Oxygen (Bottom) at Mid-Ebb Tide

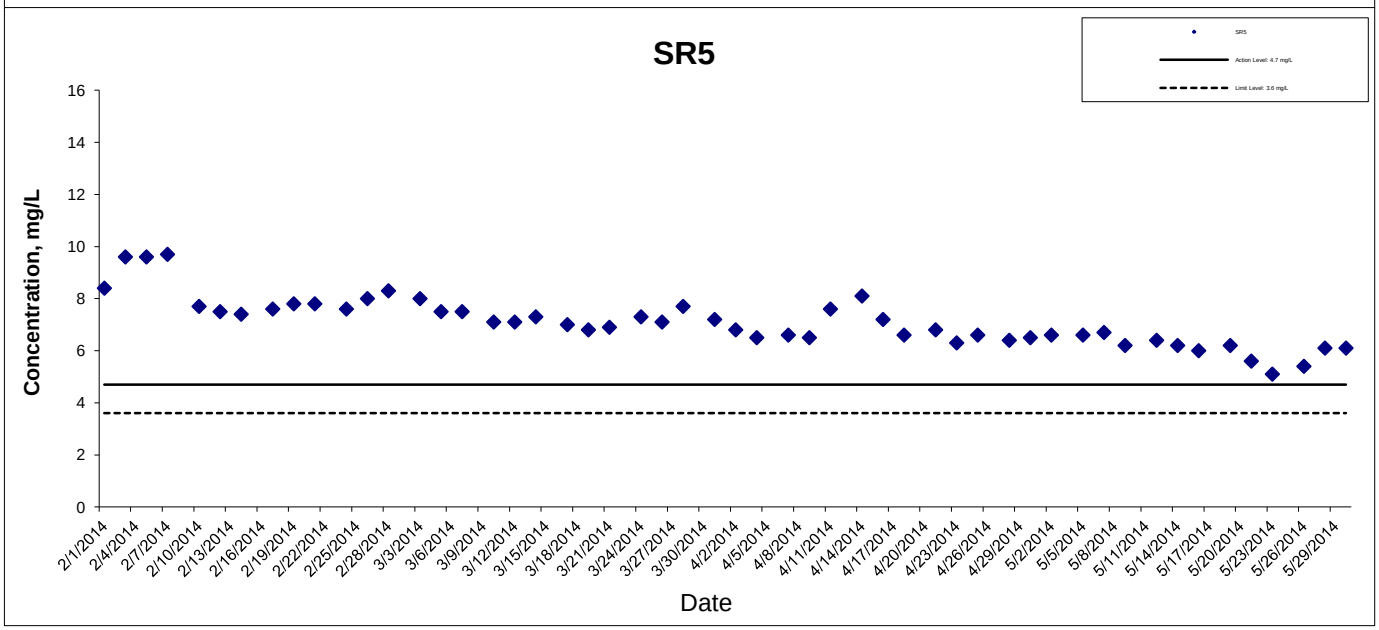


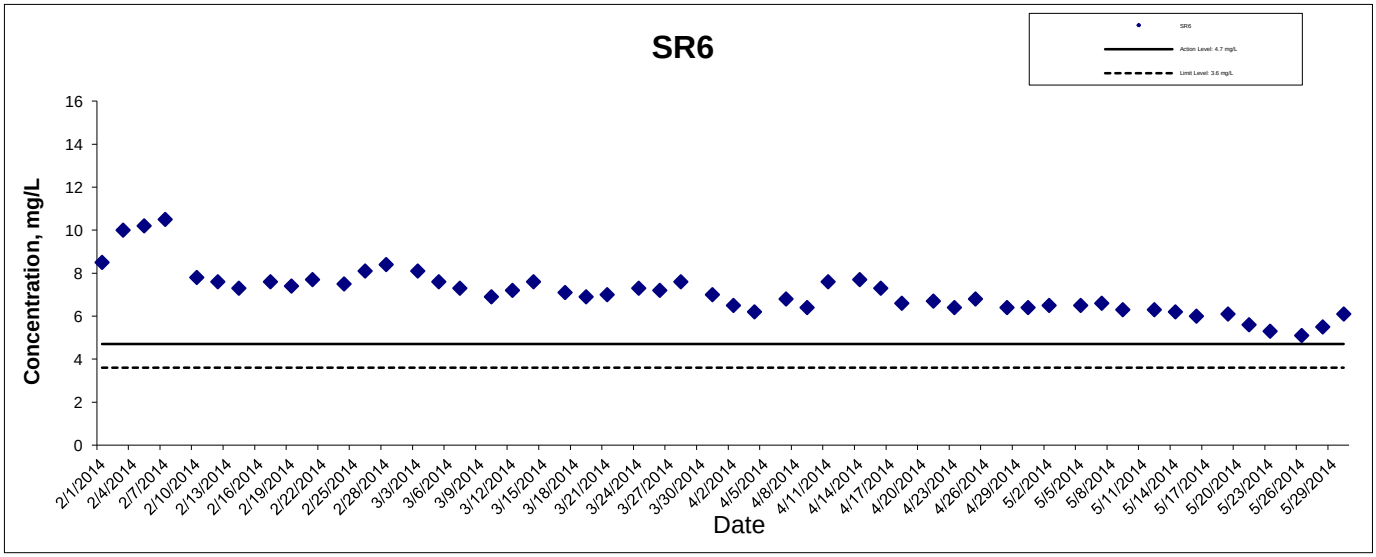
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



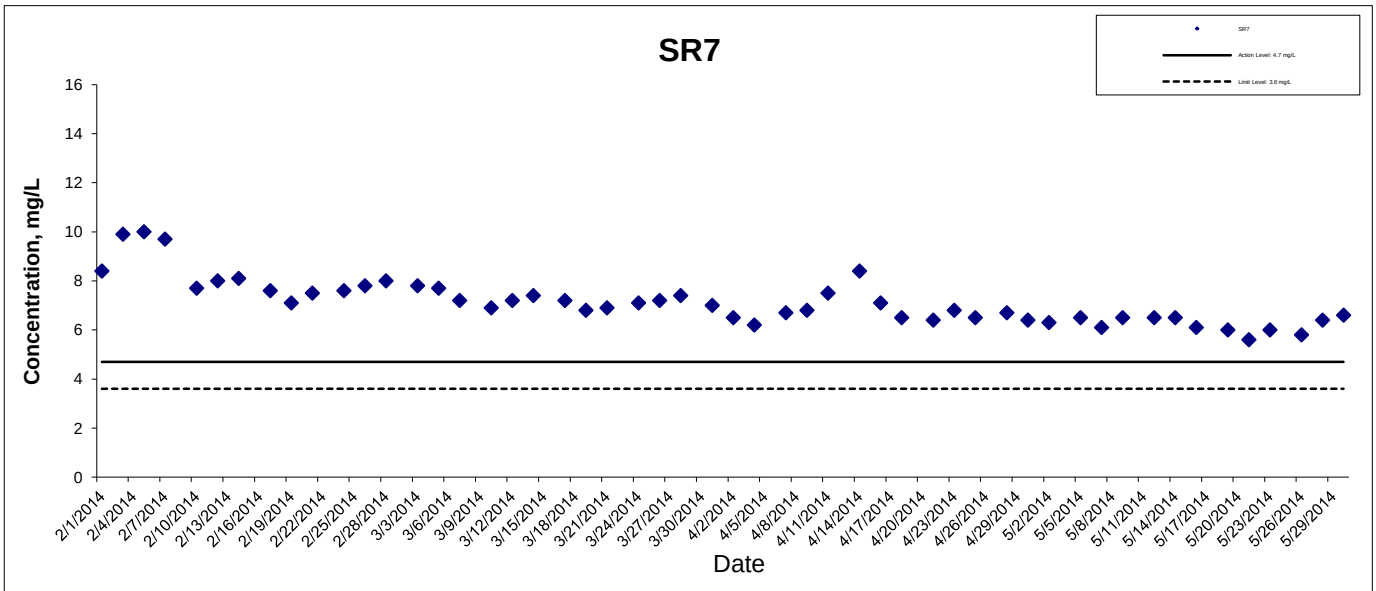
Dissolved Oxygen (Bottom) at Mid-Ebb Tide

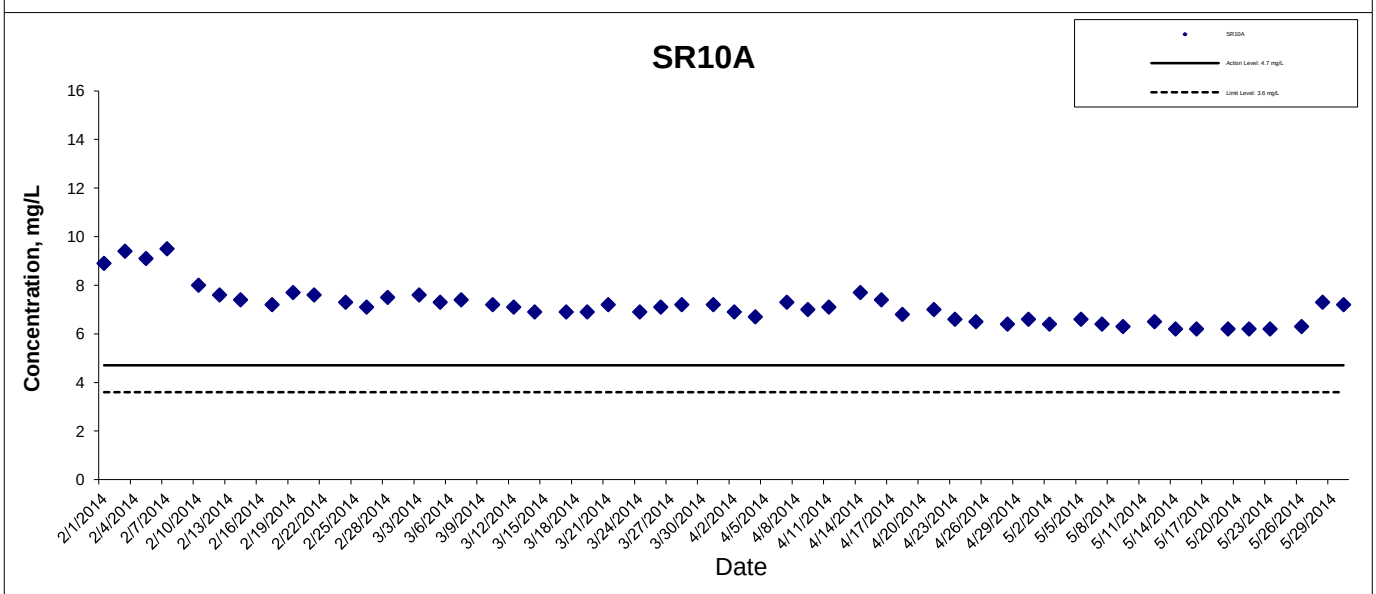


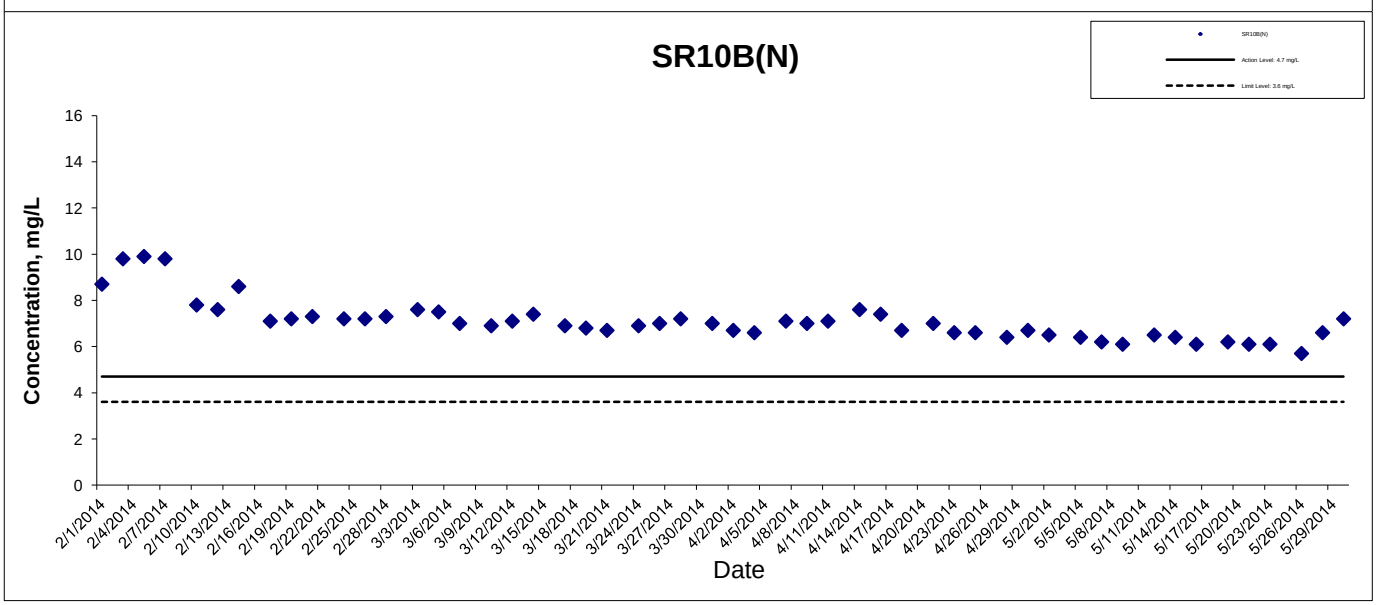




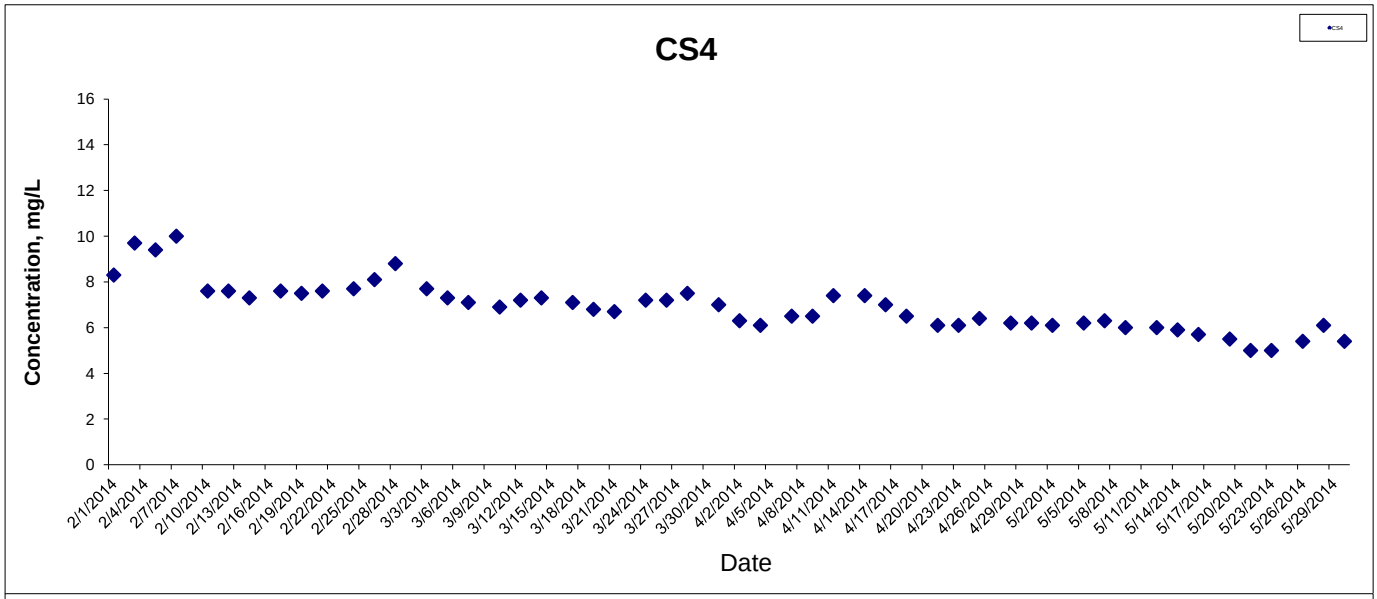
Dissolved Oxygen (Bottom) at Mid-Ebb Tide

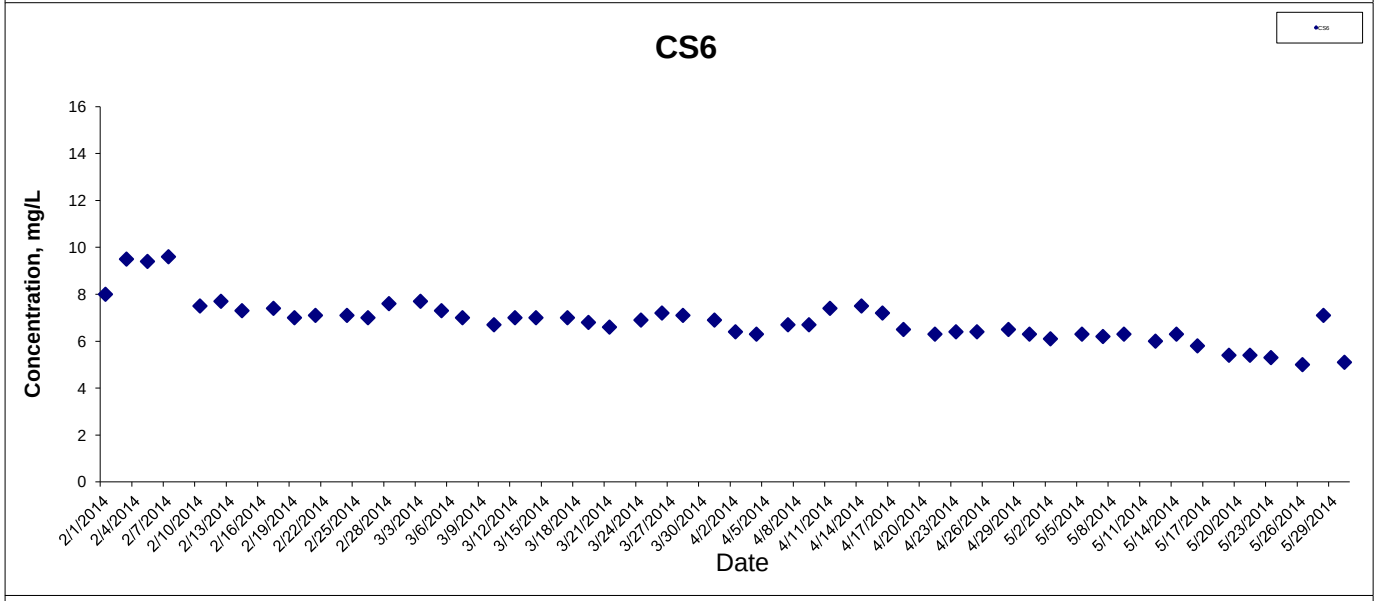


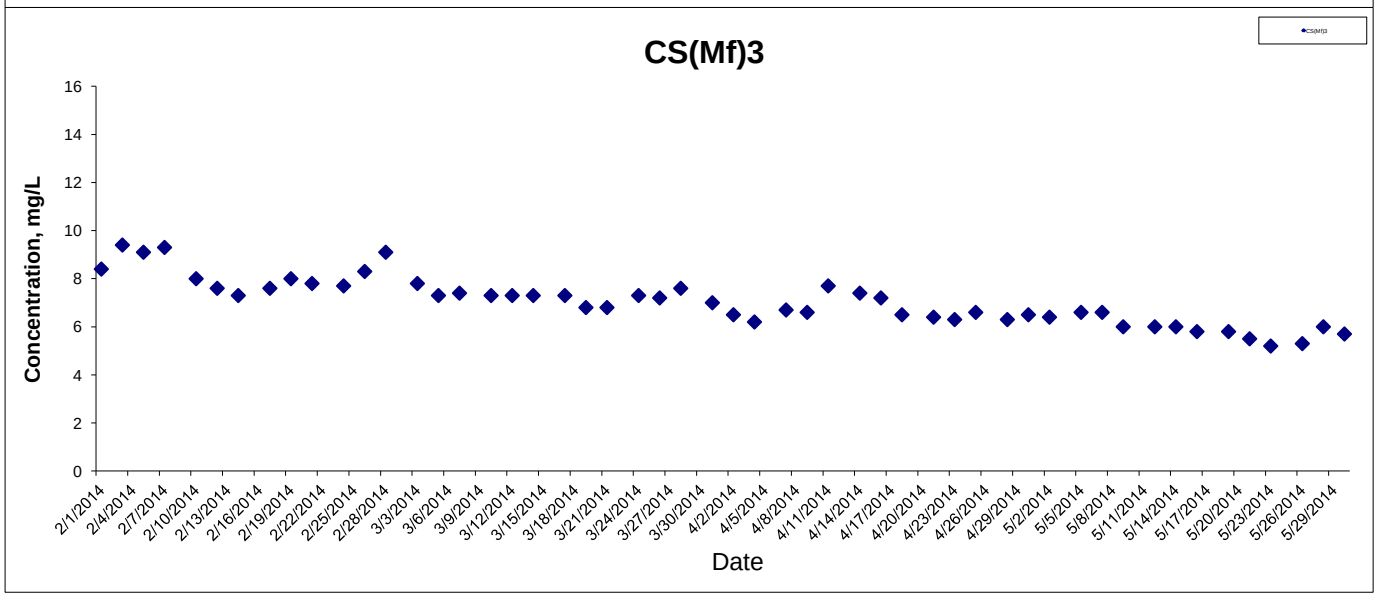




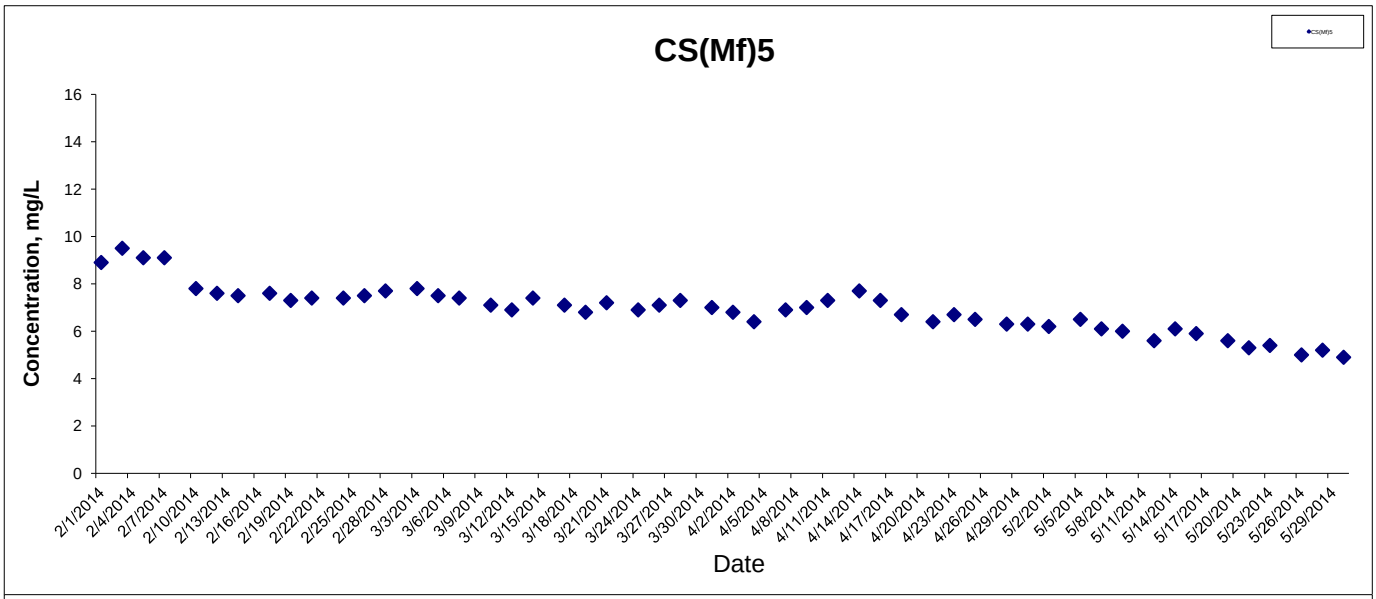
Dissolved Oxygen (Bottom) at Mid-Flood Tide

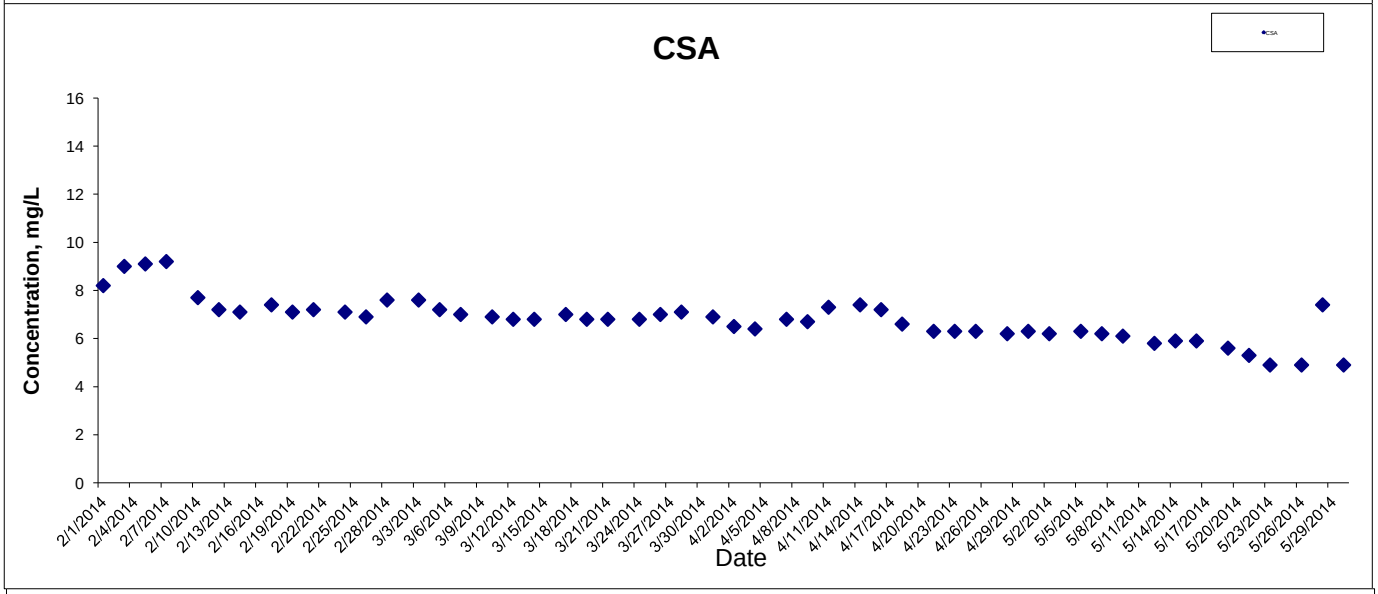


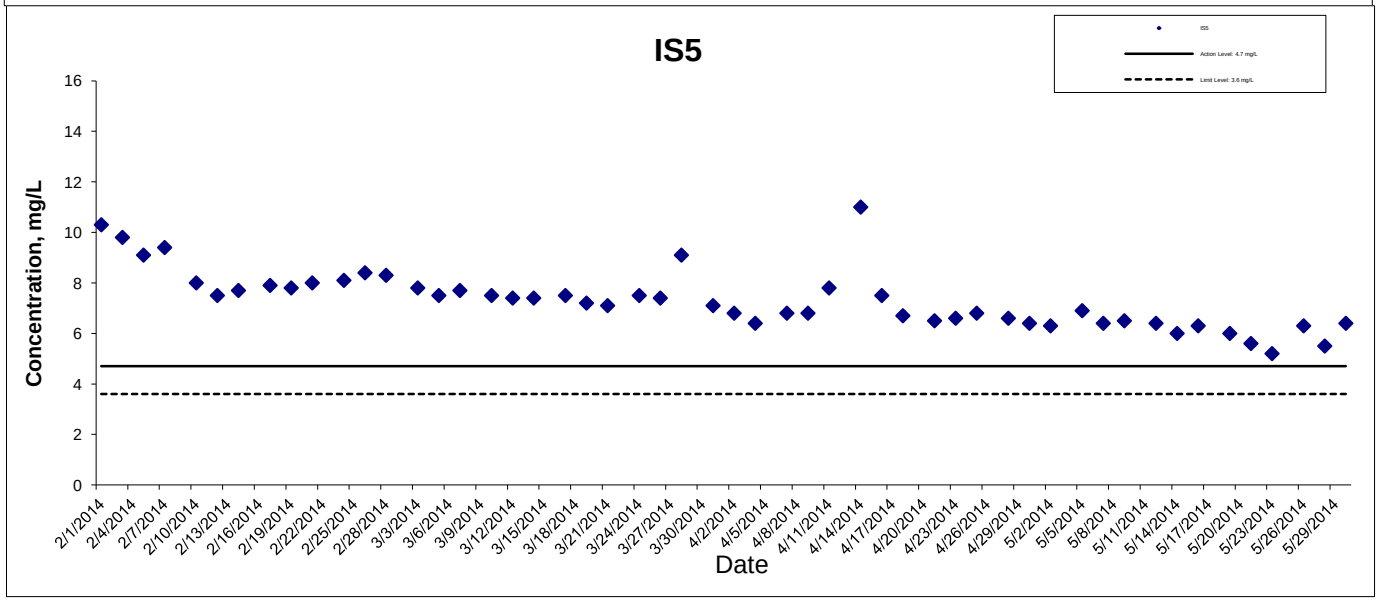




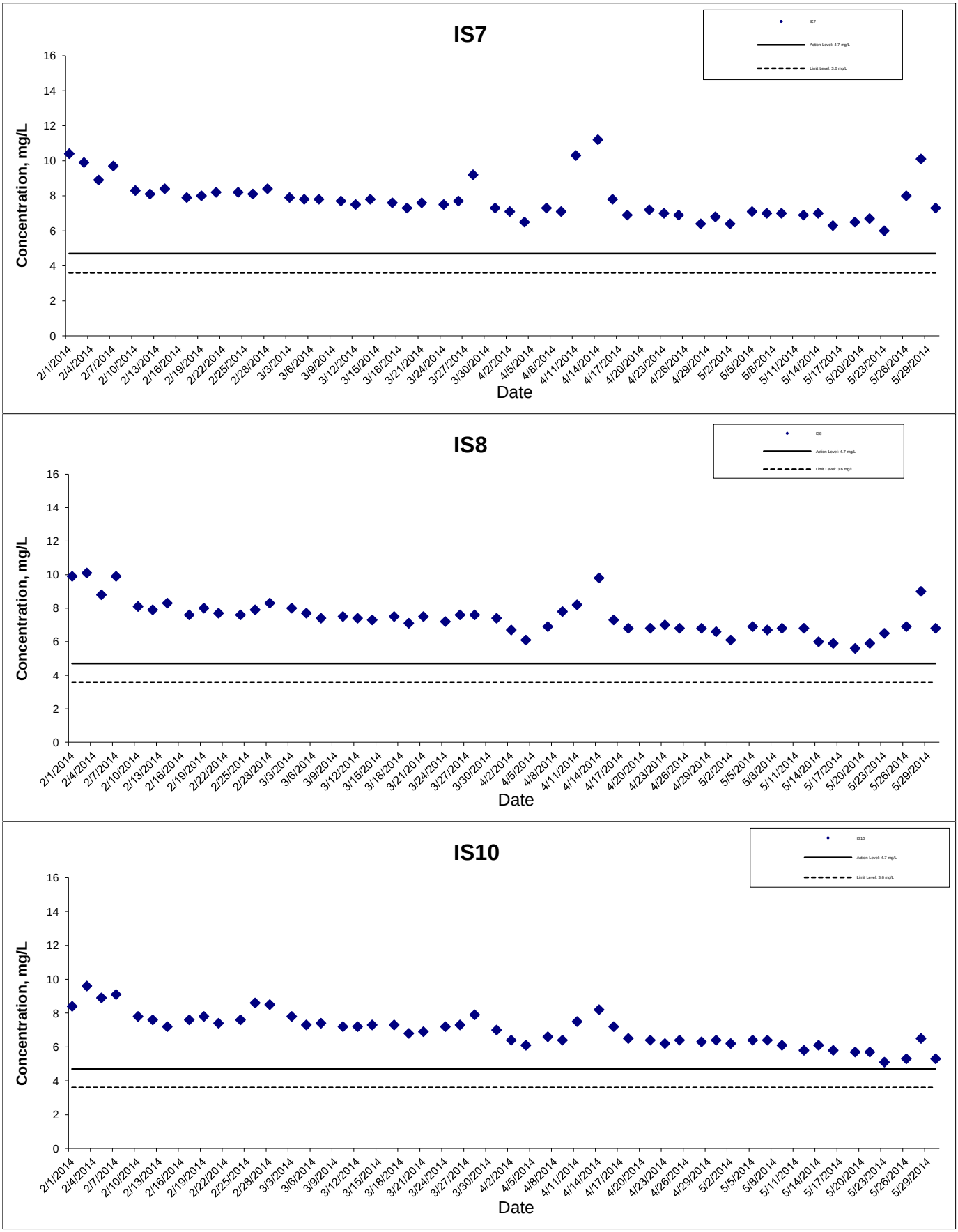
Dissolved Oxygen (Bottom) at Mid-Flood Tide



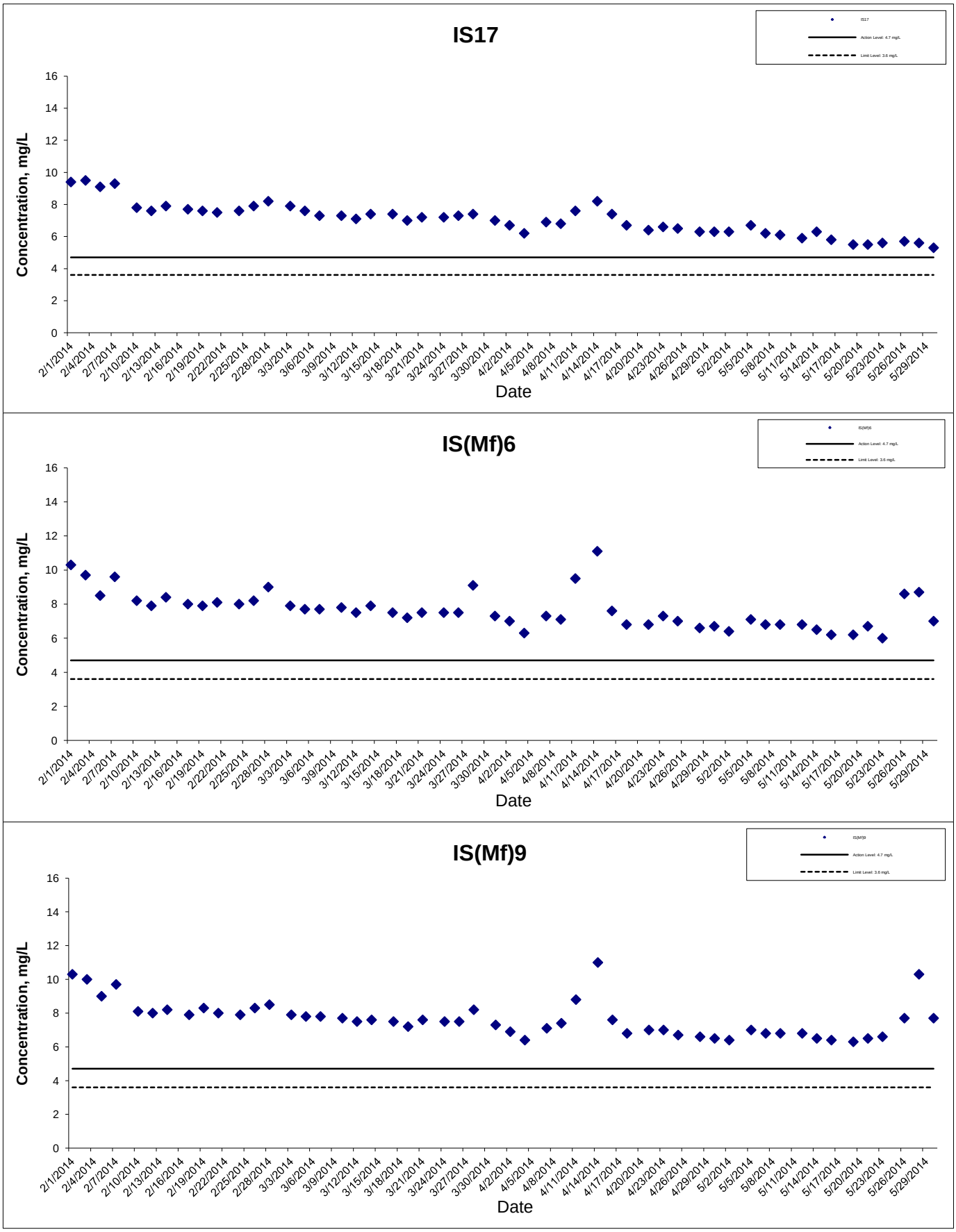




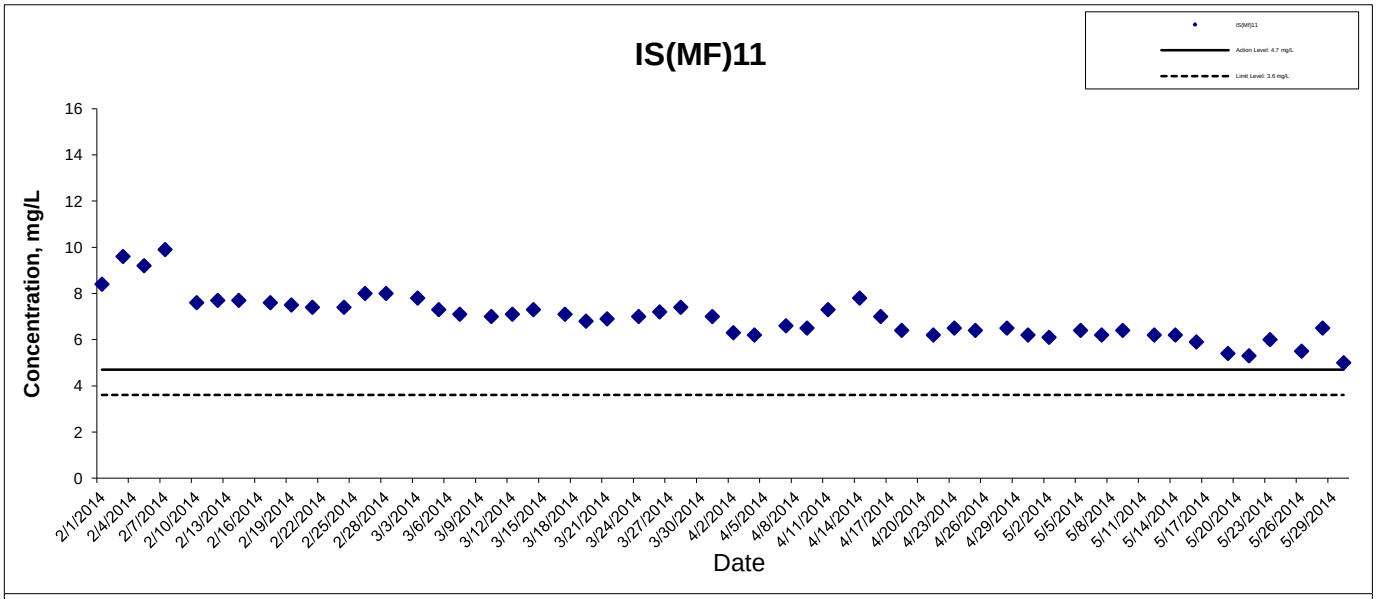
Dissolved Oxygen (Bottom) at Mid-Flood Tide

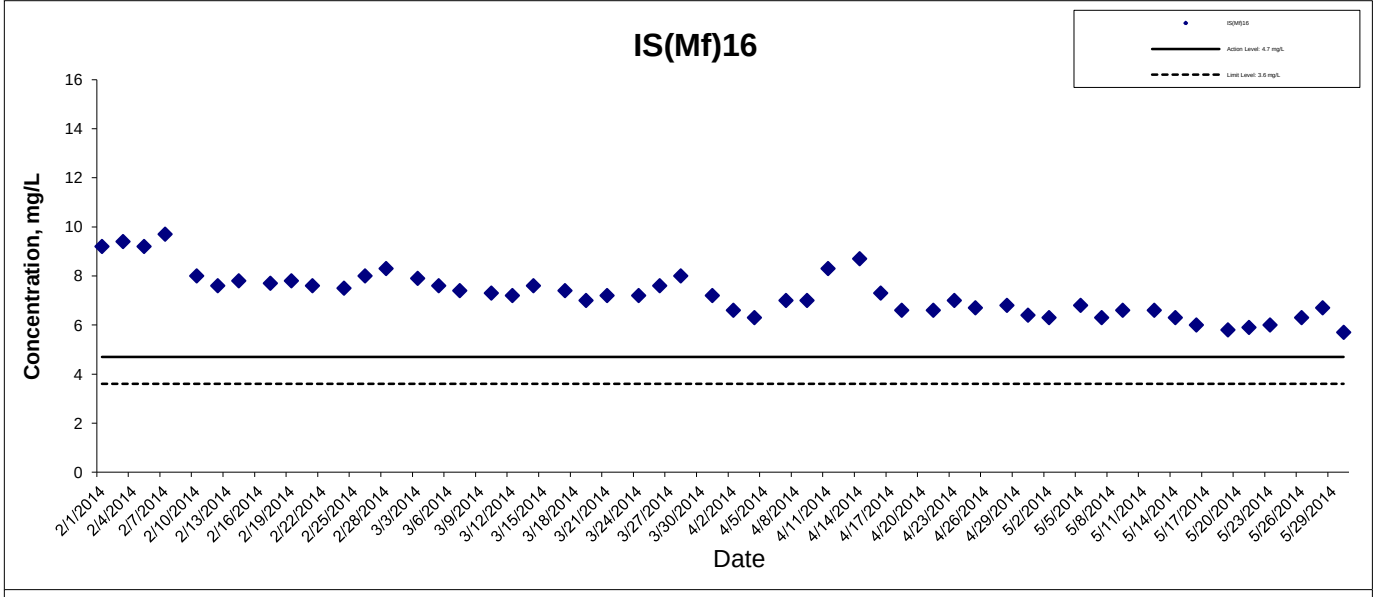


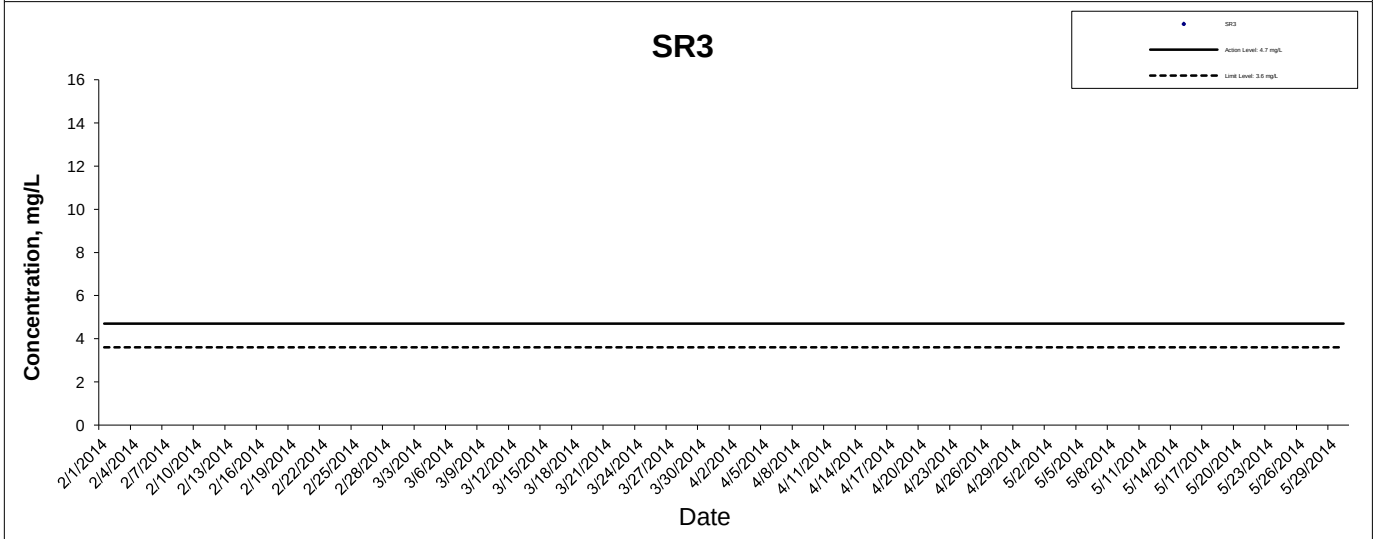
Dissolved Oxygen (Bottom) at Mid-Flood Tide



Dissolved Oxygen (Bottom) at Mid-Flood Tide

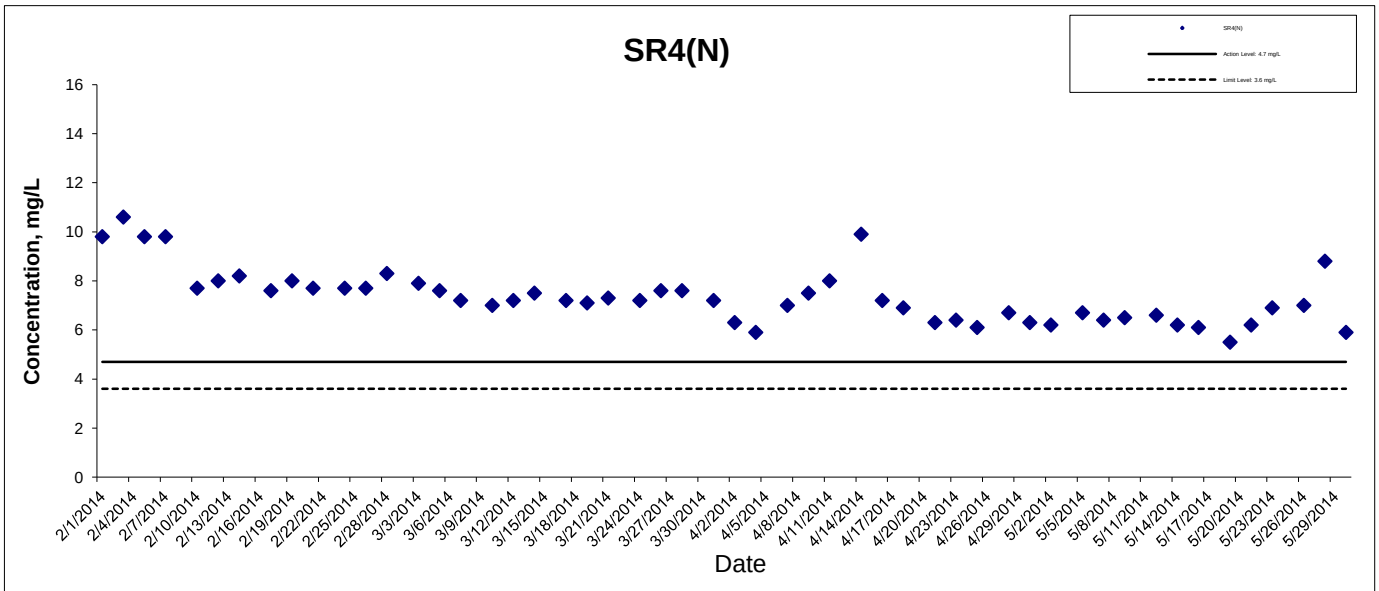


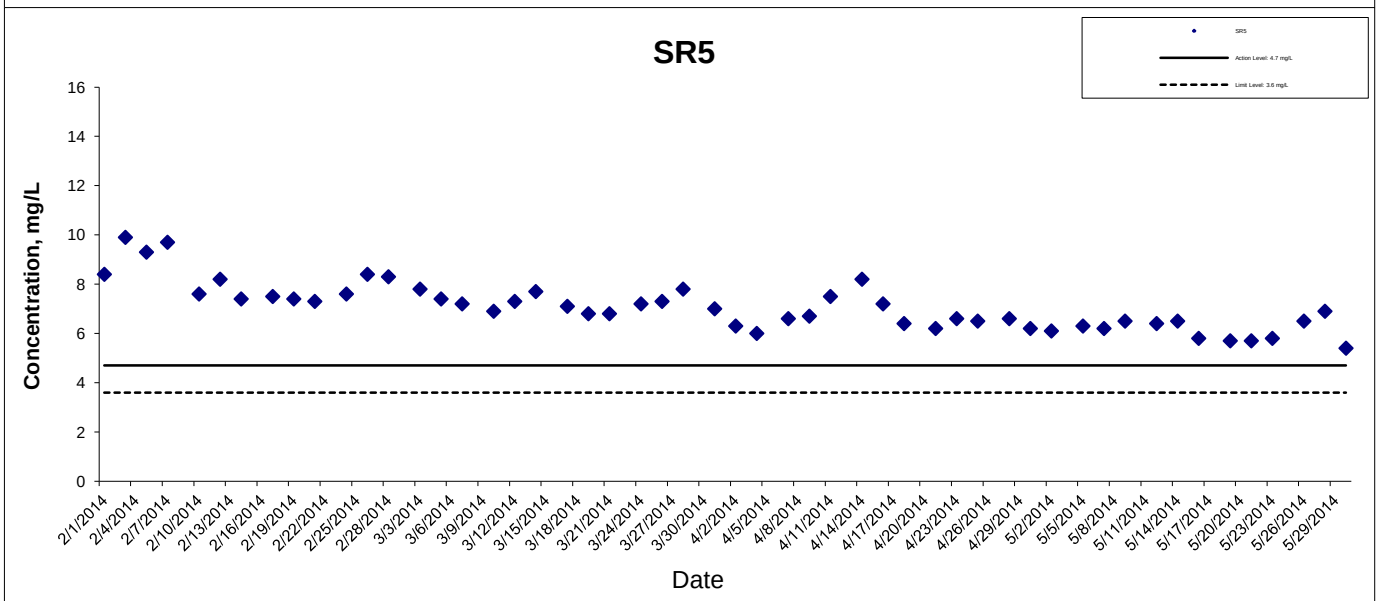


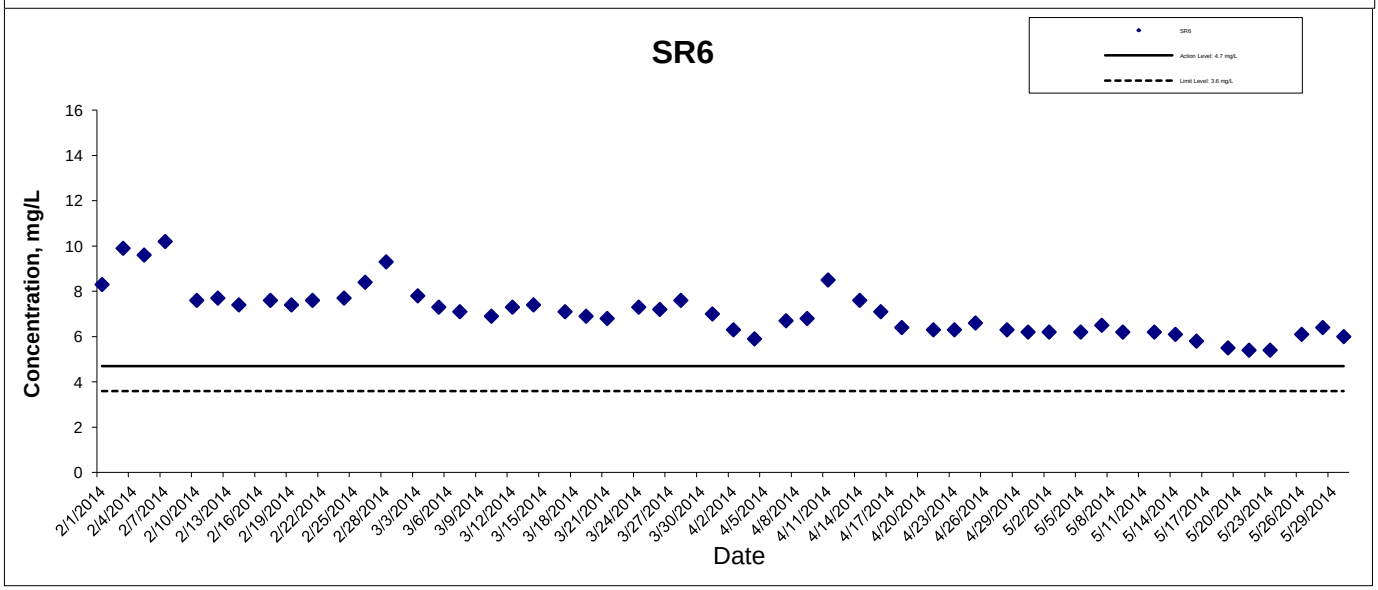


As the measured water depths were less than 3 m during all monitoring days, water samples are collected at mid-depth only .

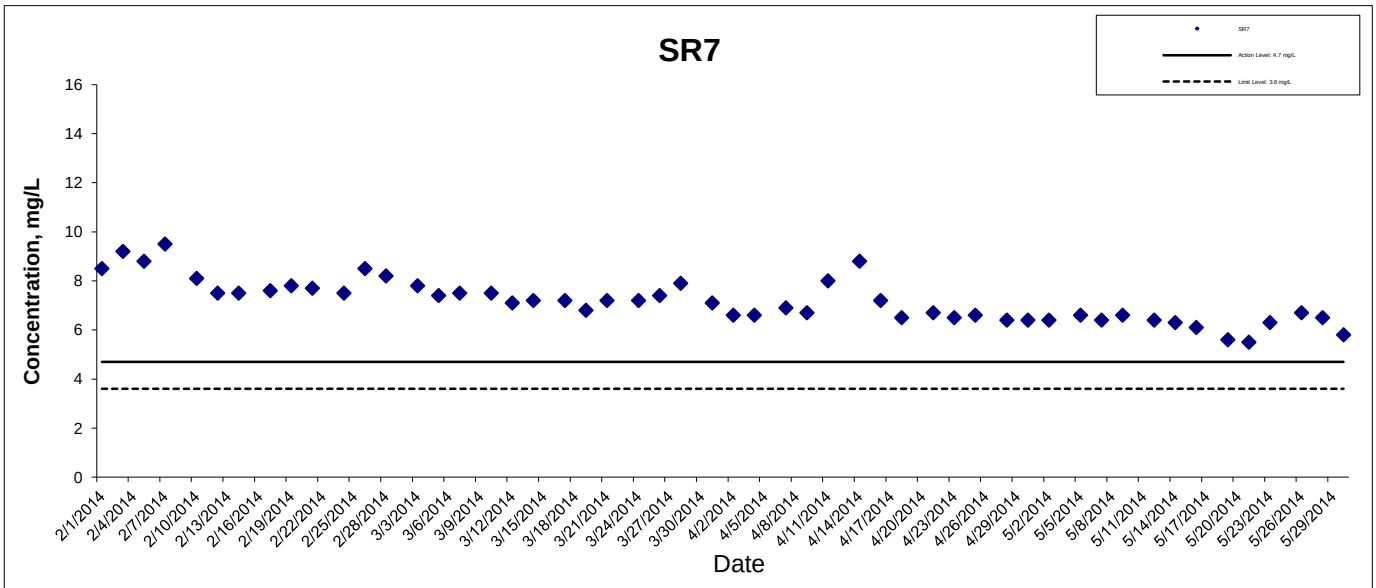
Dissolved Oxygen (Bottom) at Mid-Flood Tide

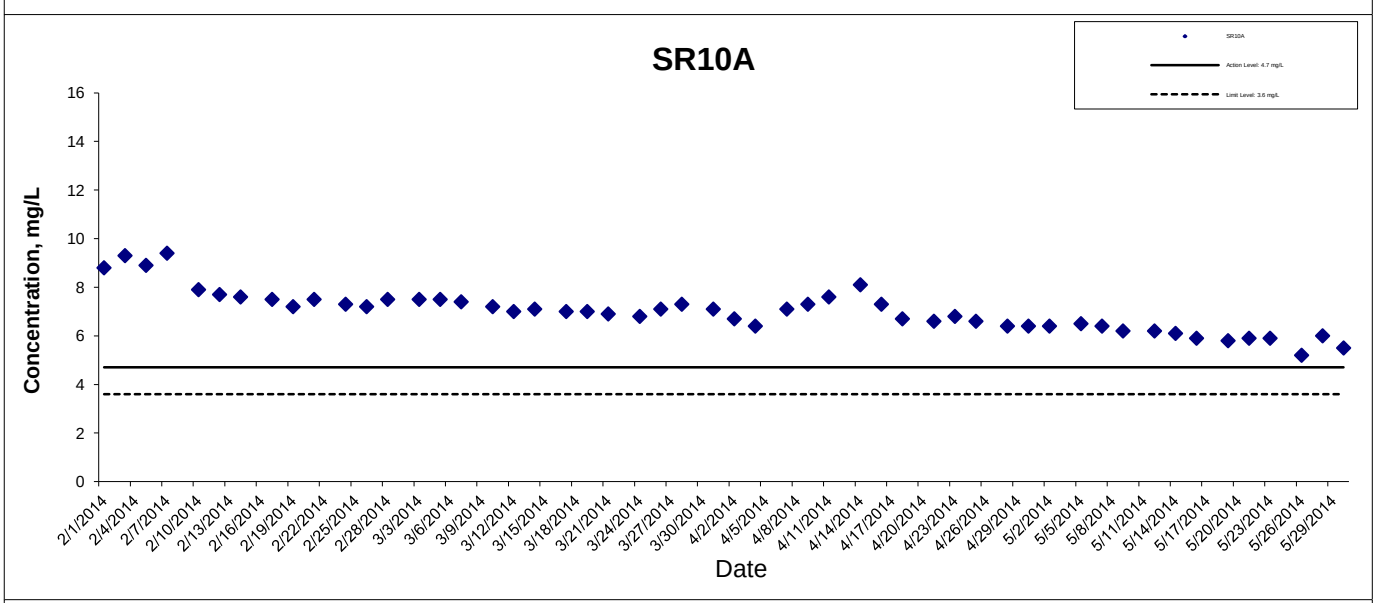


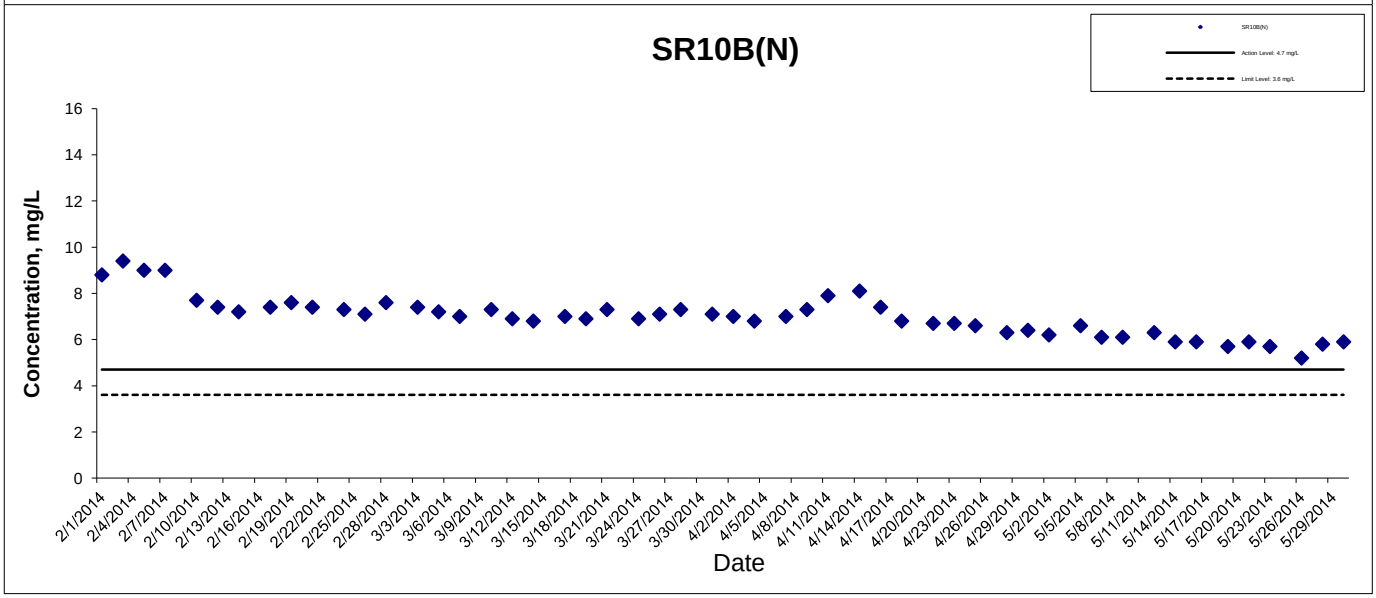




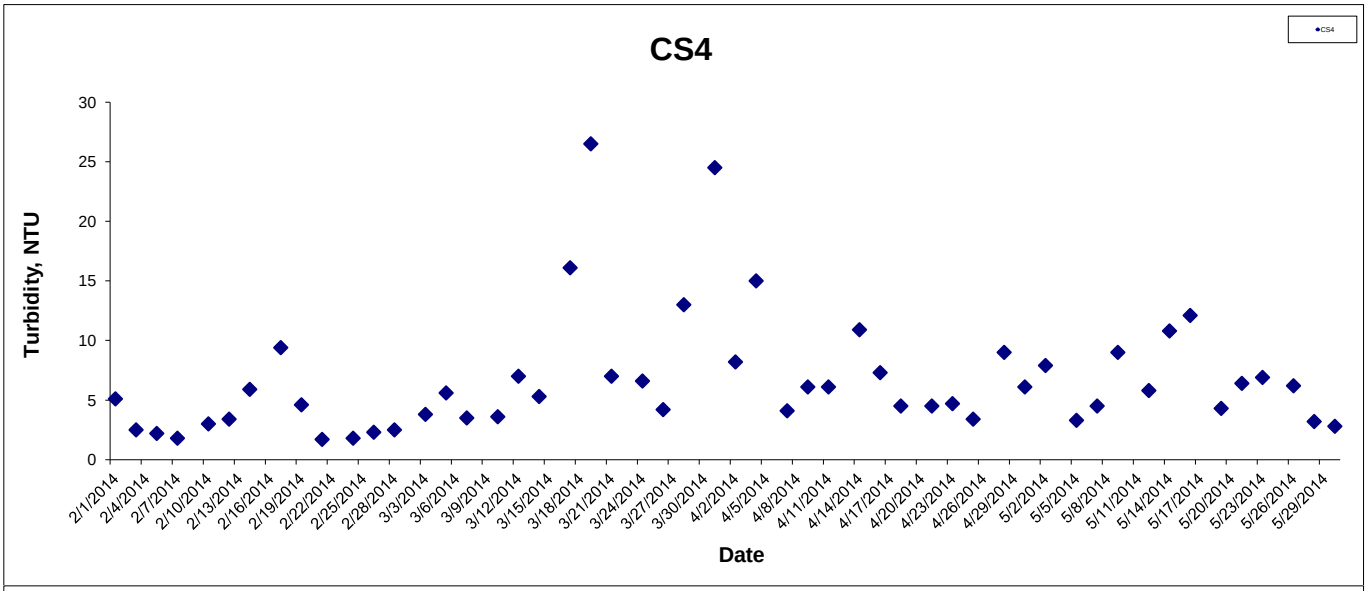
Dissolved Oxygen (Bottom) at Mid-Flood Tide

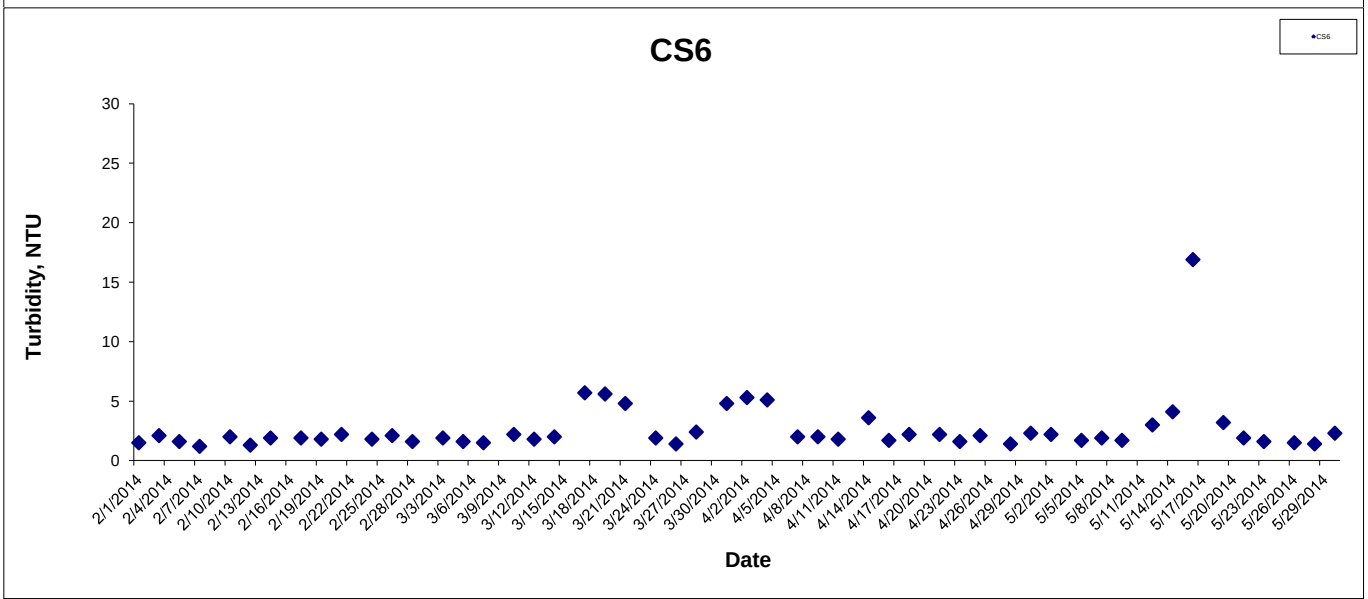


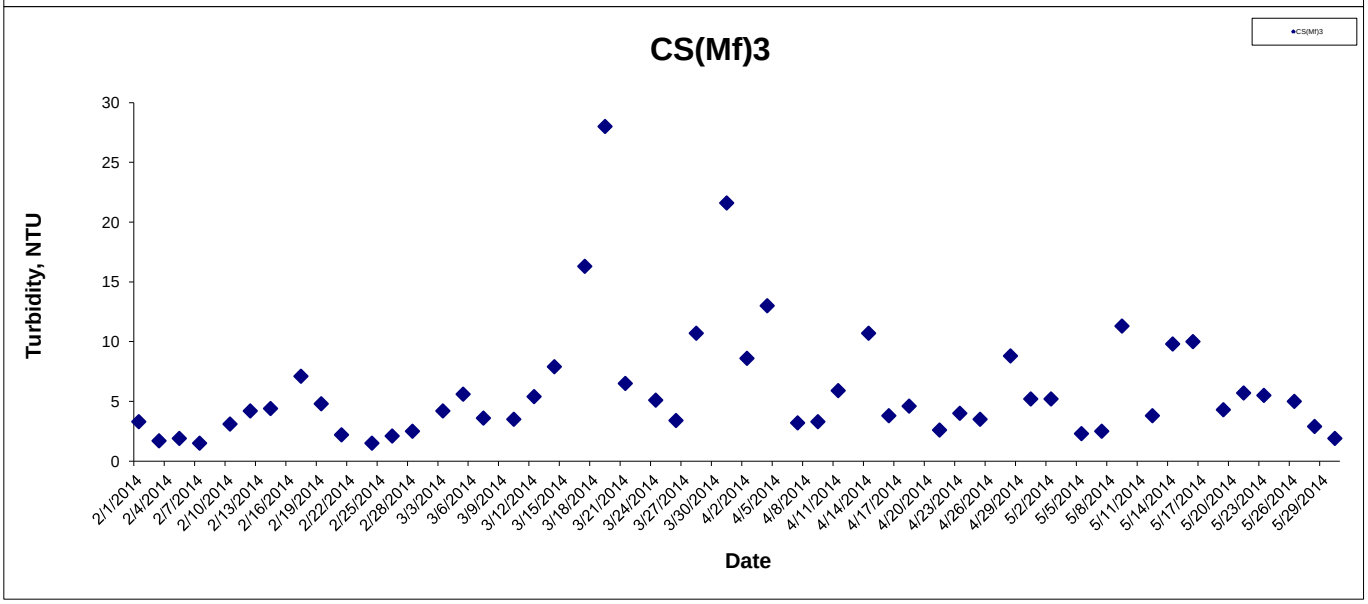




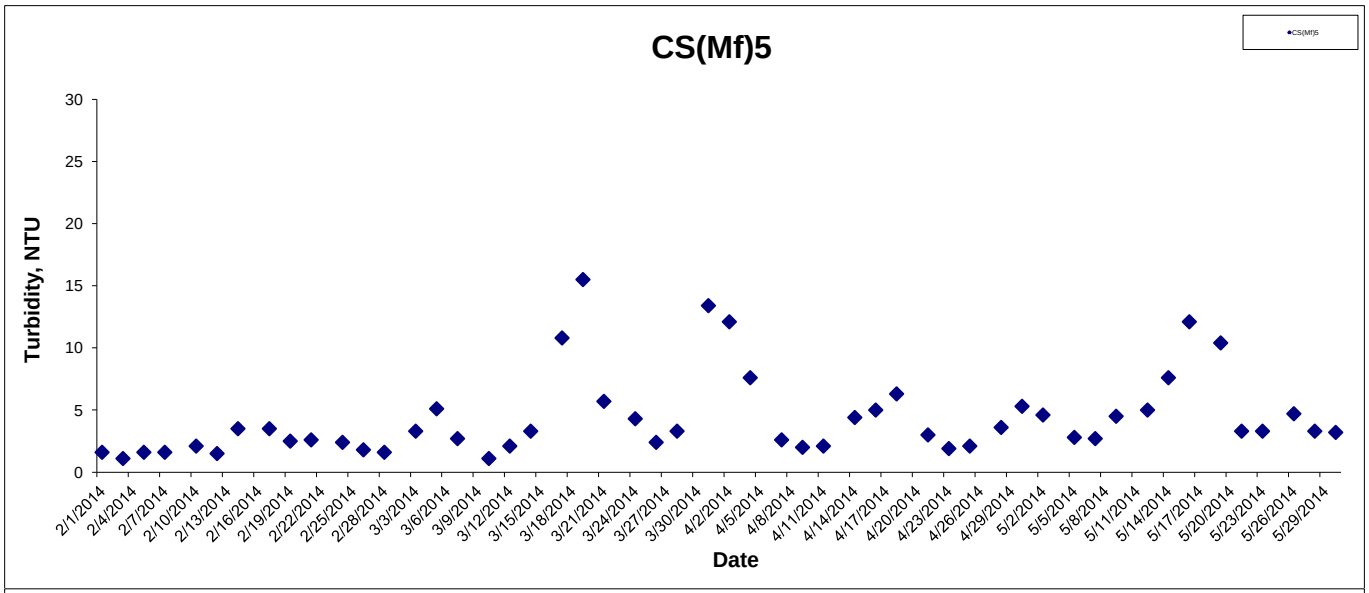
Turbidity at Mid-Ebb Tide

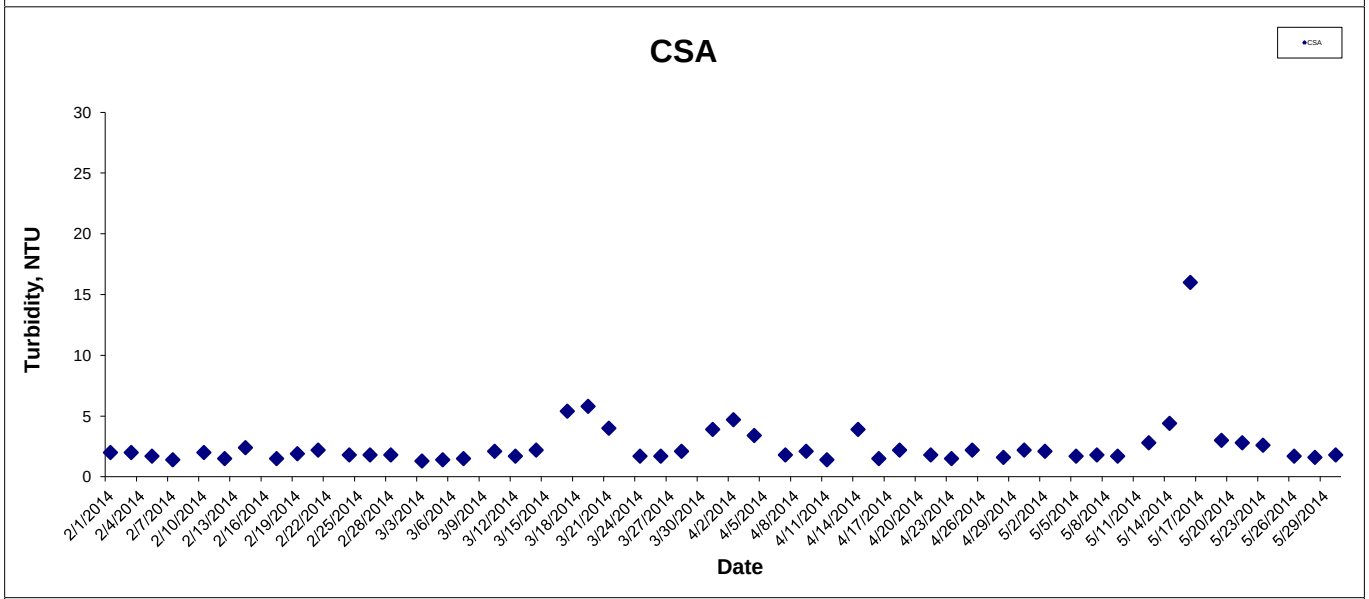


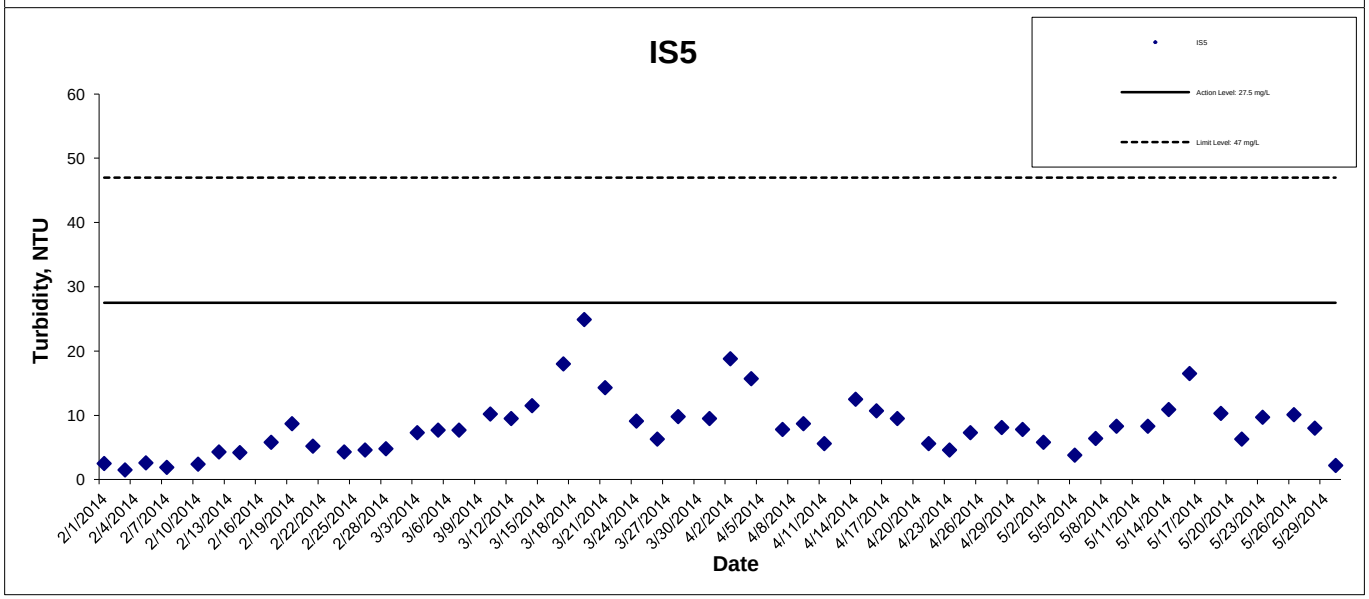




Turbidity at Mid-Ebb Tide







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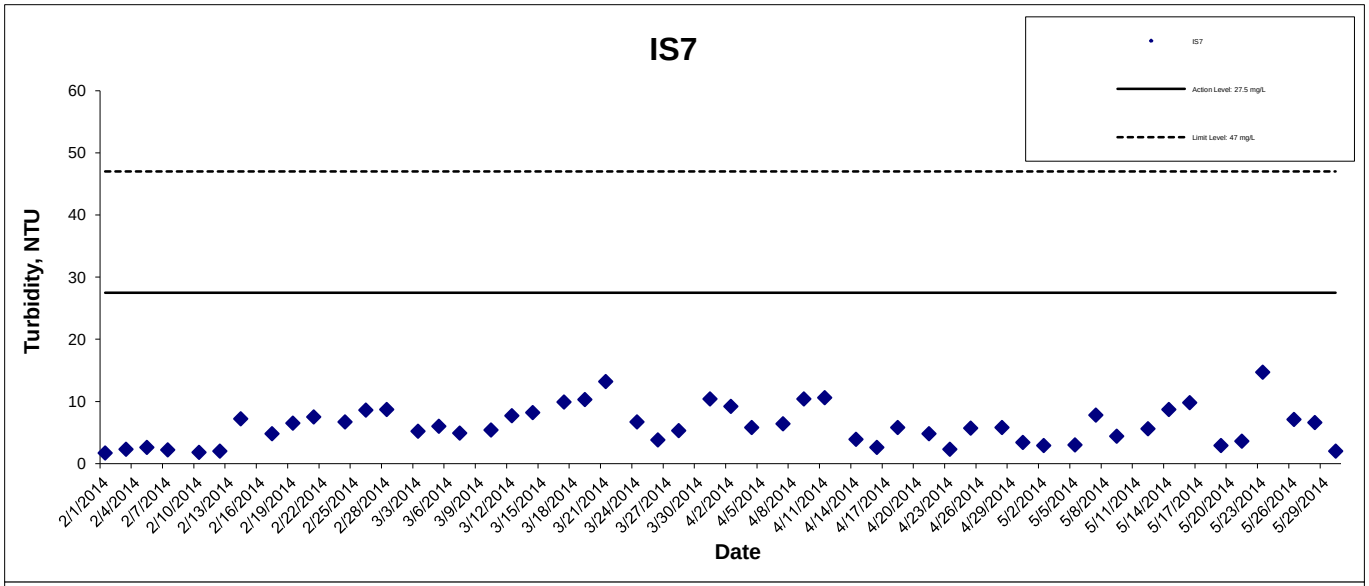

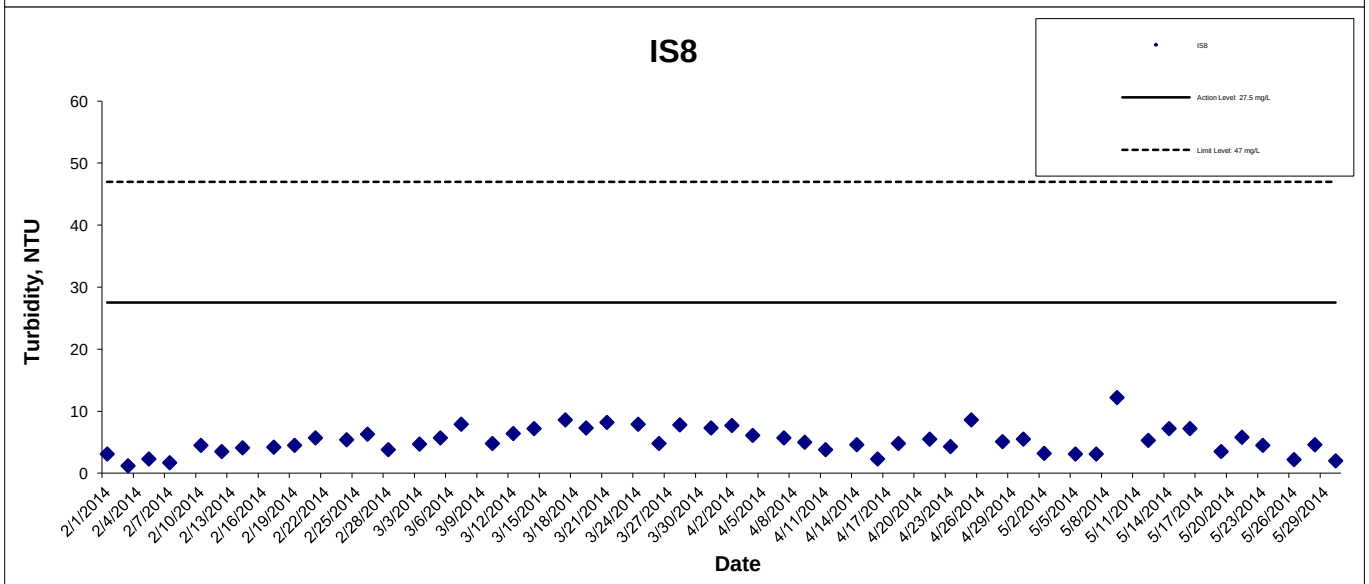

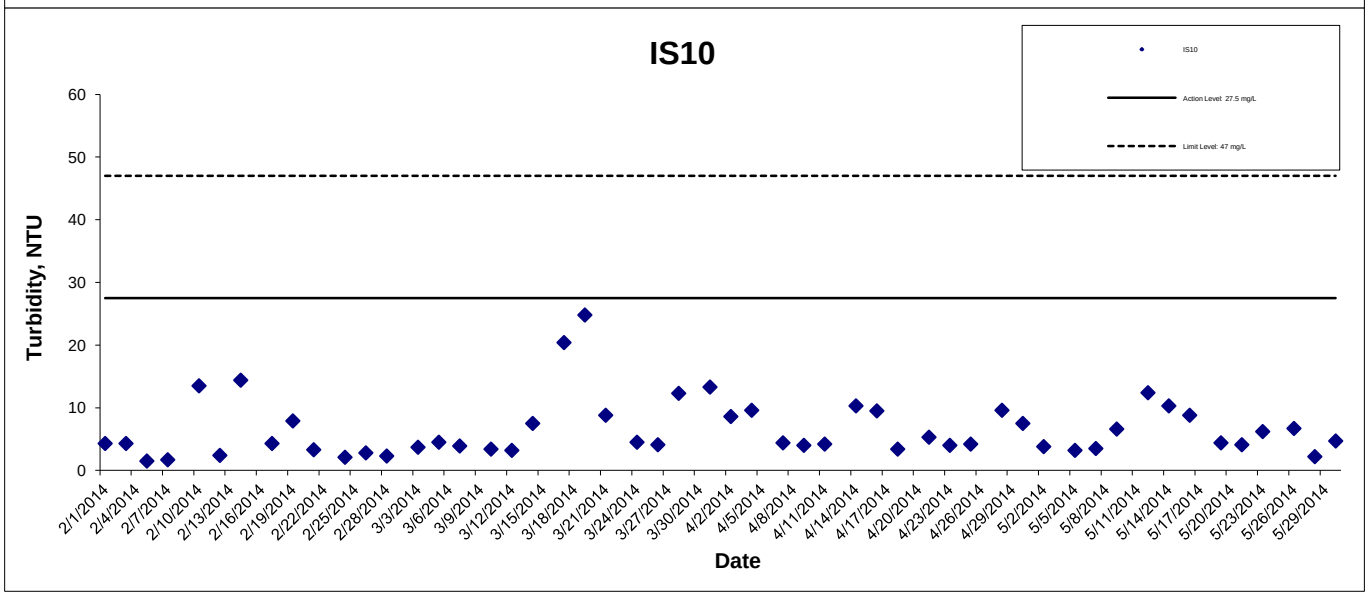

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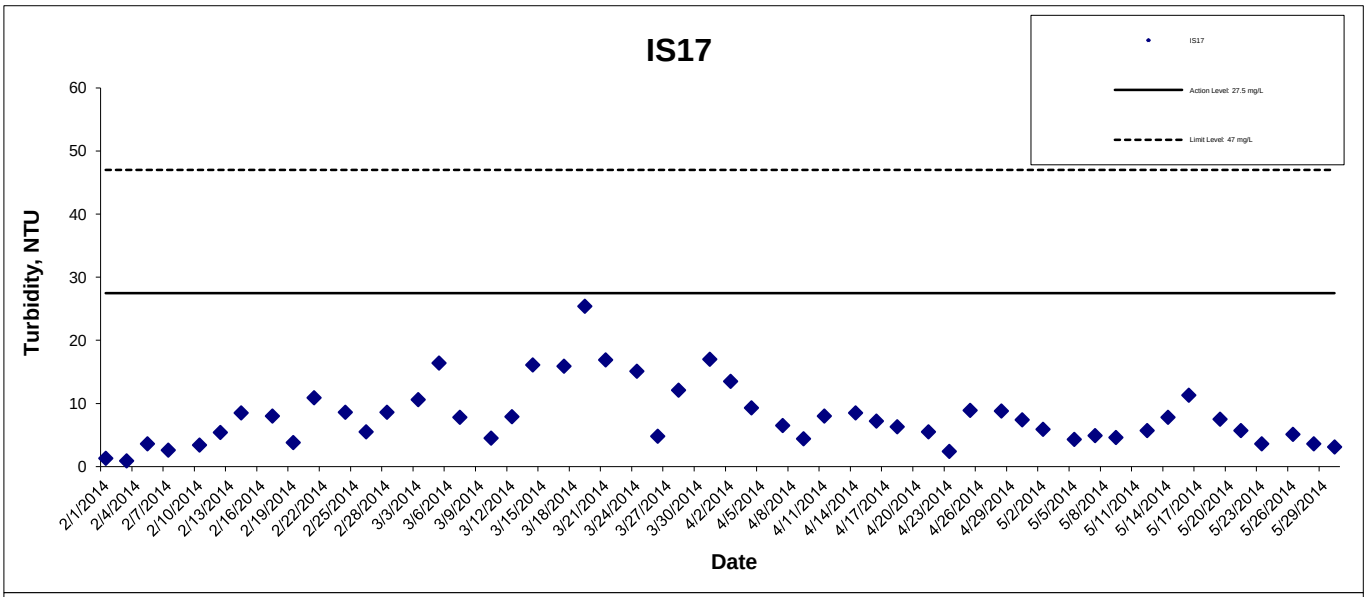
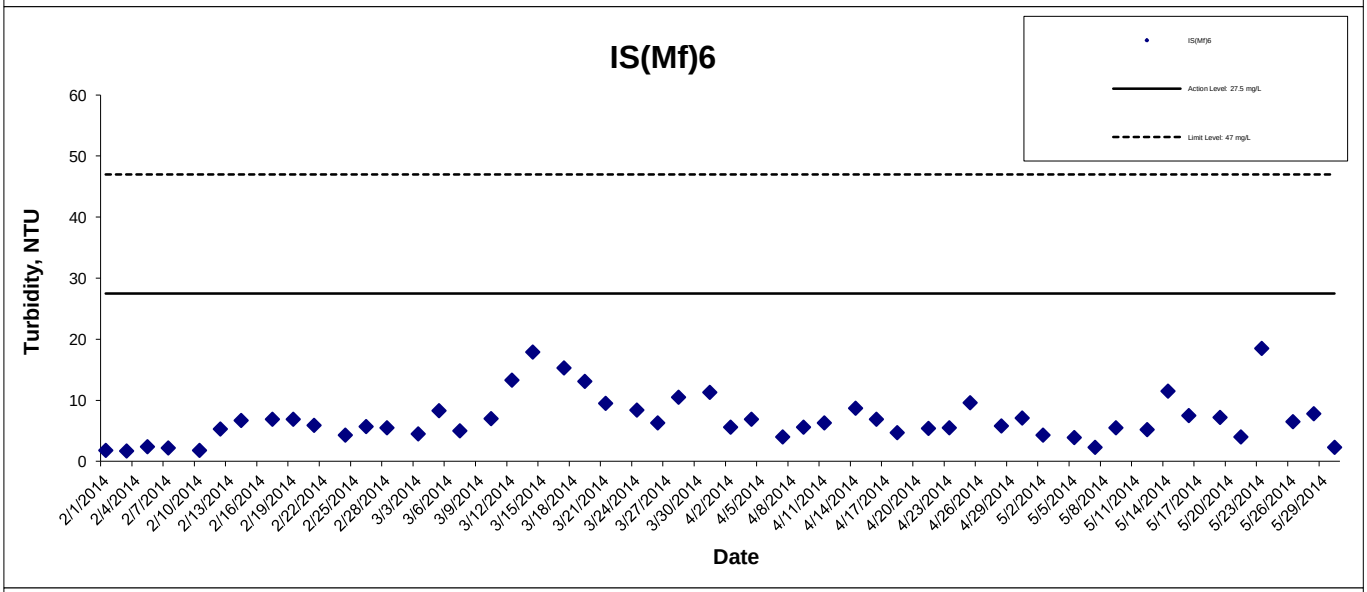
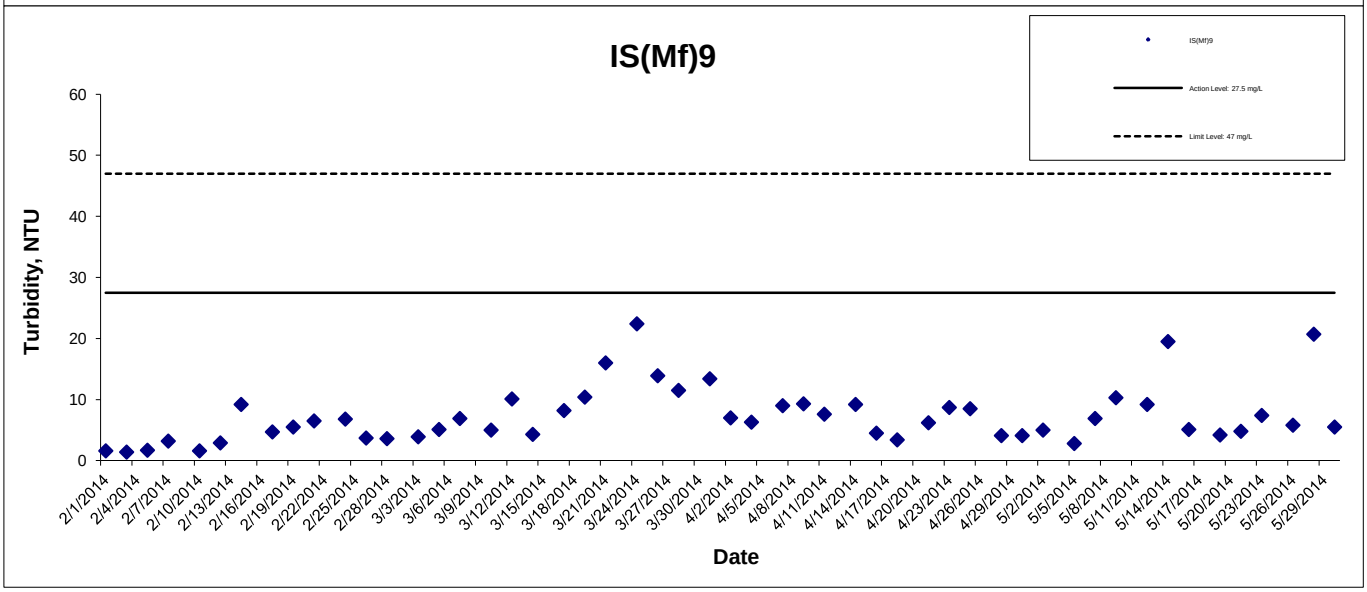




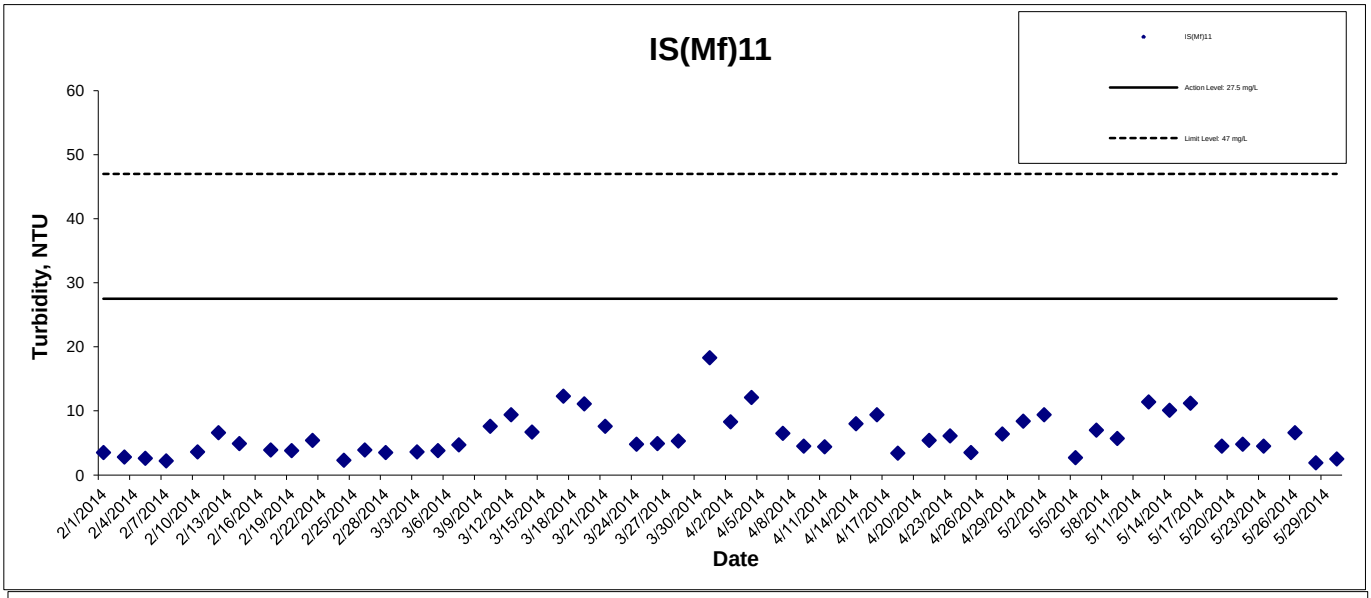


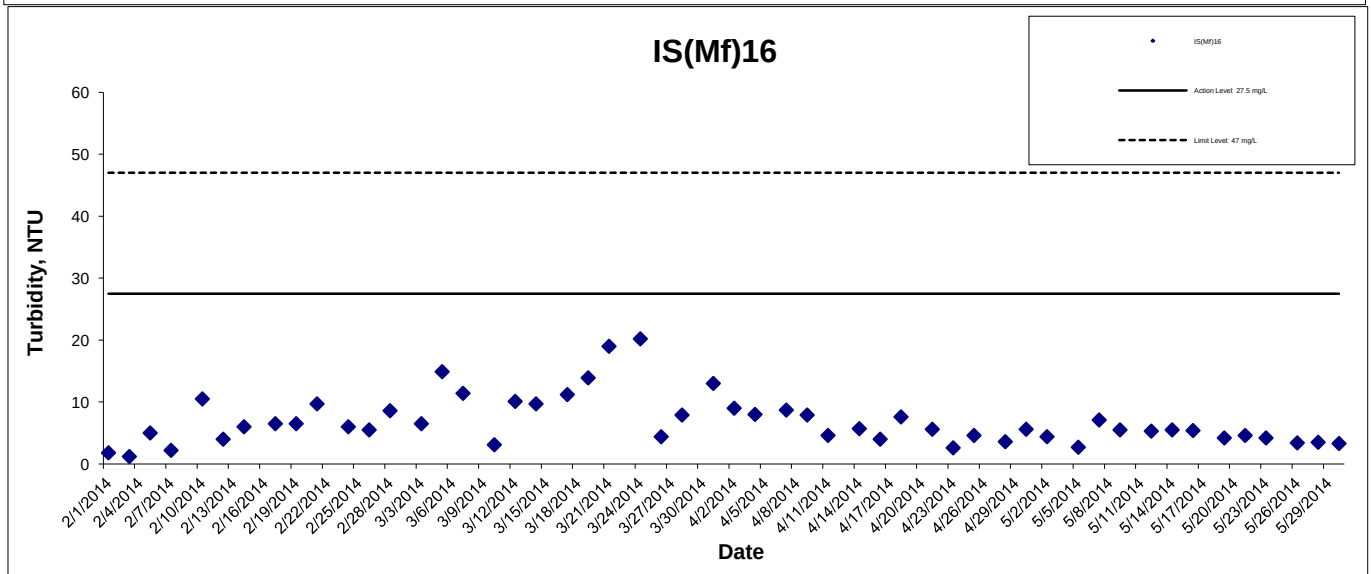
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

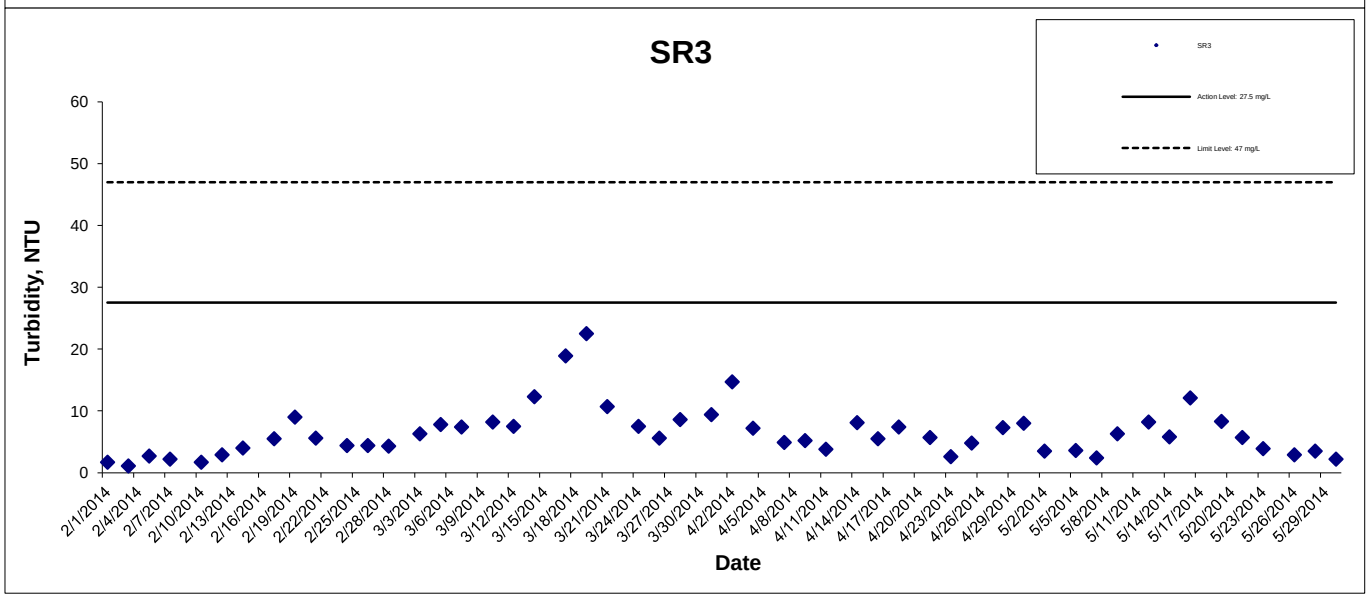
Graphical Presentation of Impact Water Quality Monitoring Results

Project No.: 60249820 **Date: June 2014** **Appendix G**

Turbidity at Mid-Ebb Tide







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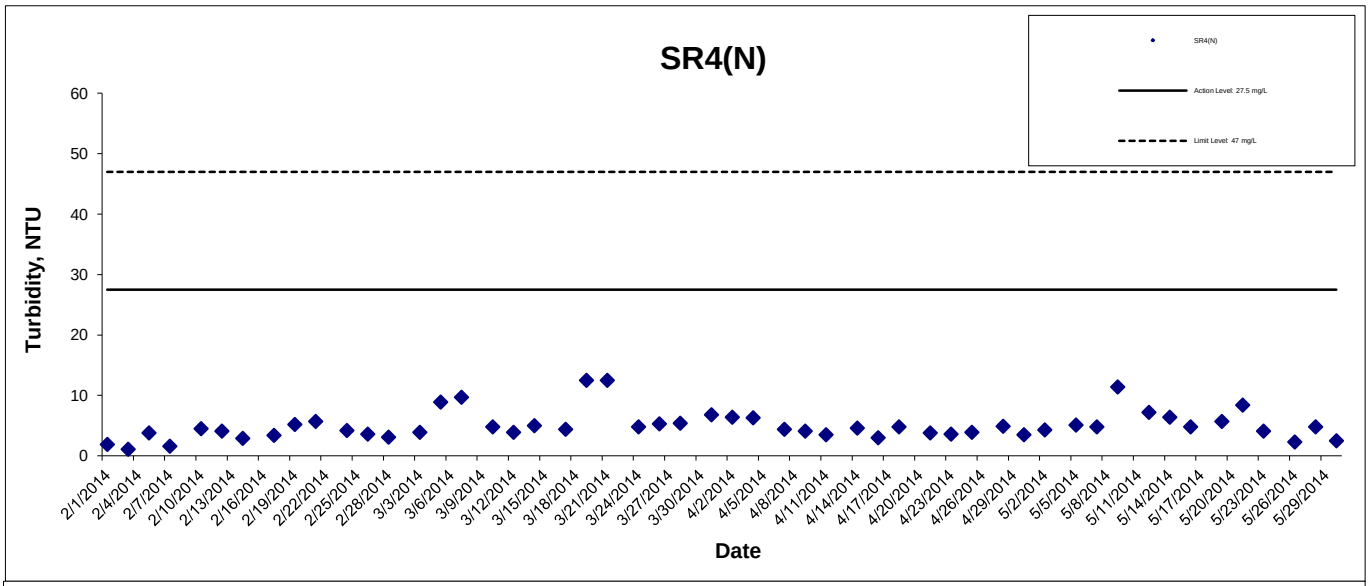
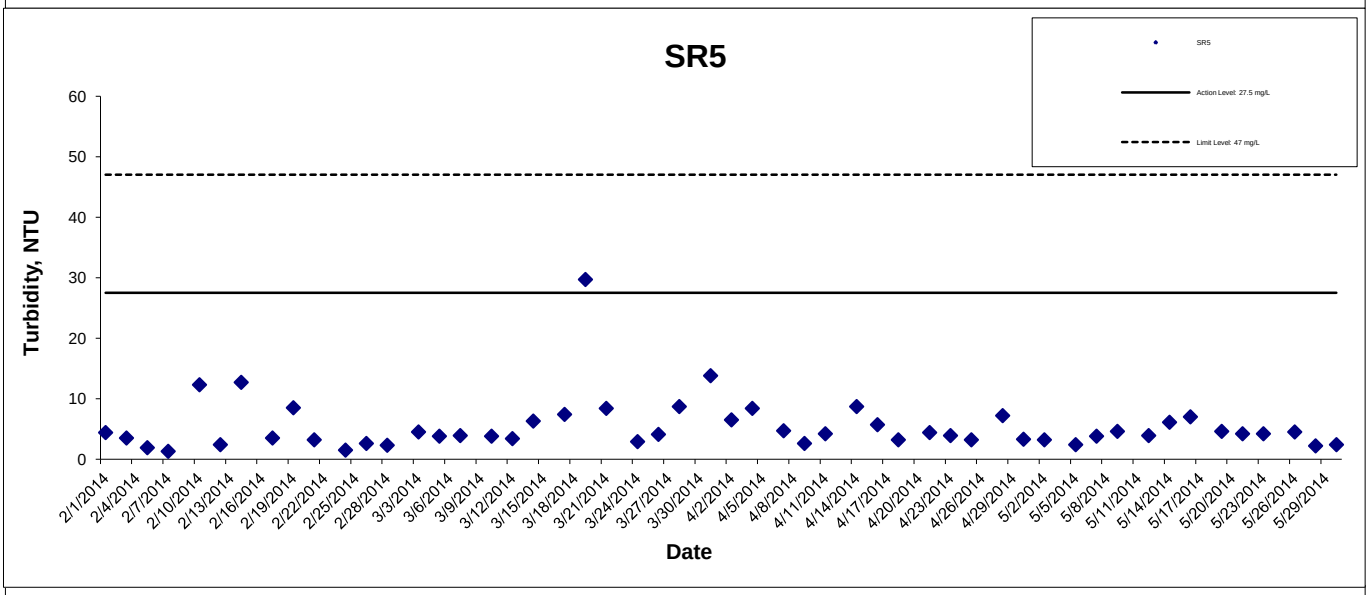
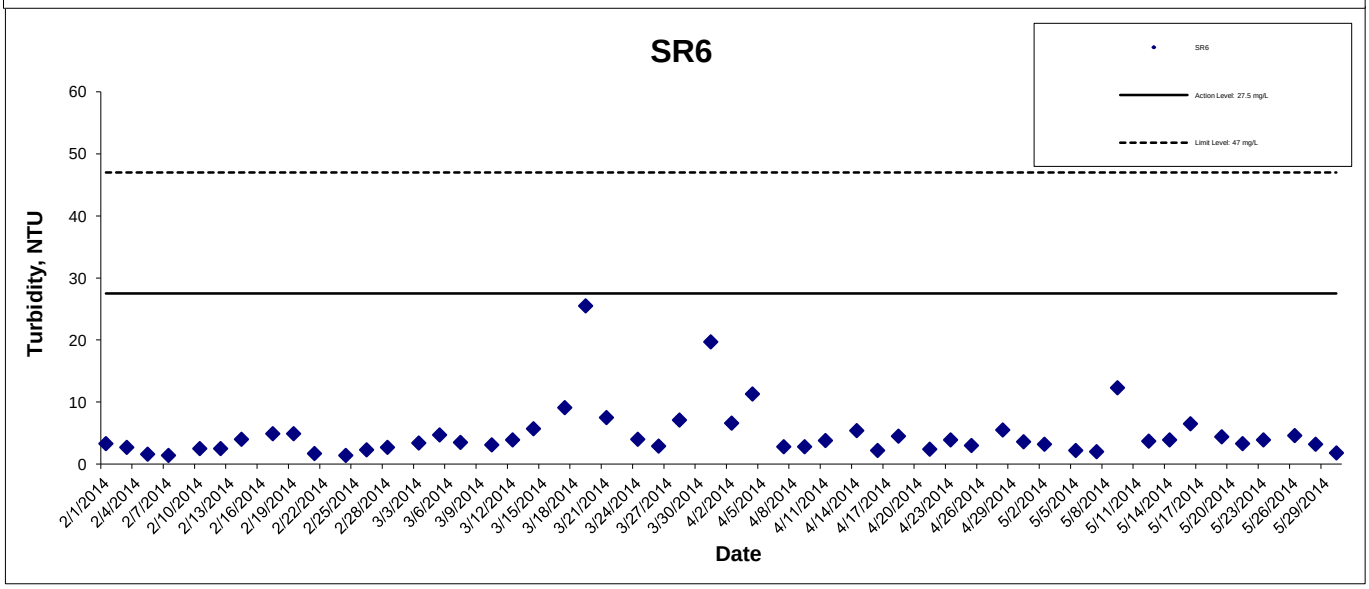
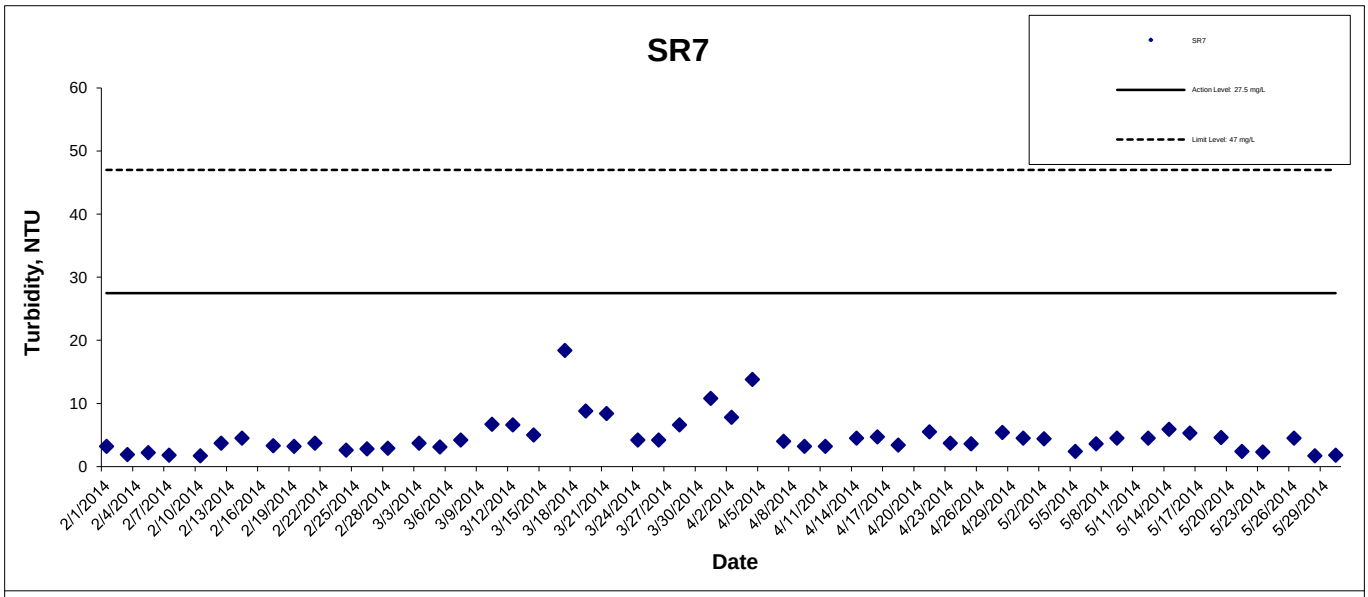
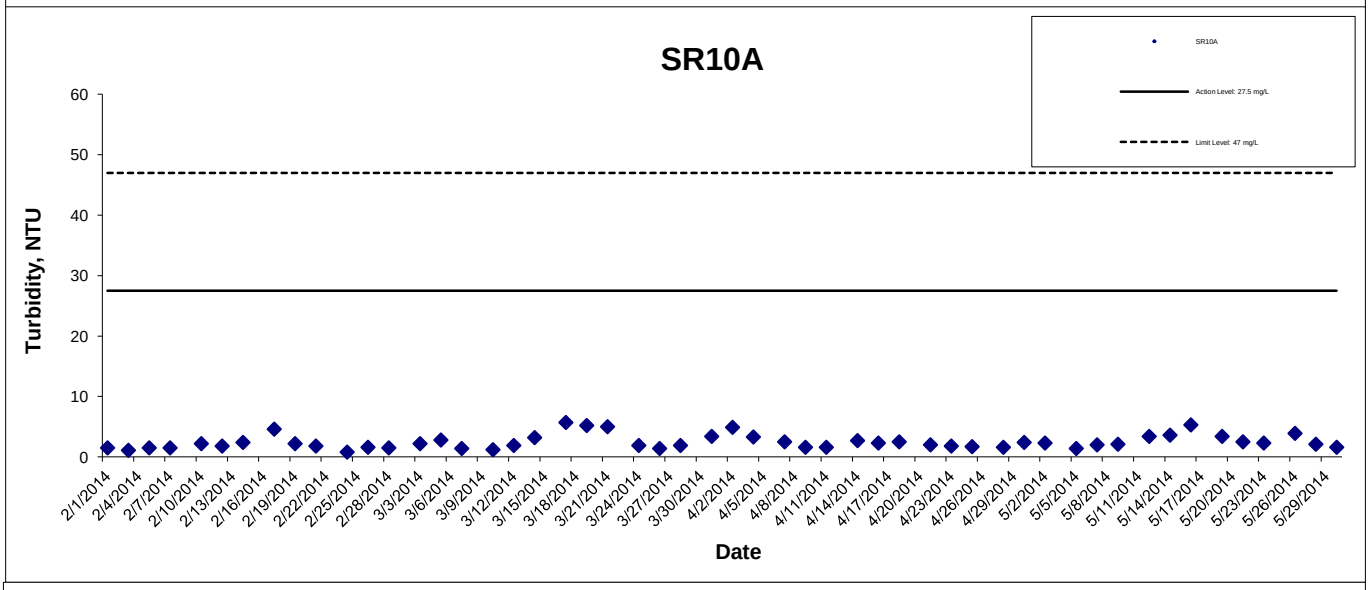


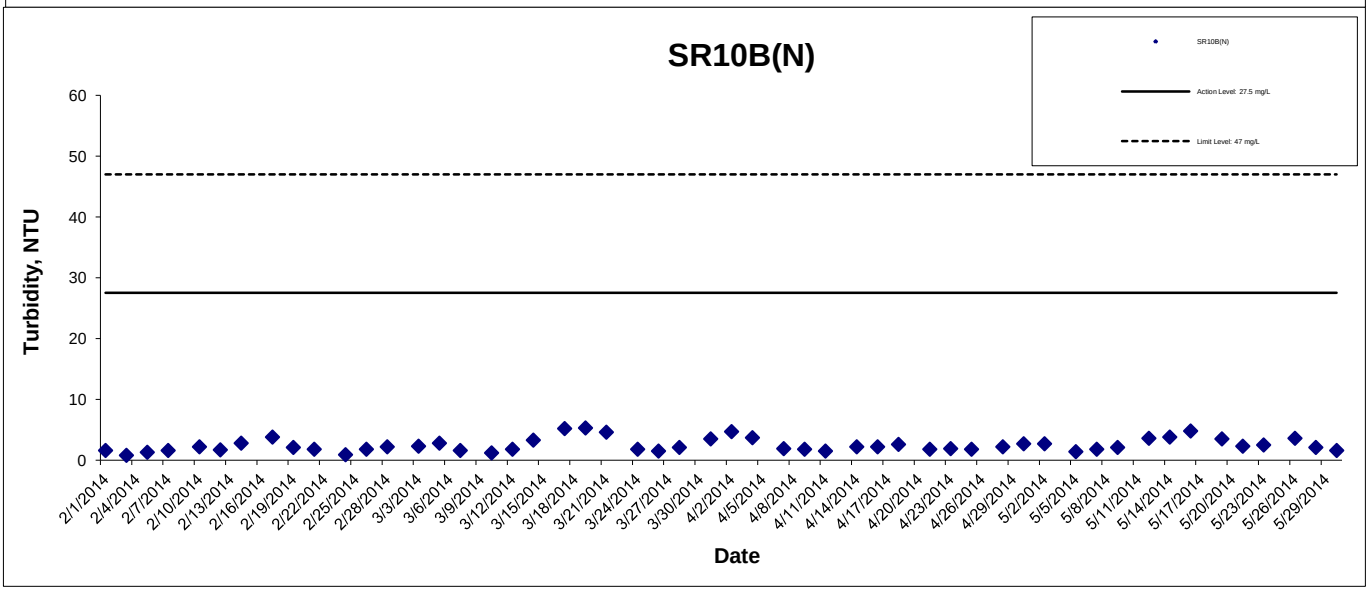




Turbidity at Mid-Ebb Tide





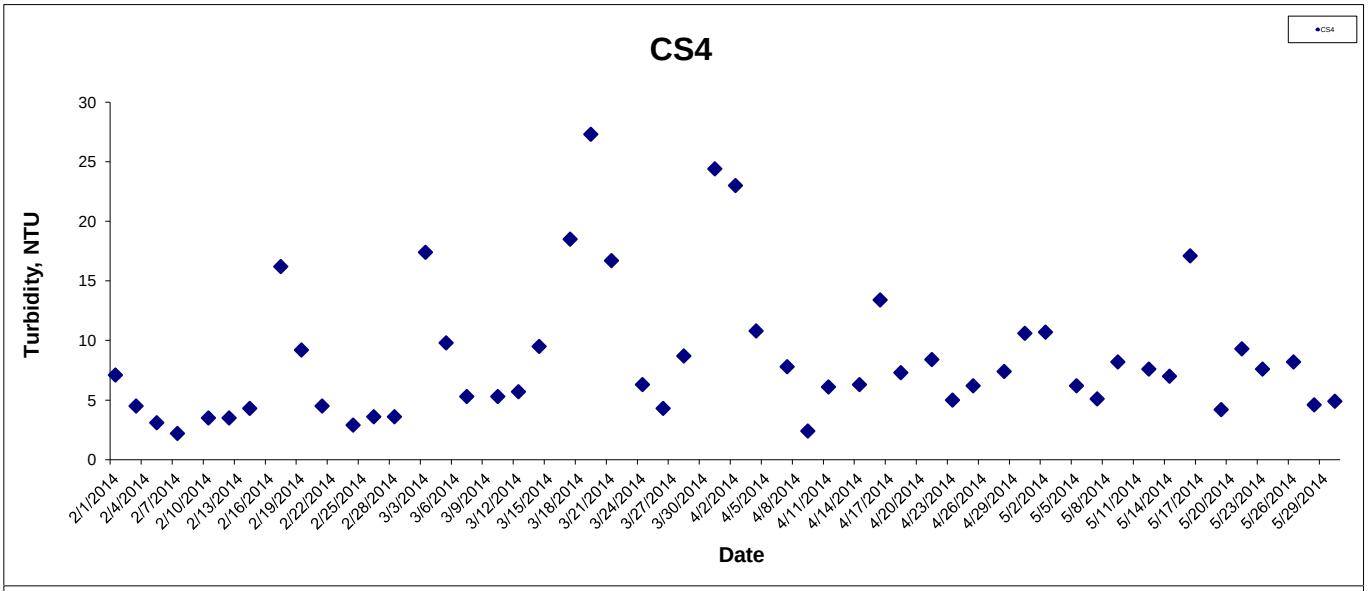


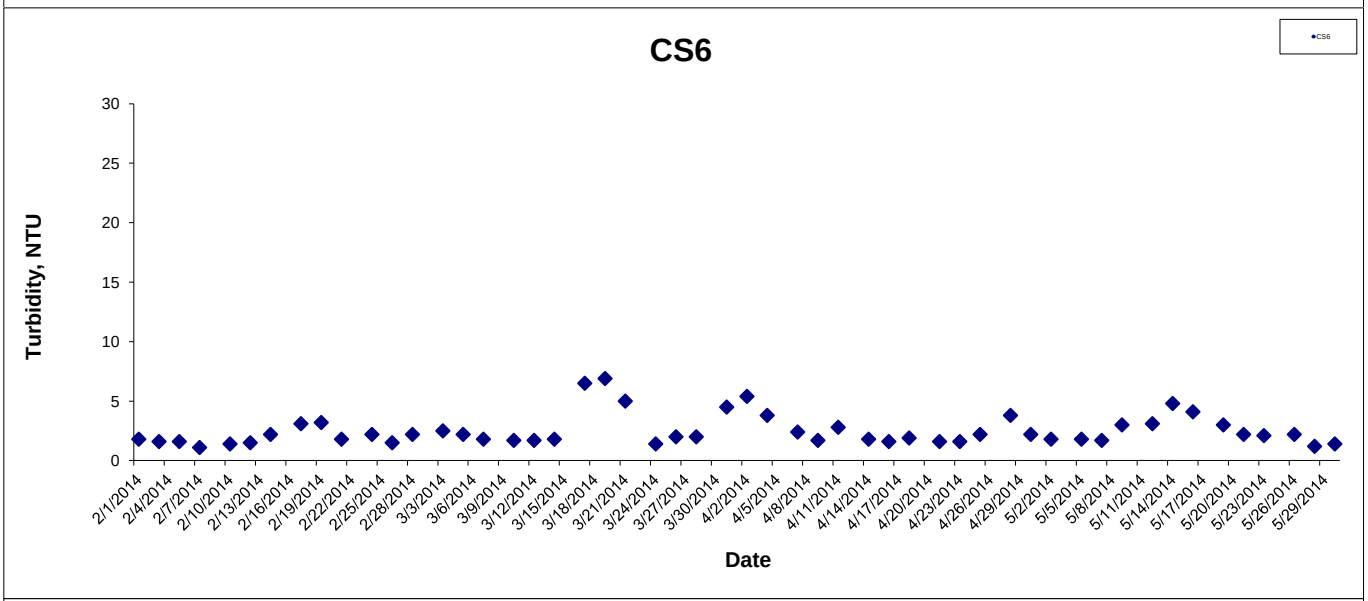
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

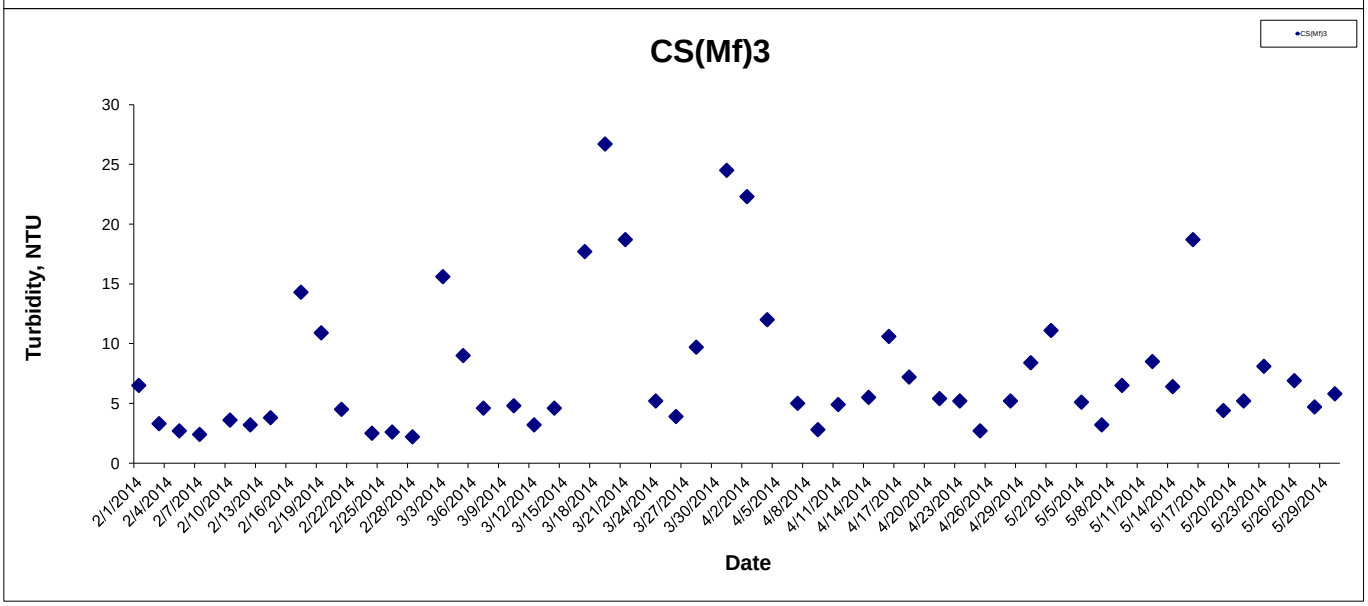
Graphical Presentation of Impact Water Quality Monitoring Results

Project No.: 60249820 **Date: June 2014** **Appendix G**

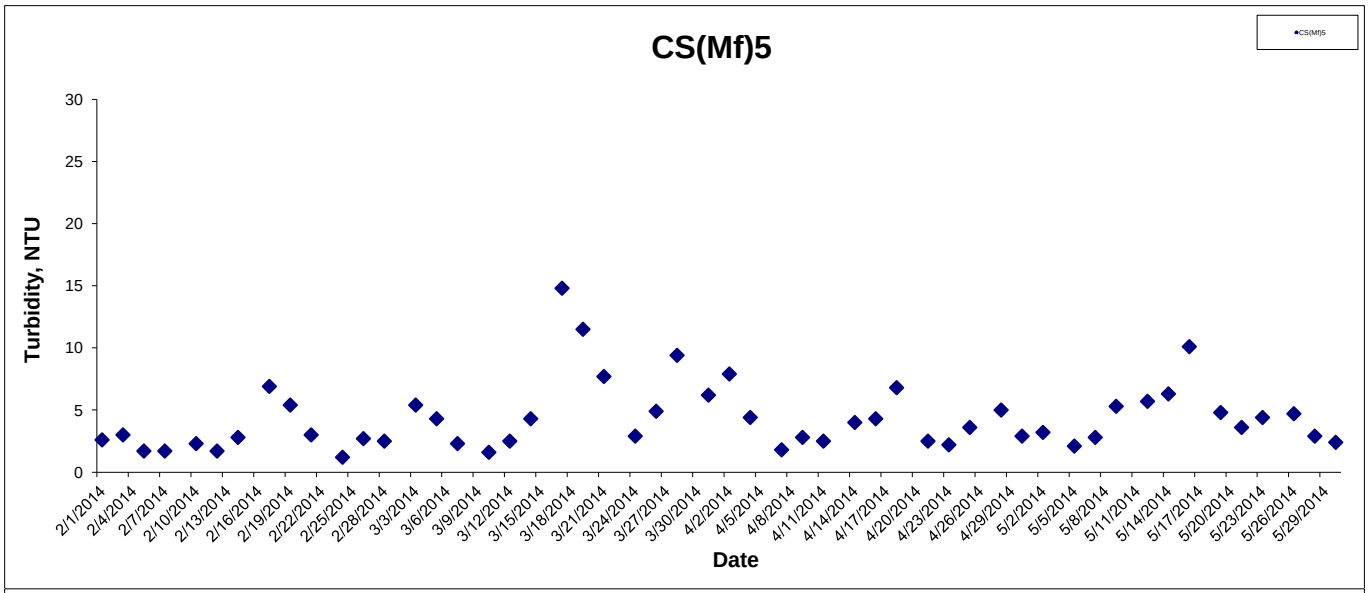
Turbidity at Mid-Flood Tide

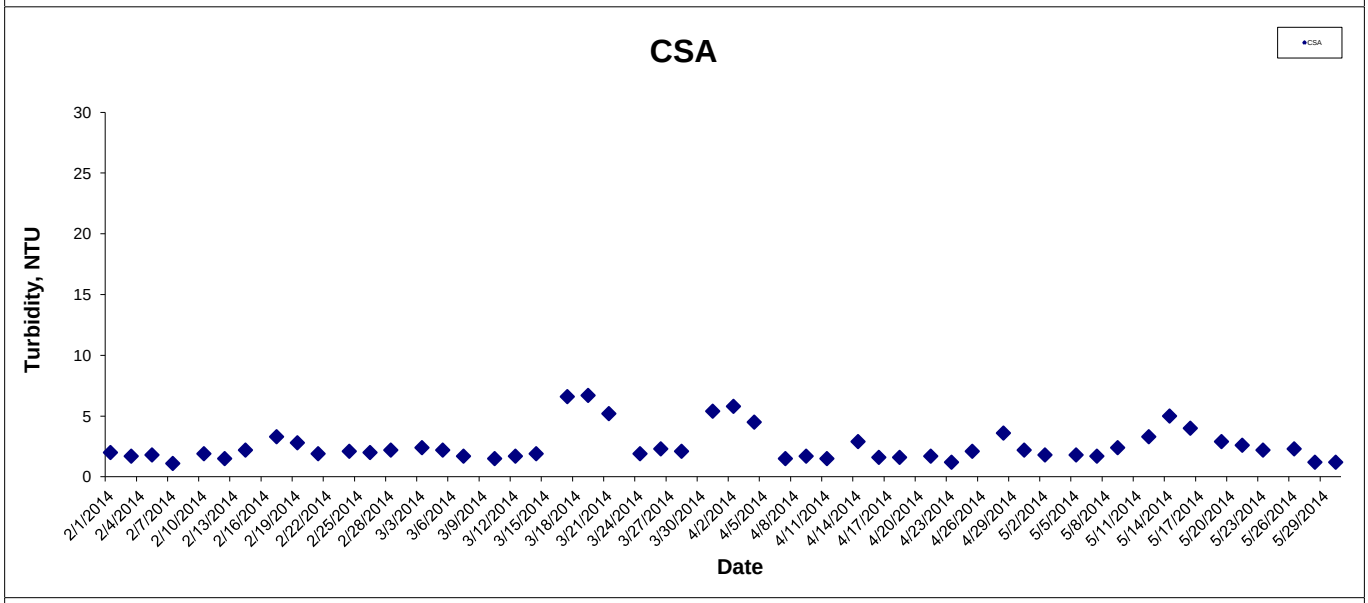


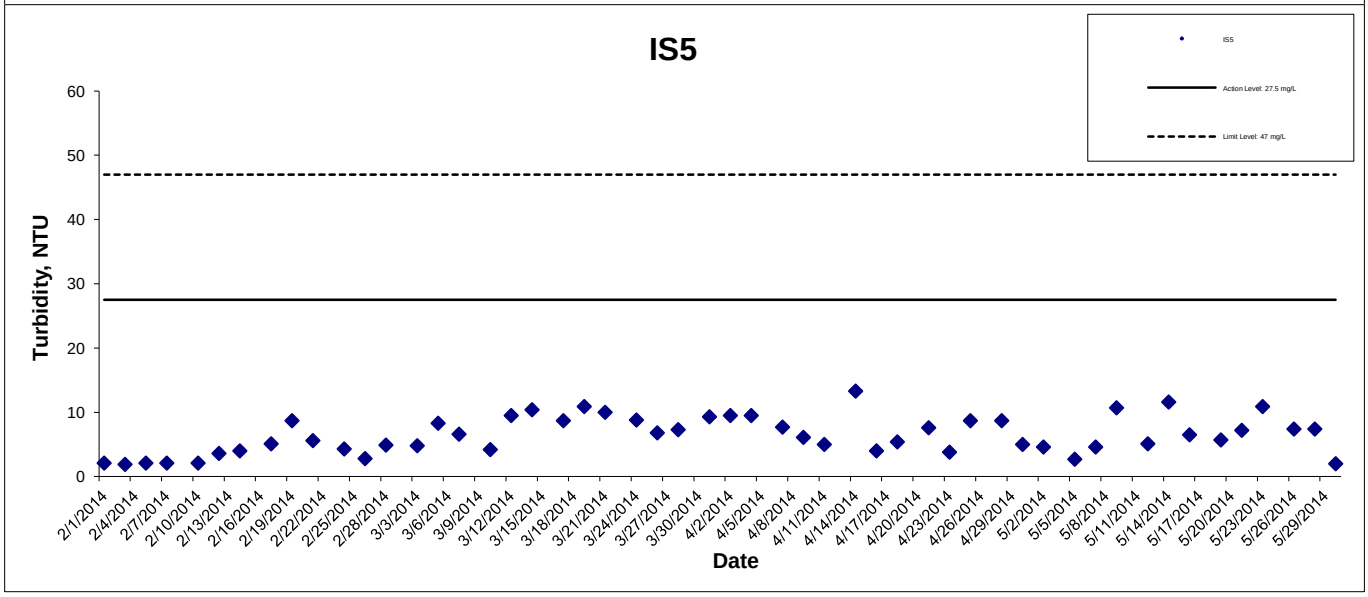




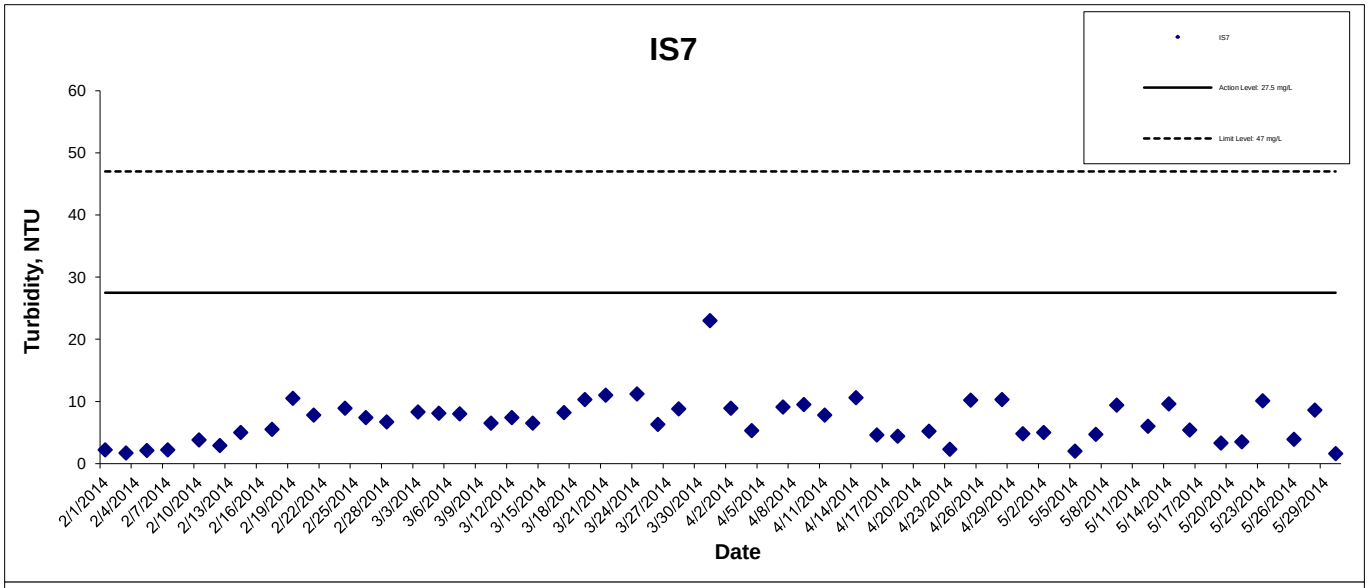
Turbidity at Mid-Flood Tide

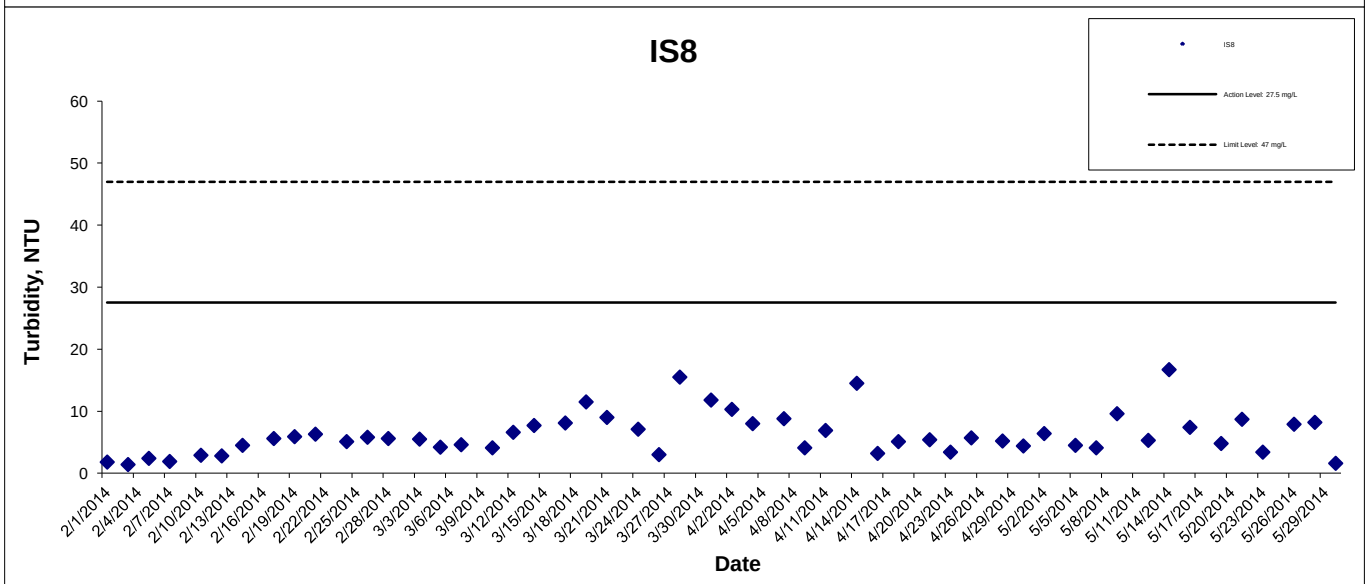


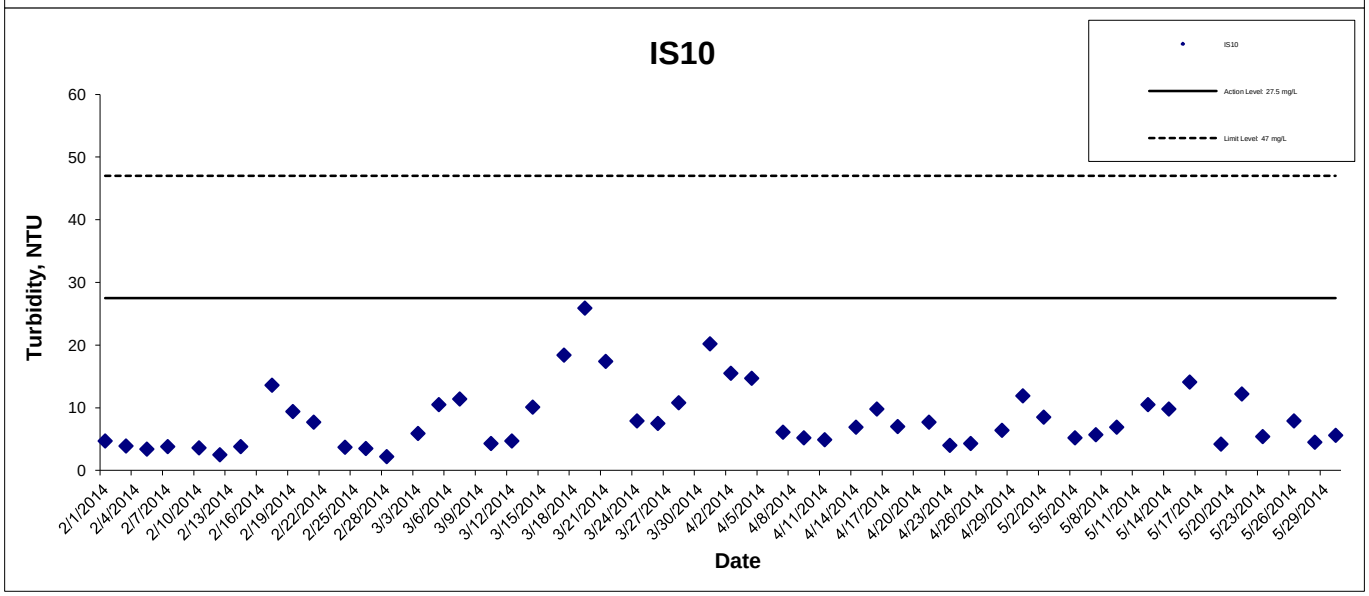




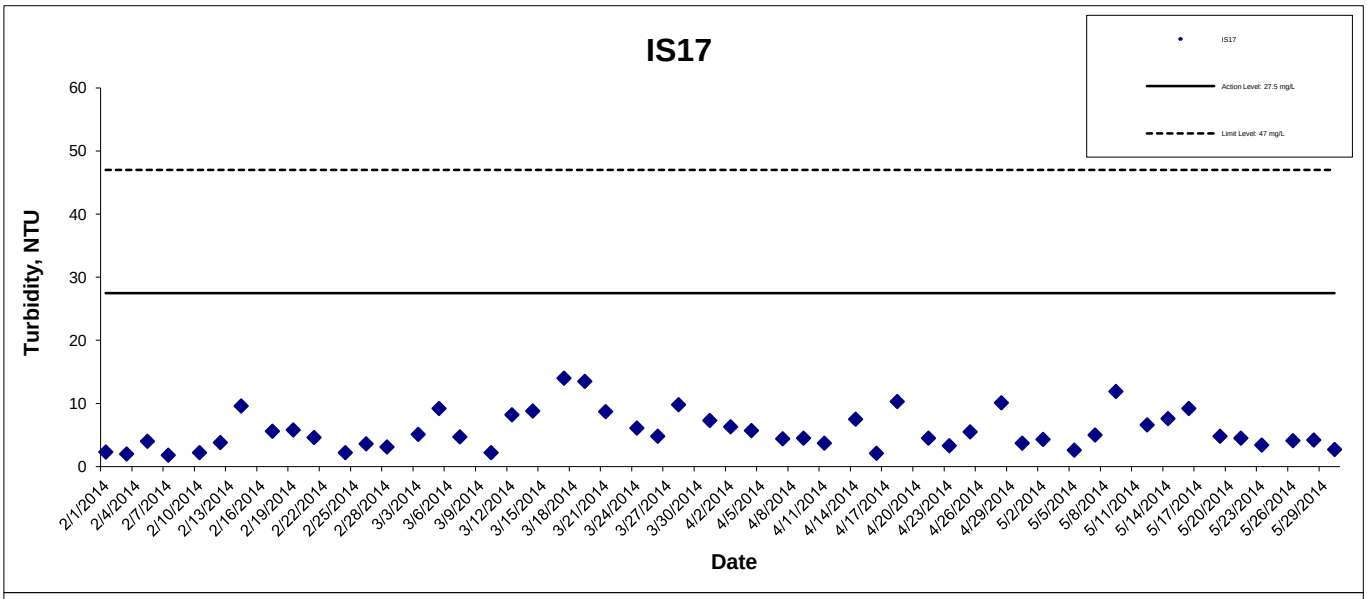
Turbidity at Mid-Flood Tide

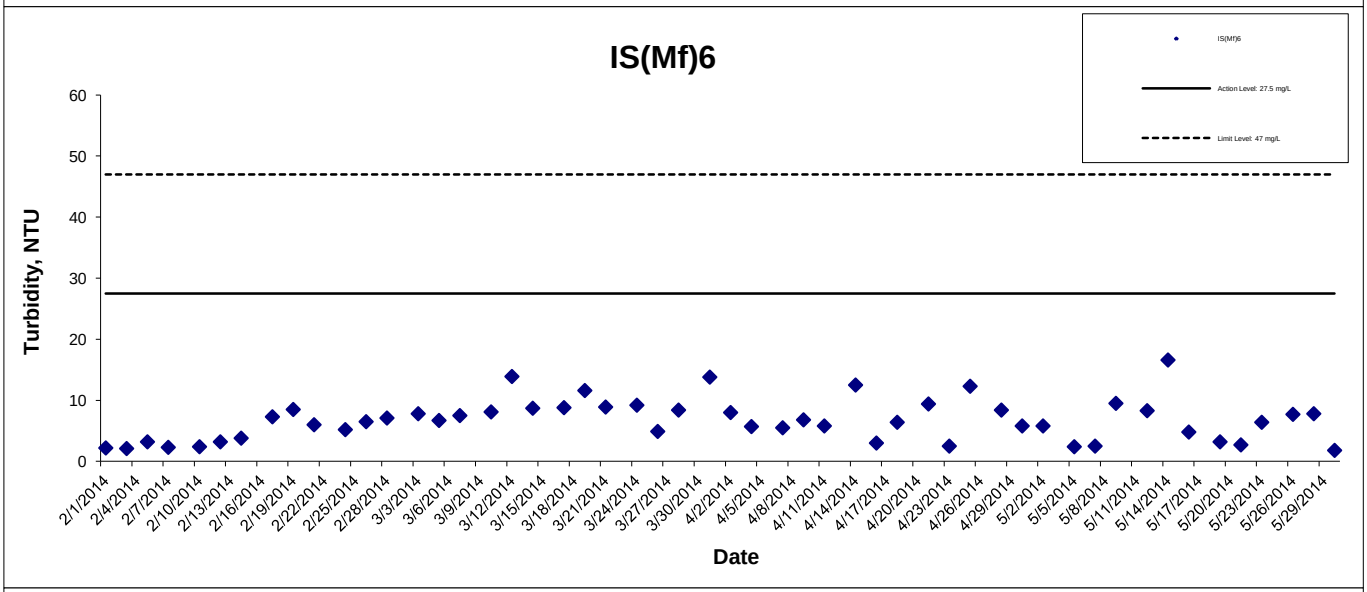


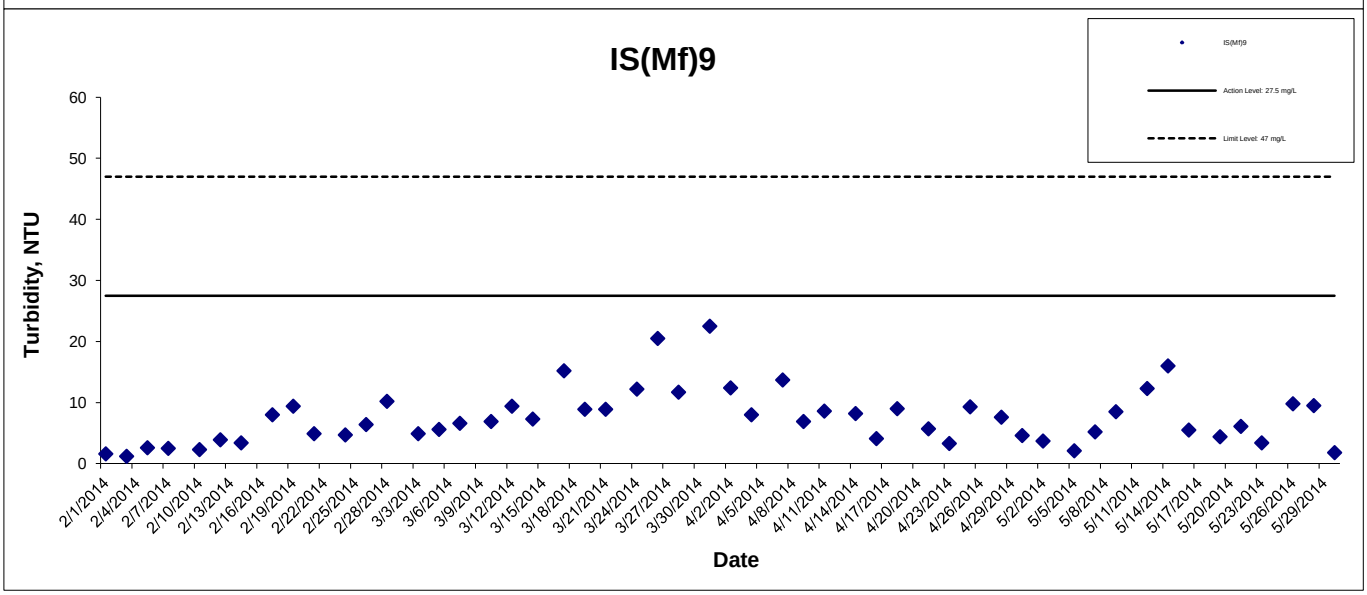




Turbidity at Mid-Flood Tide







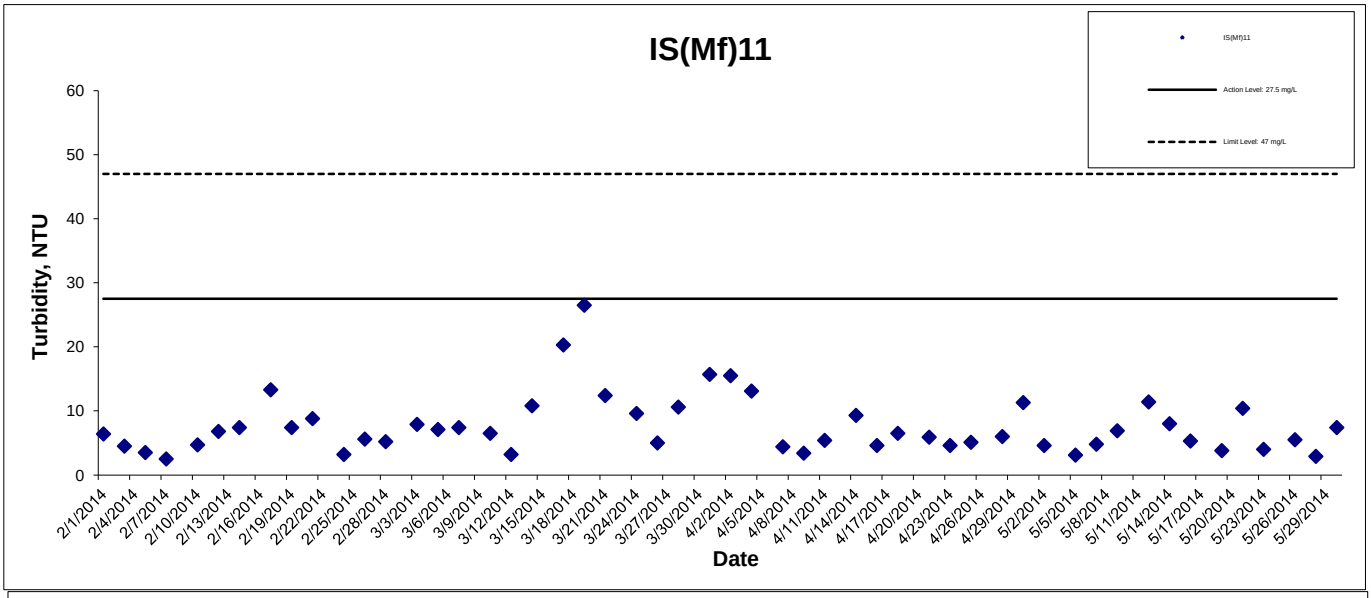
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

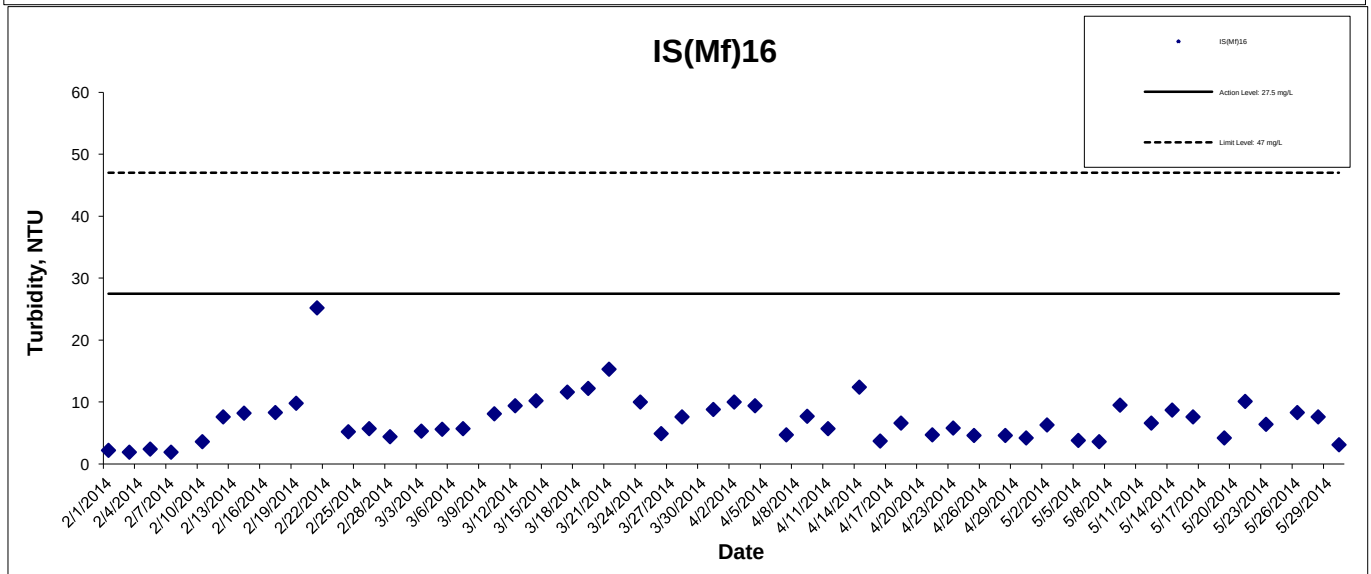
AECOM

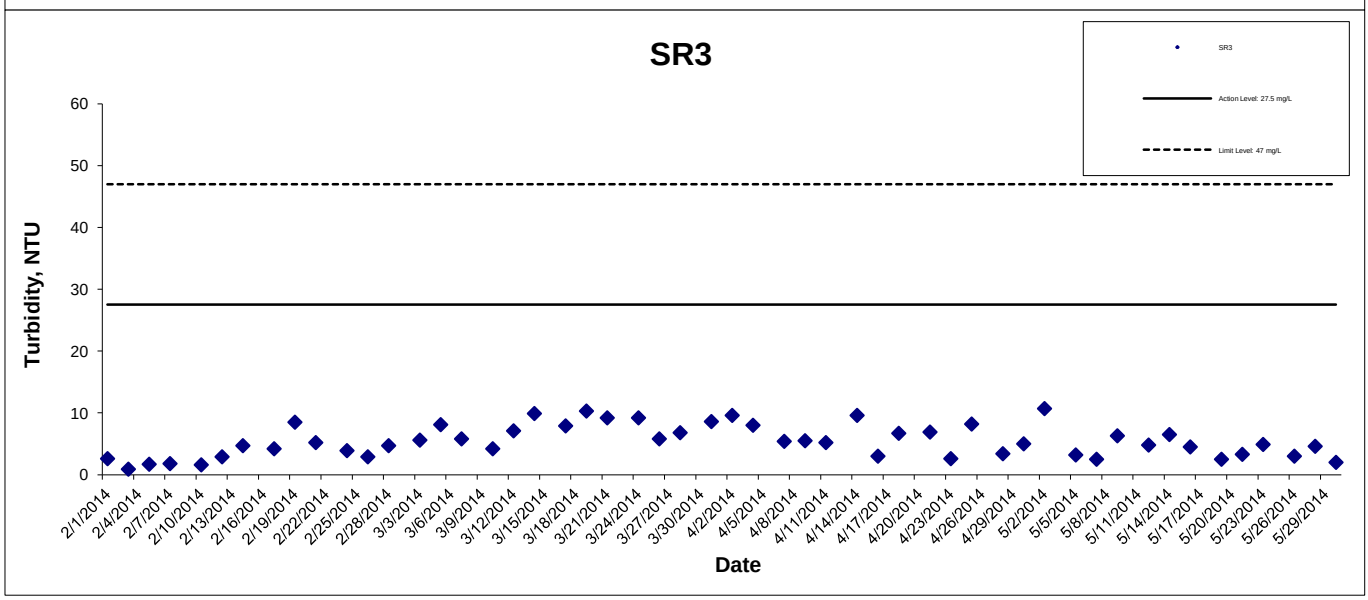
Graphical Presentation of Impact Water Quality Monitoring Results

Project No.: 60249820 **Date: June 2014** **Appendix G**

Turbidity at Mid-Flood Tide







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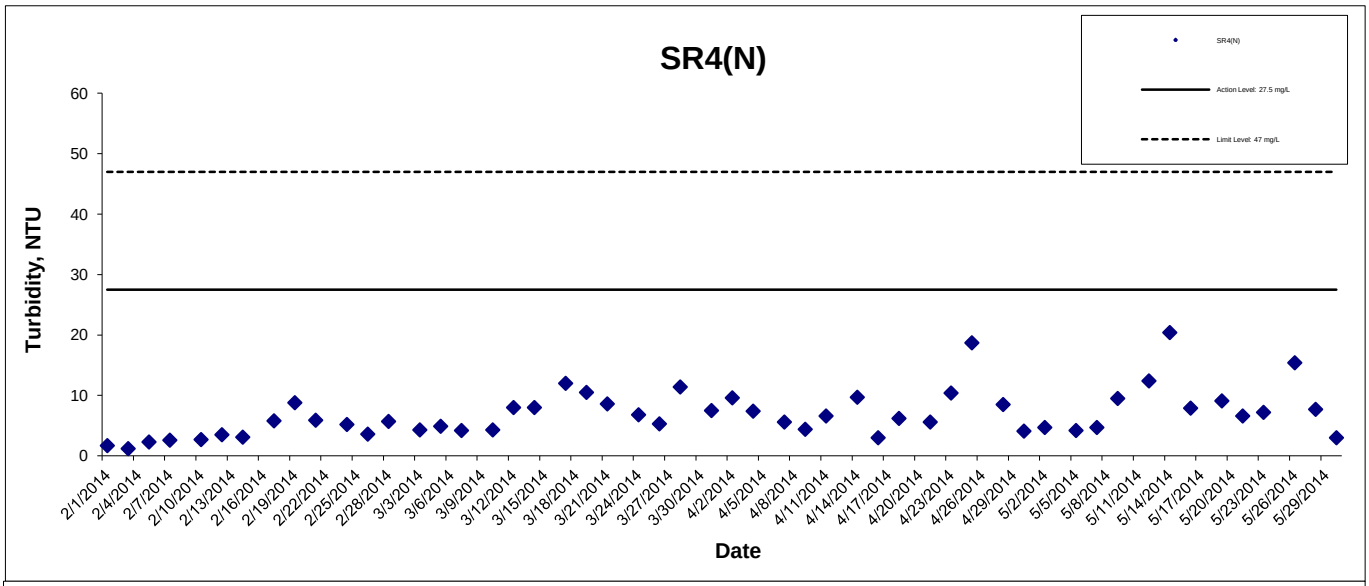

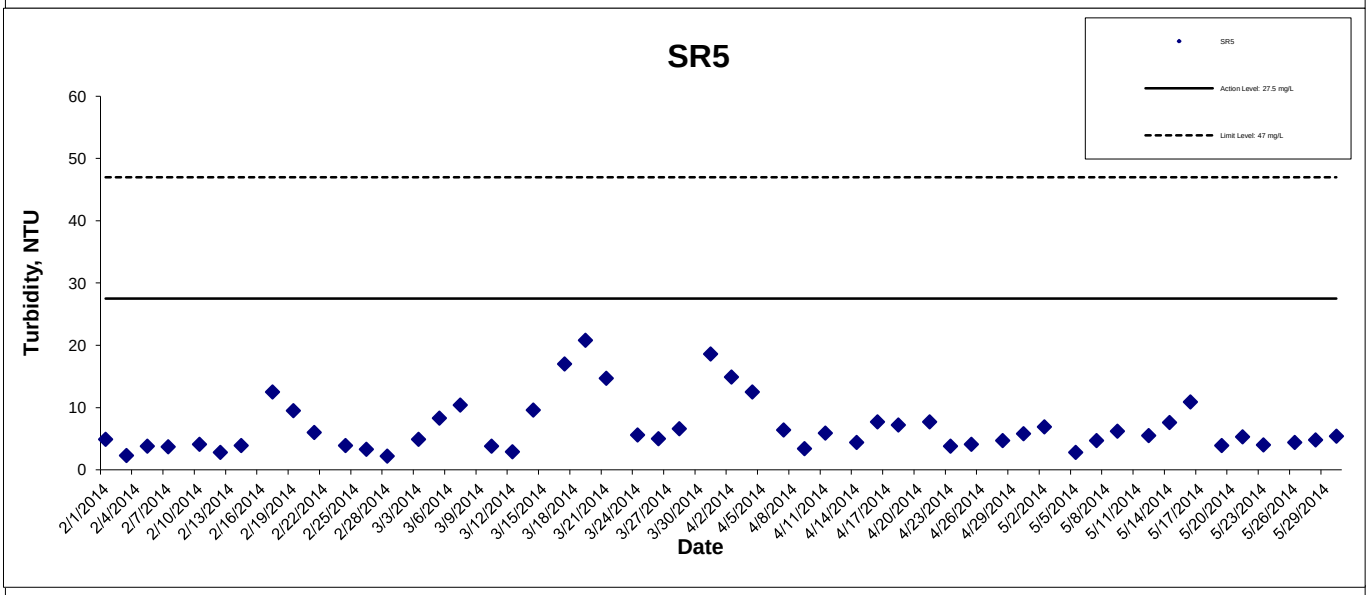

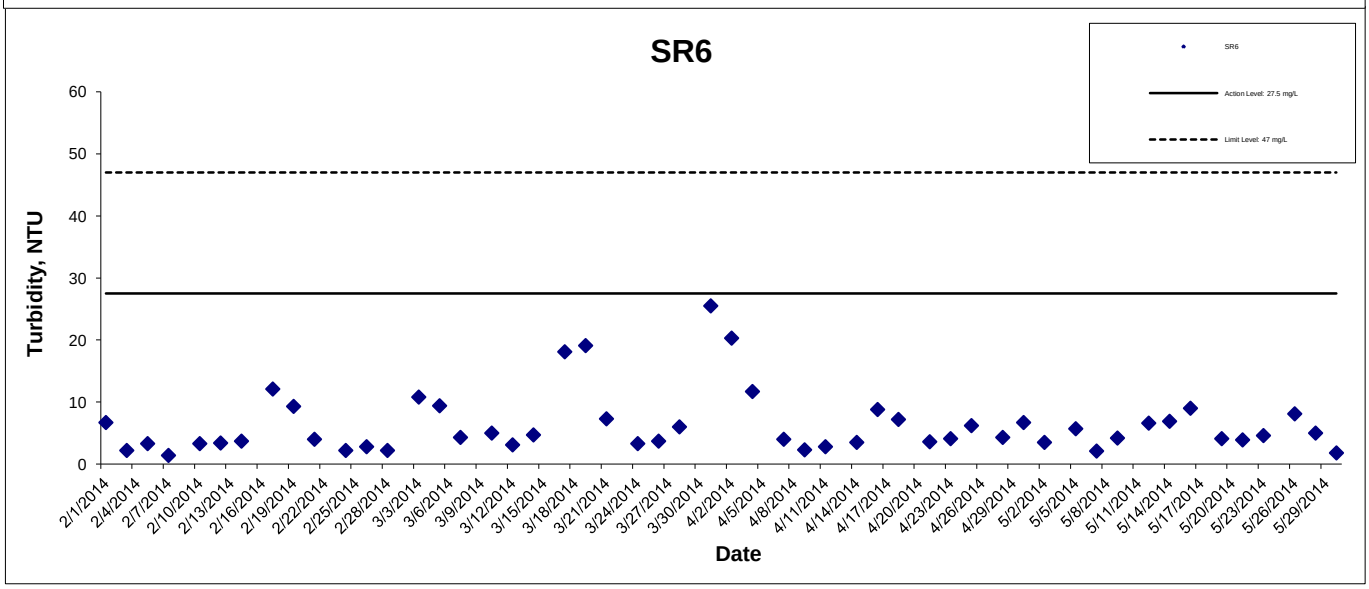

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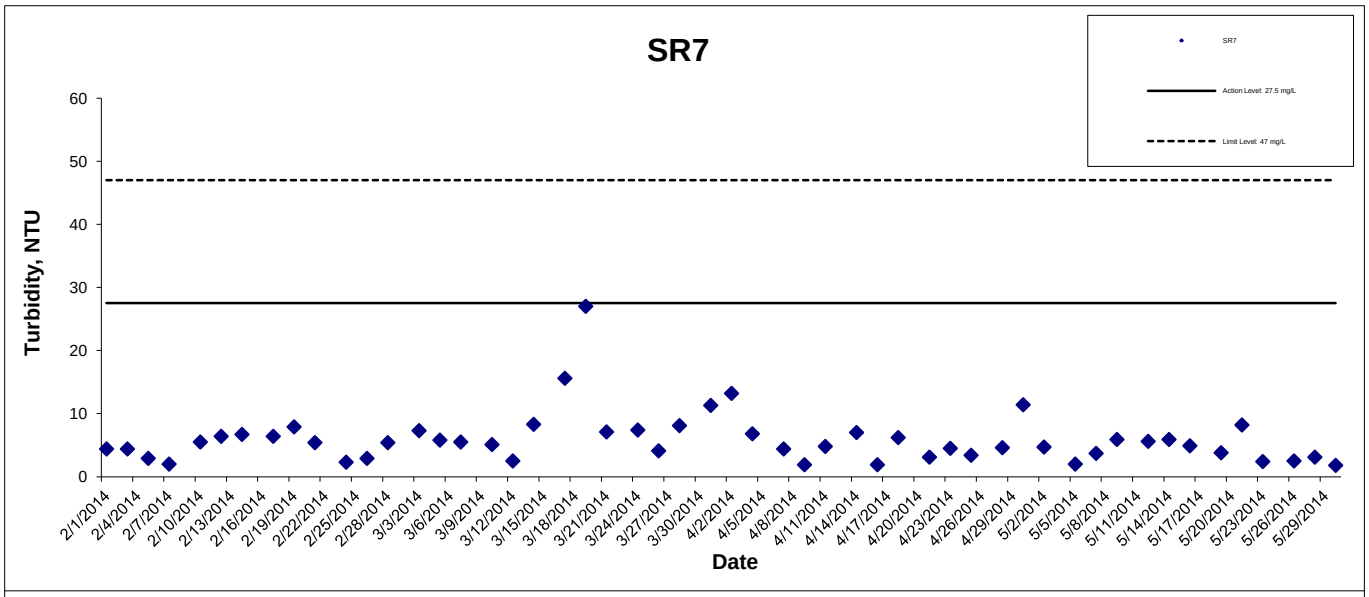
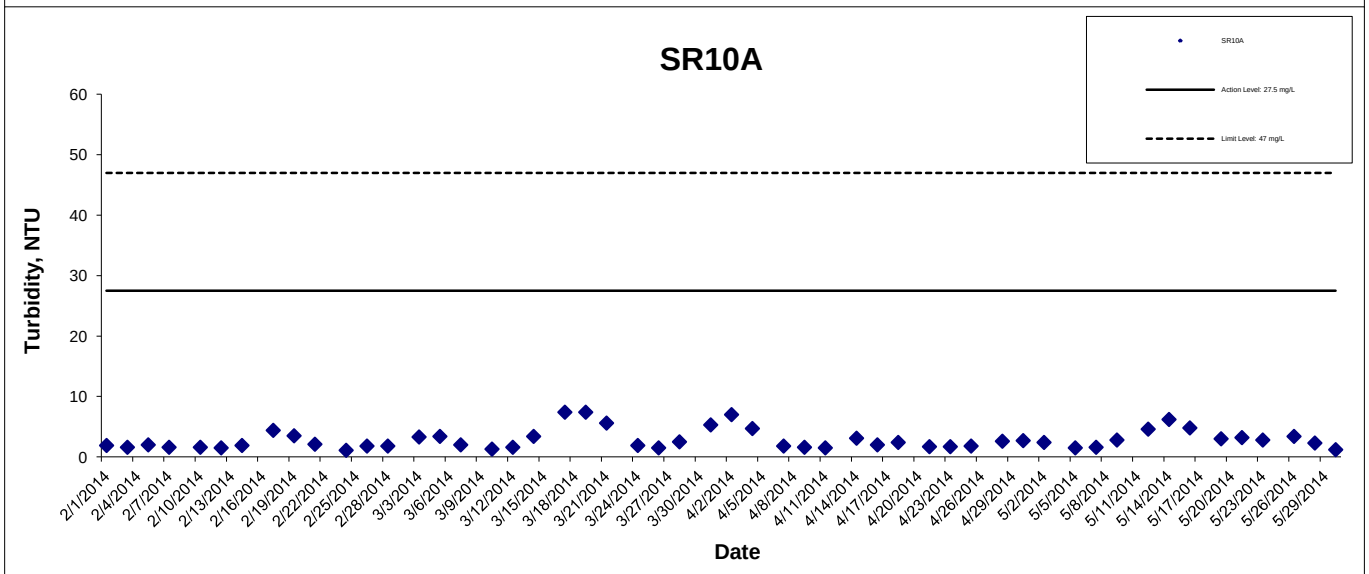
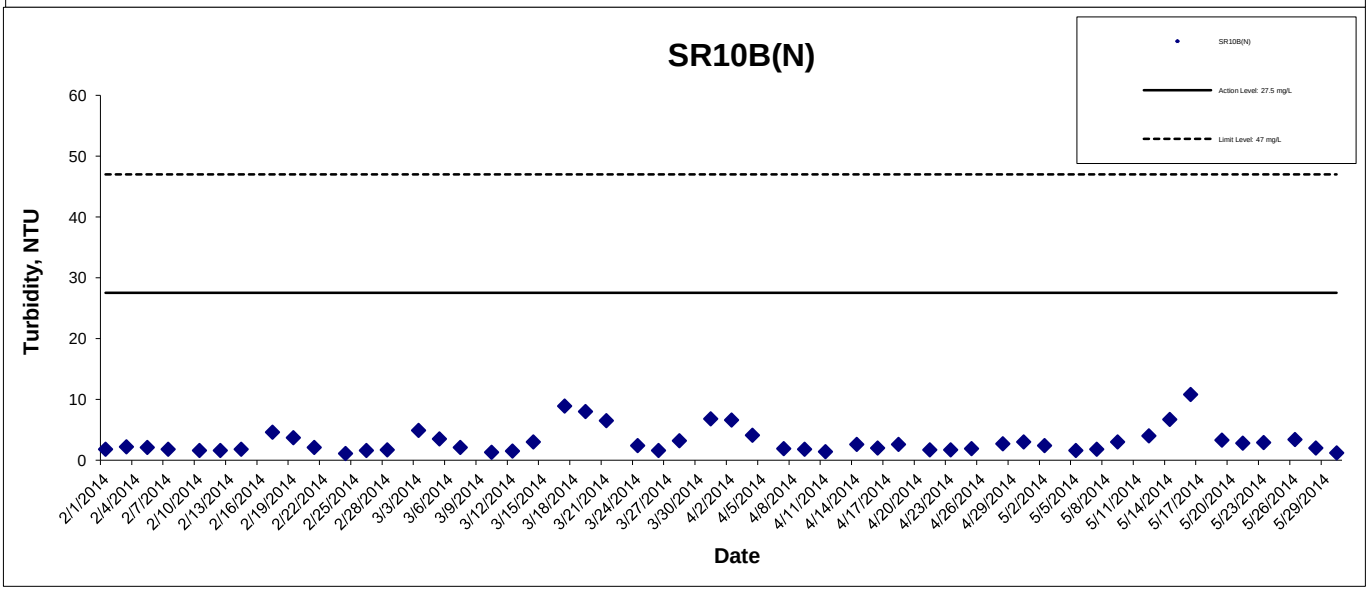
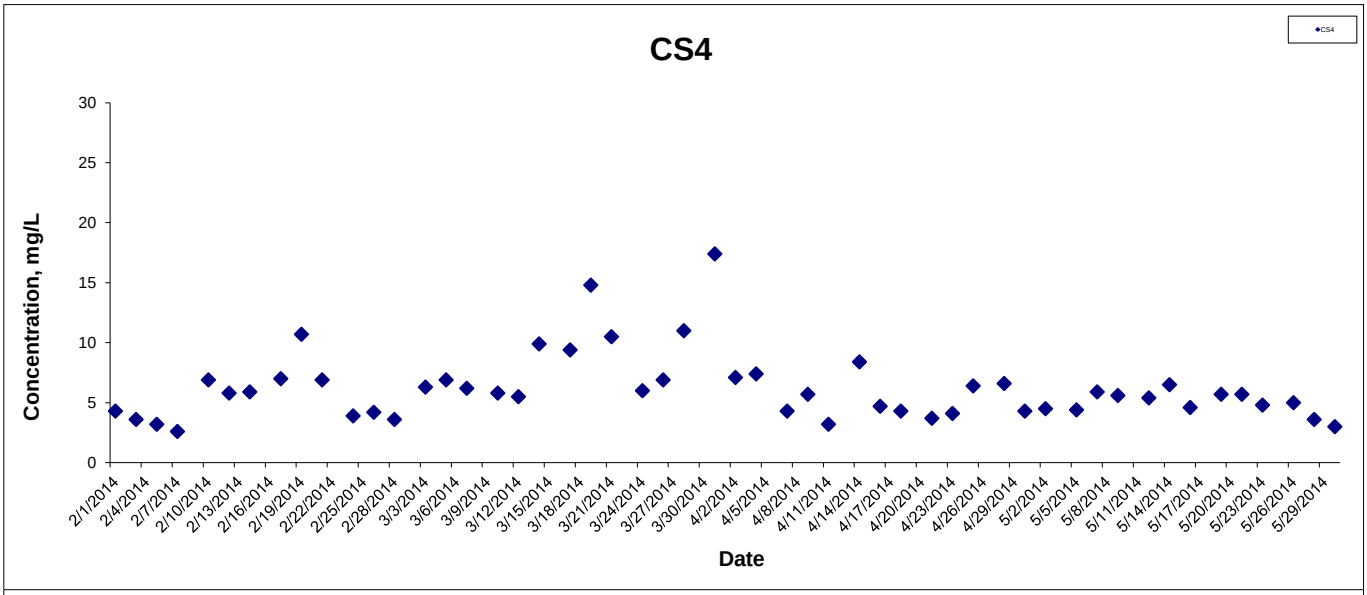
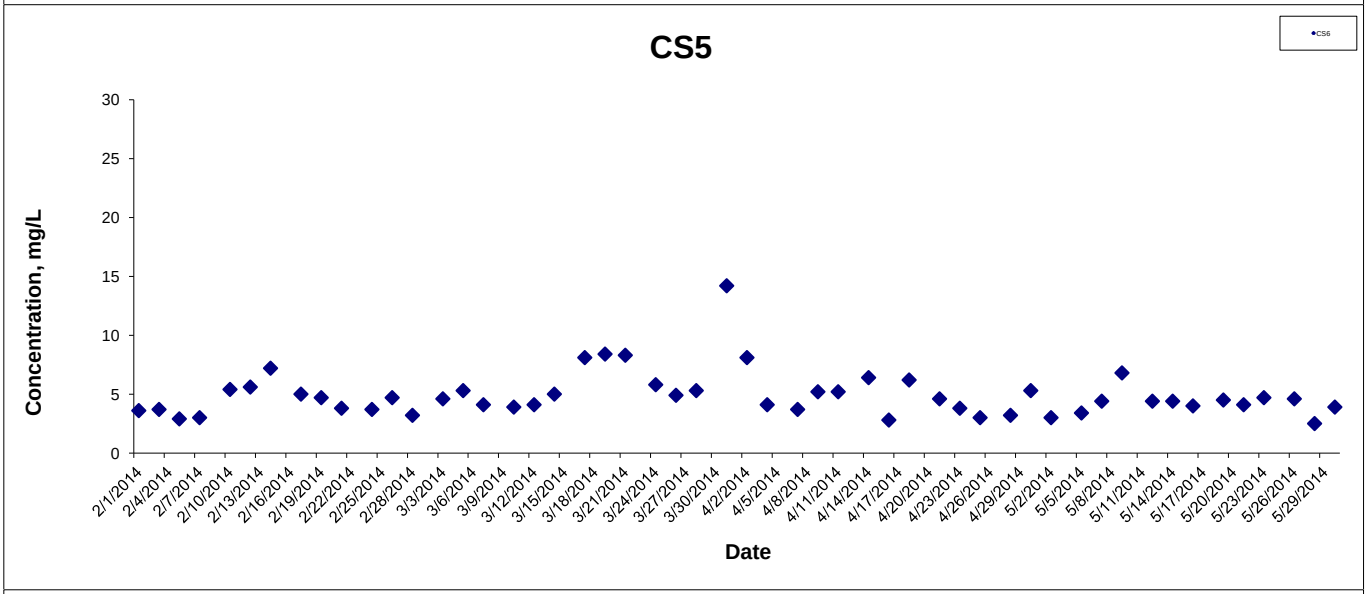


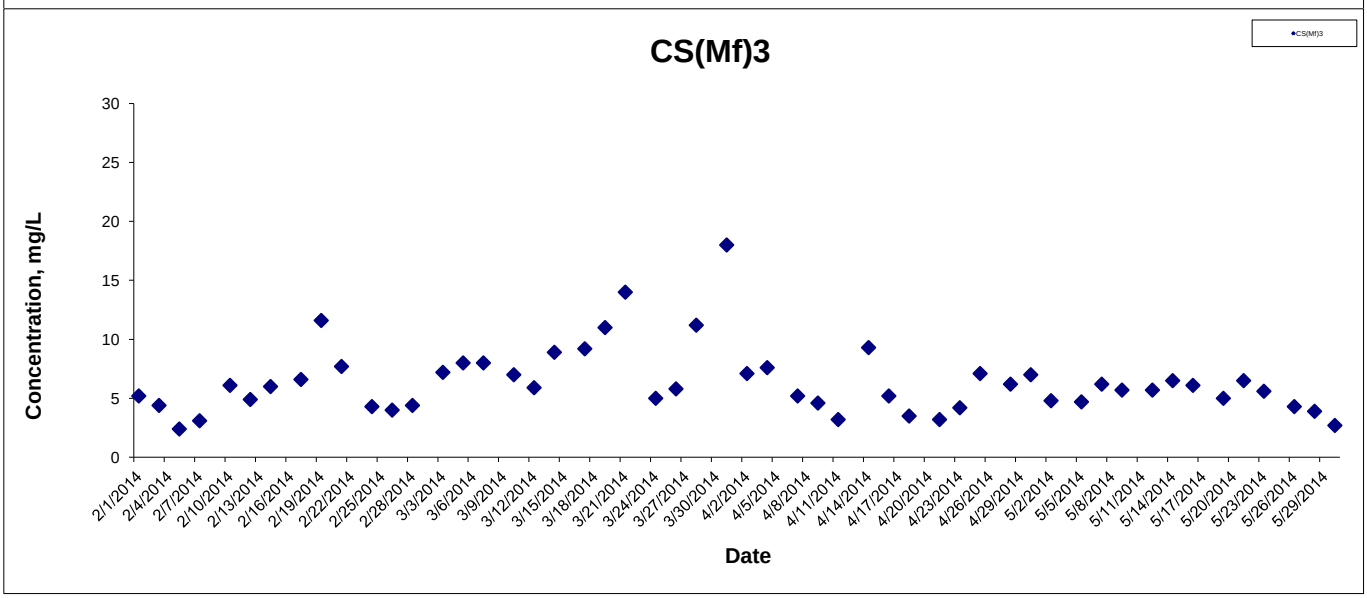




Suspended Solids at Mid-Ebb Tide







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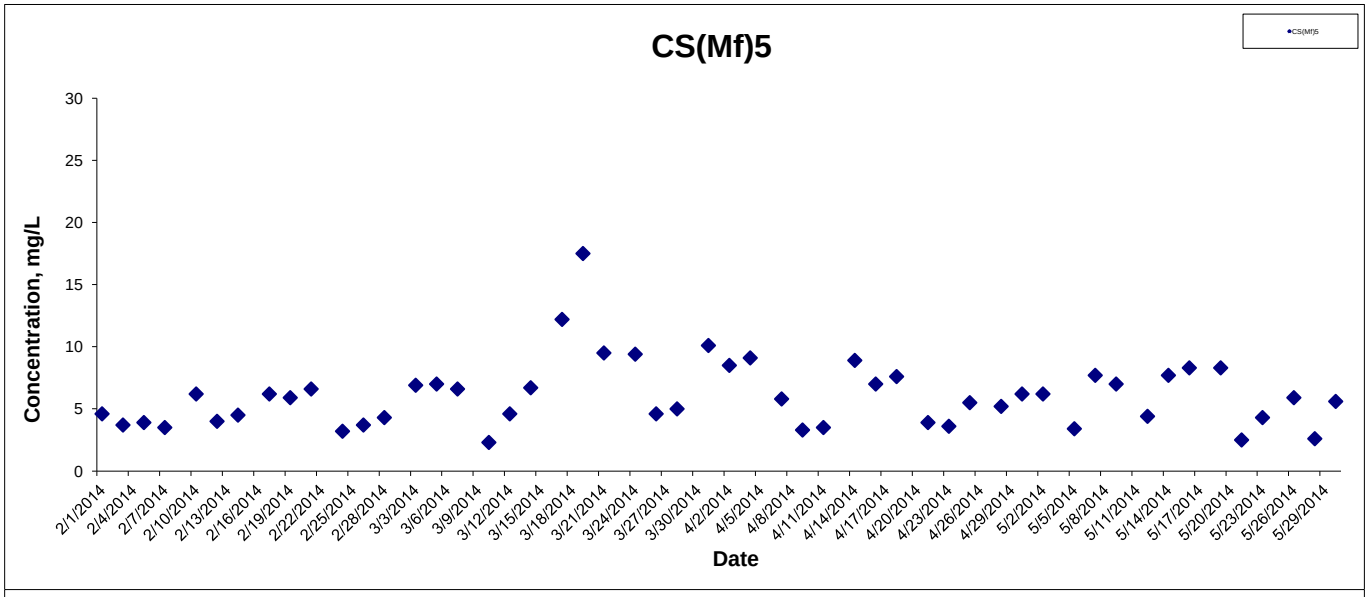

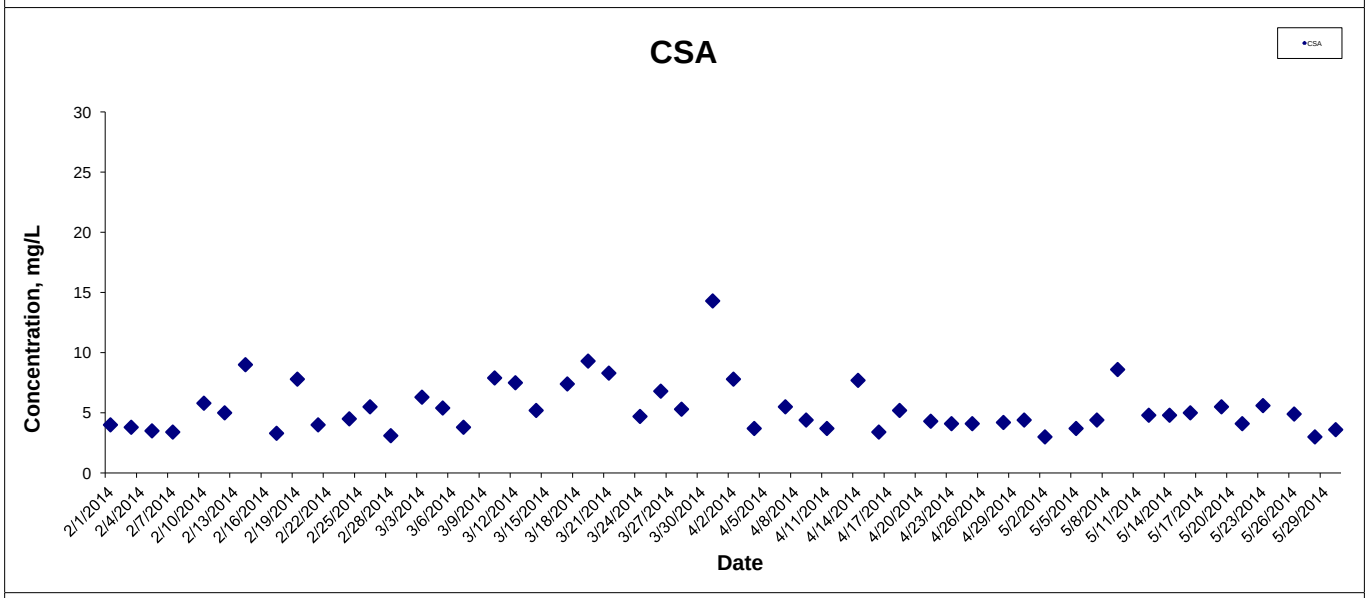

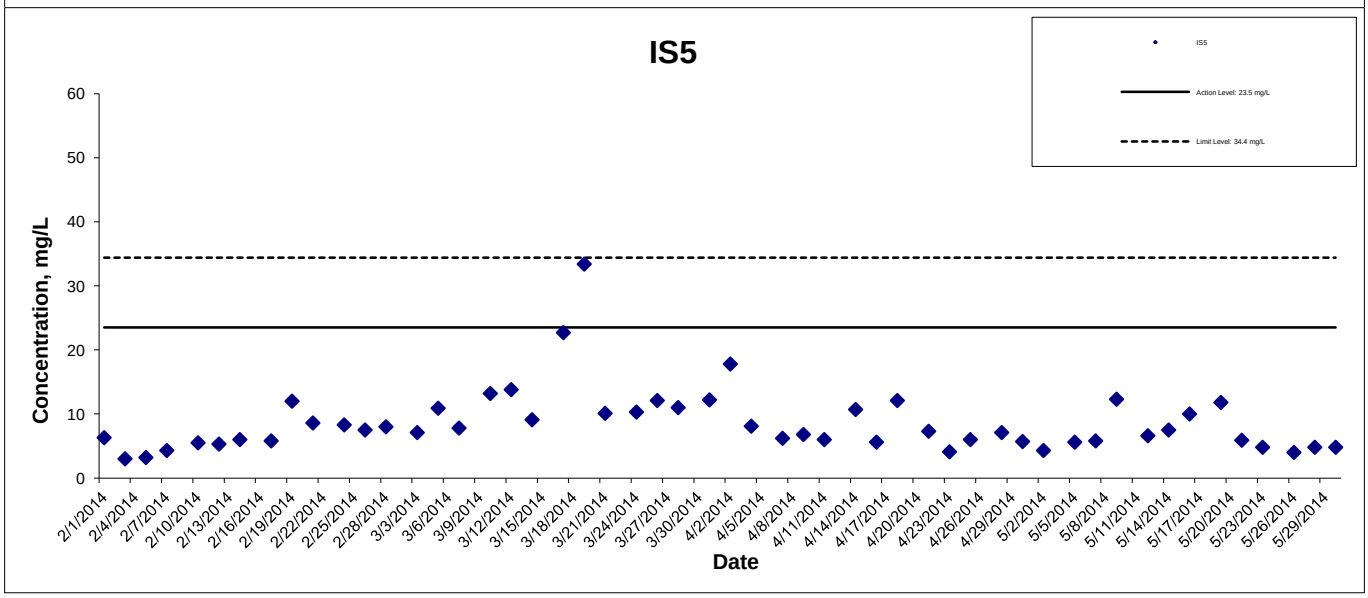

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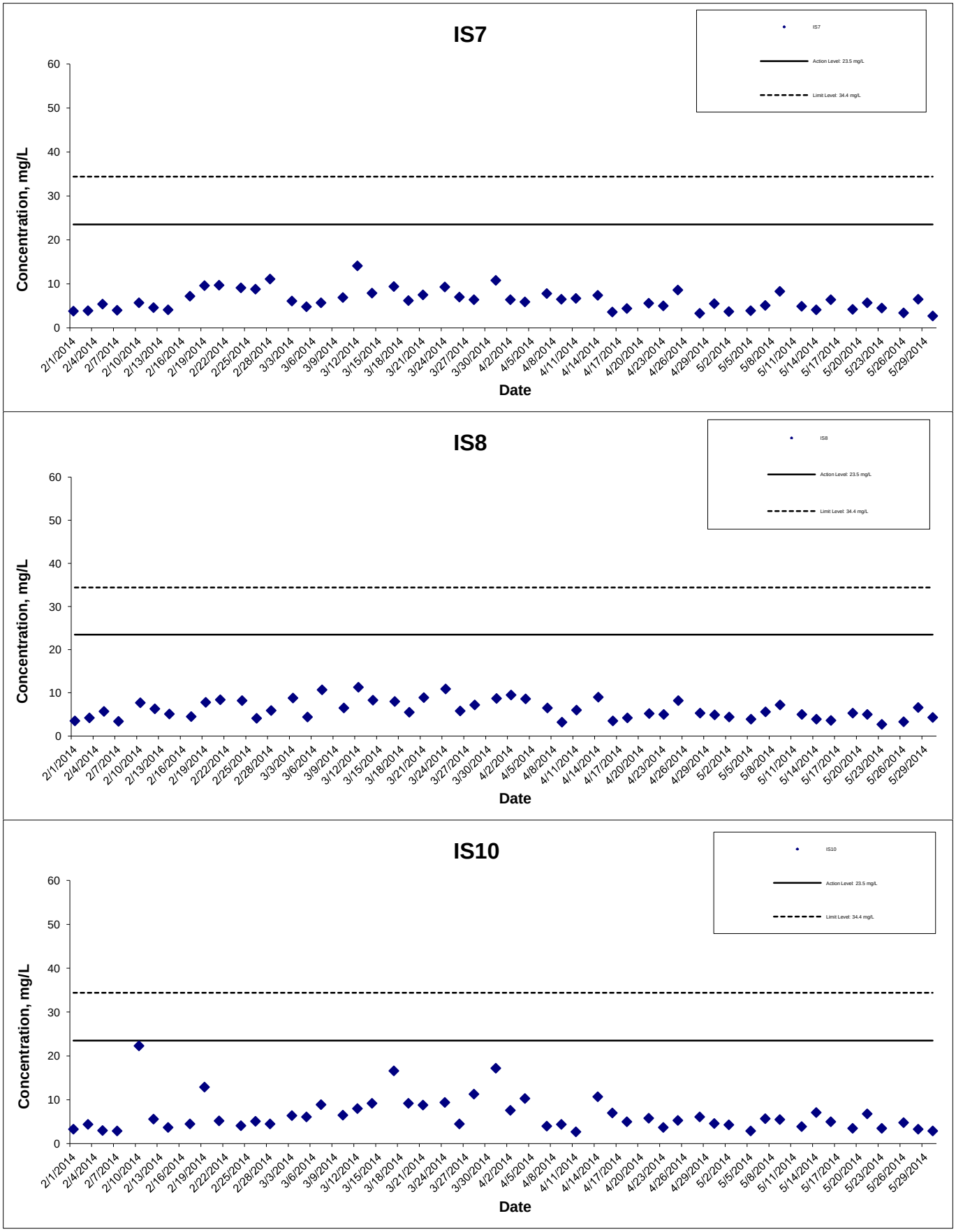

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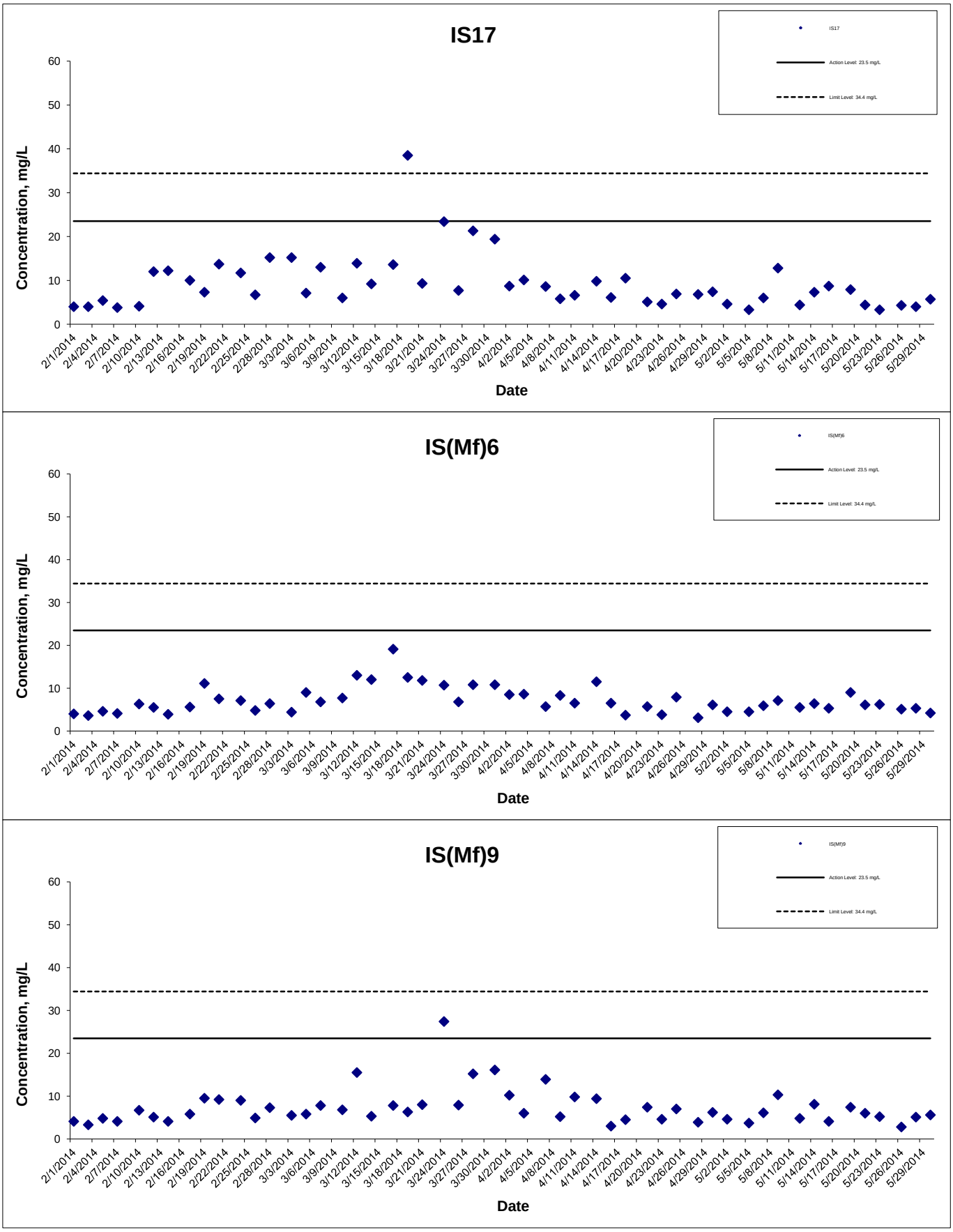

HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

AECOM

Graphical Presentation of Impact Water Quality Monitoring Results

Project No.: 60249820 **Date: June 2014**

Appendix G

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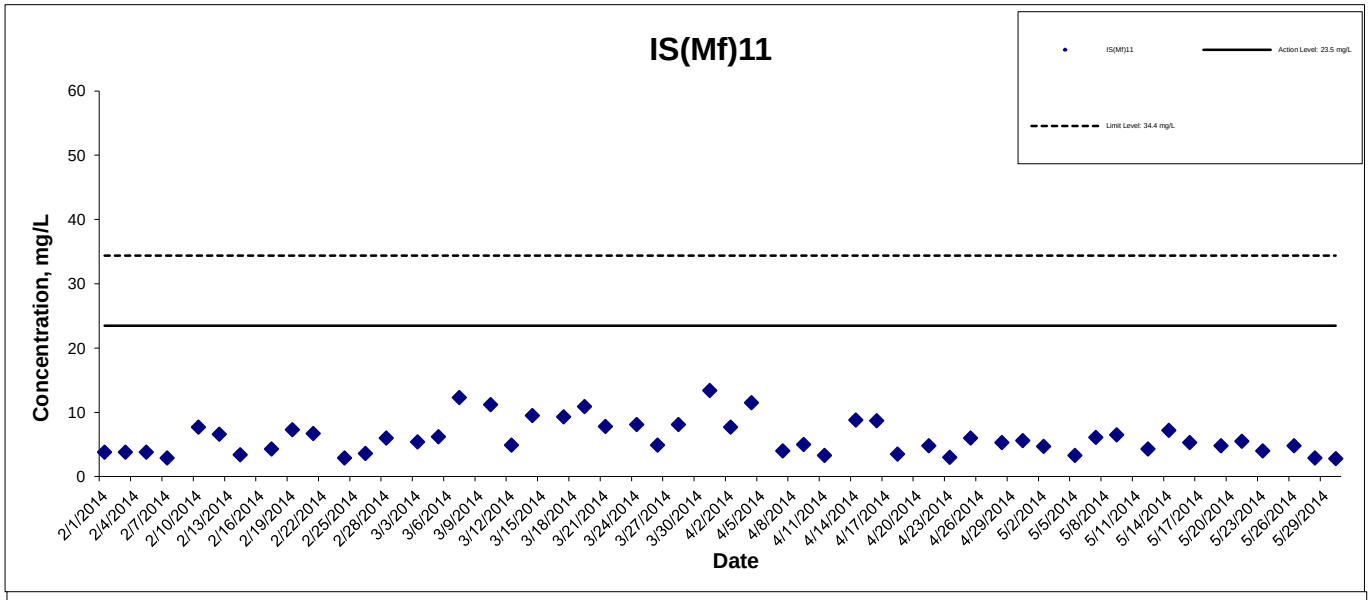

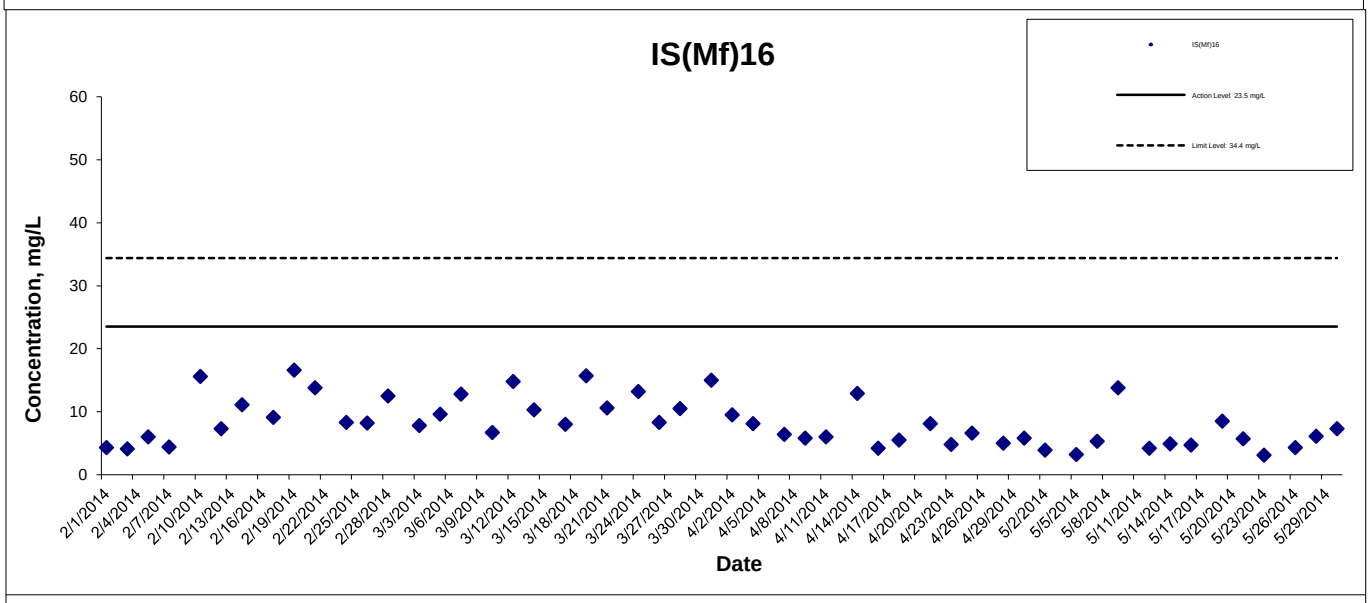

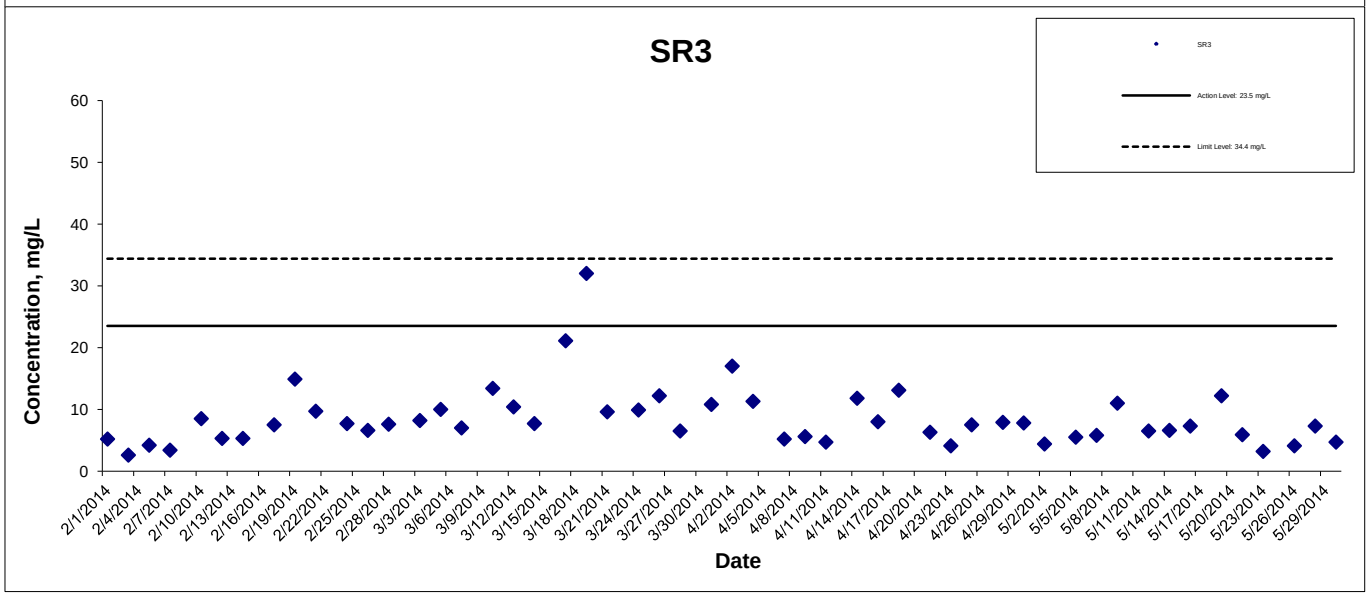

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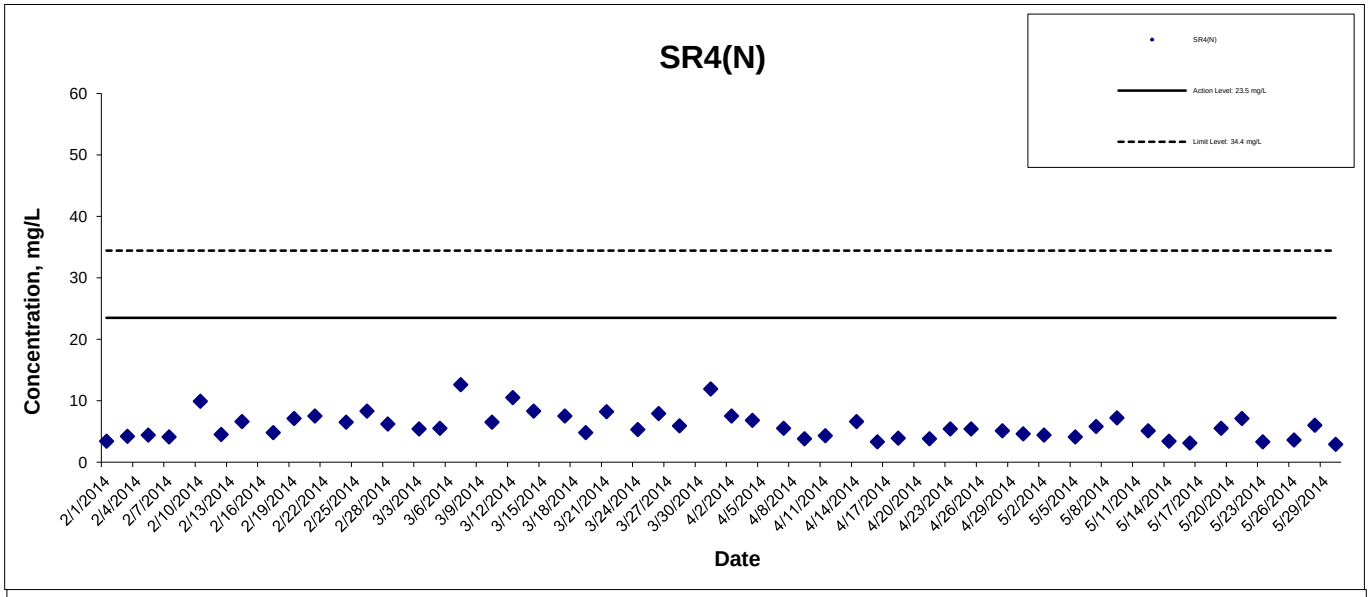

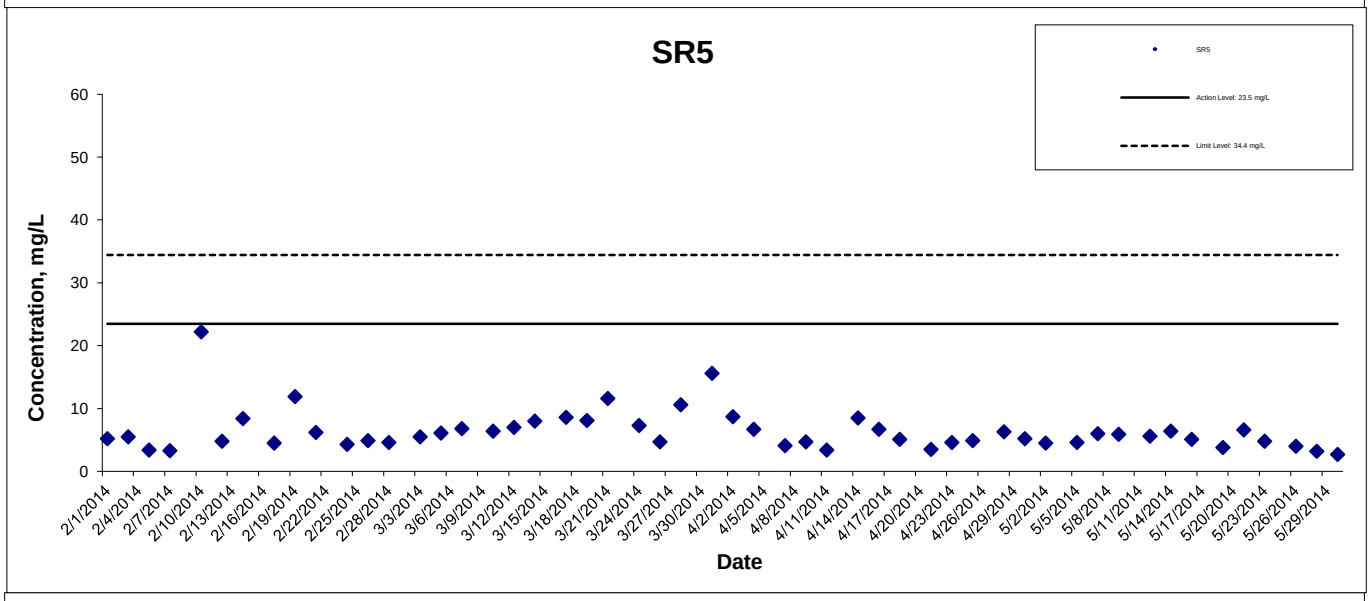

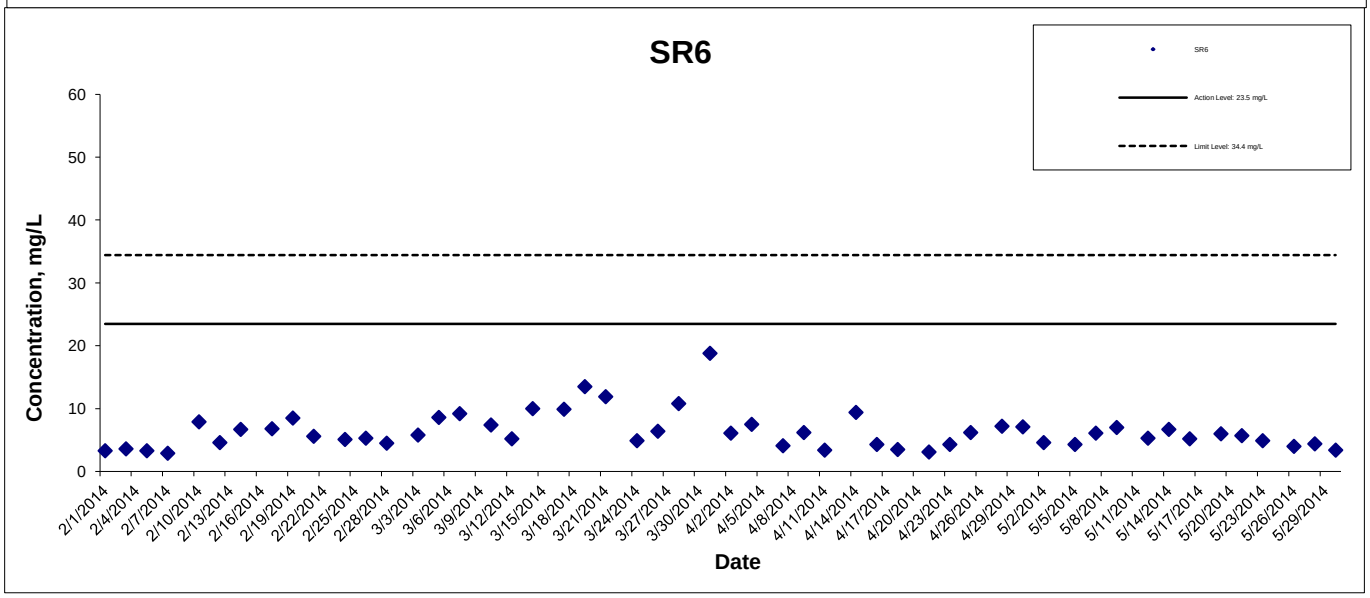

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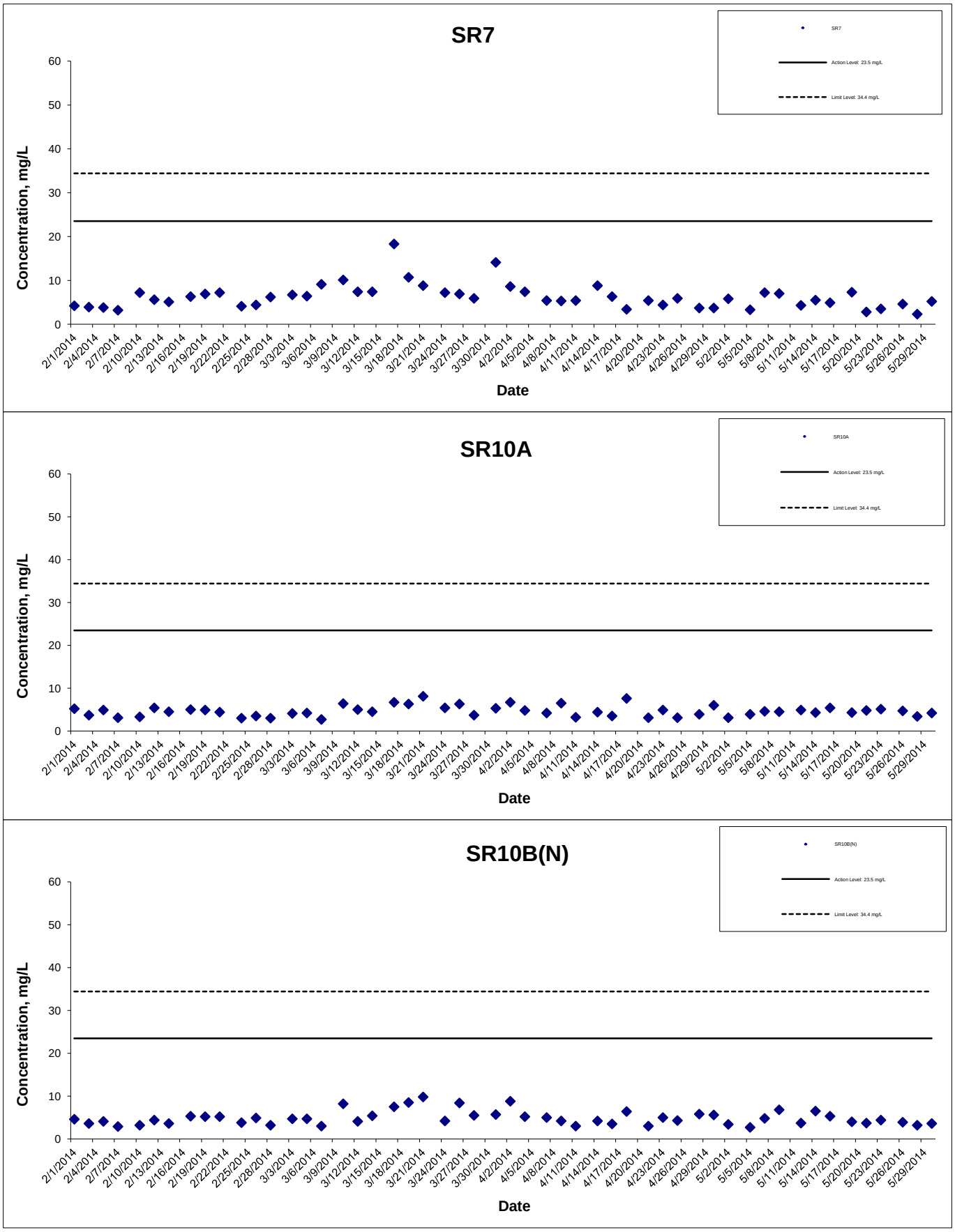
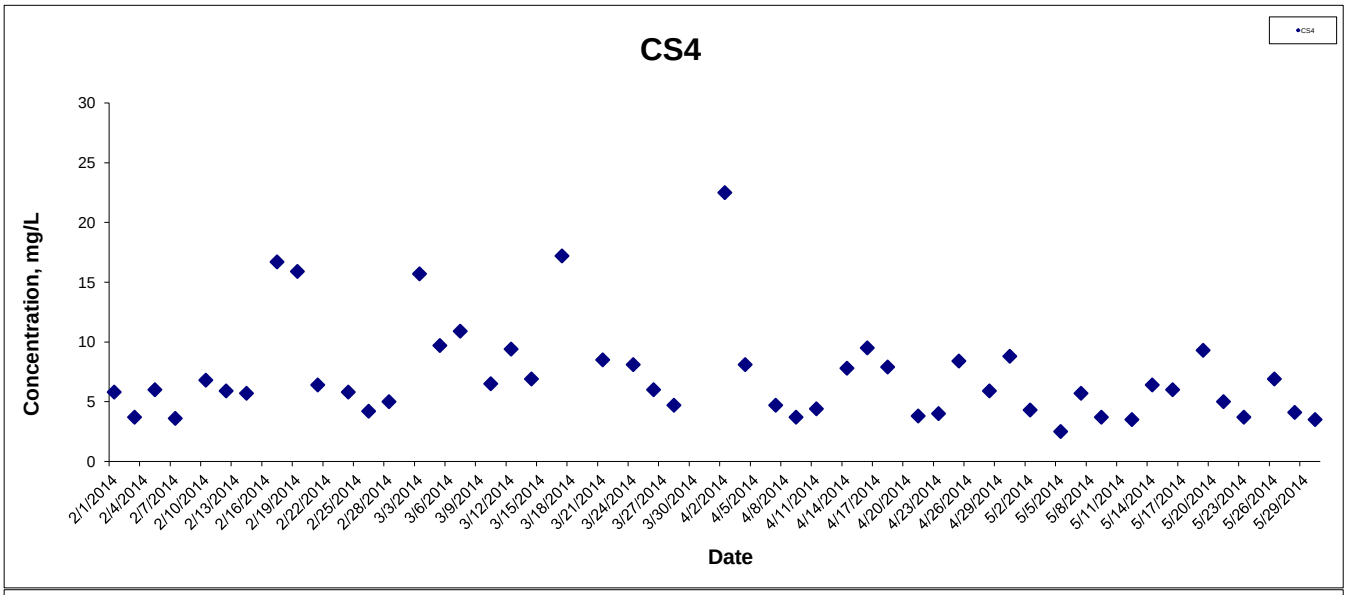
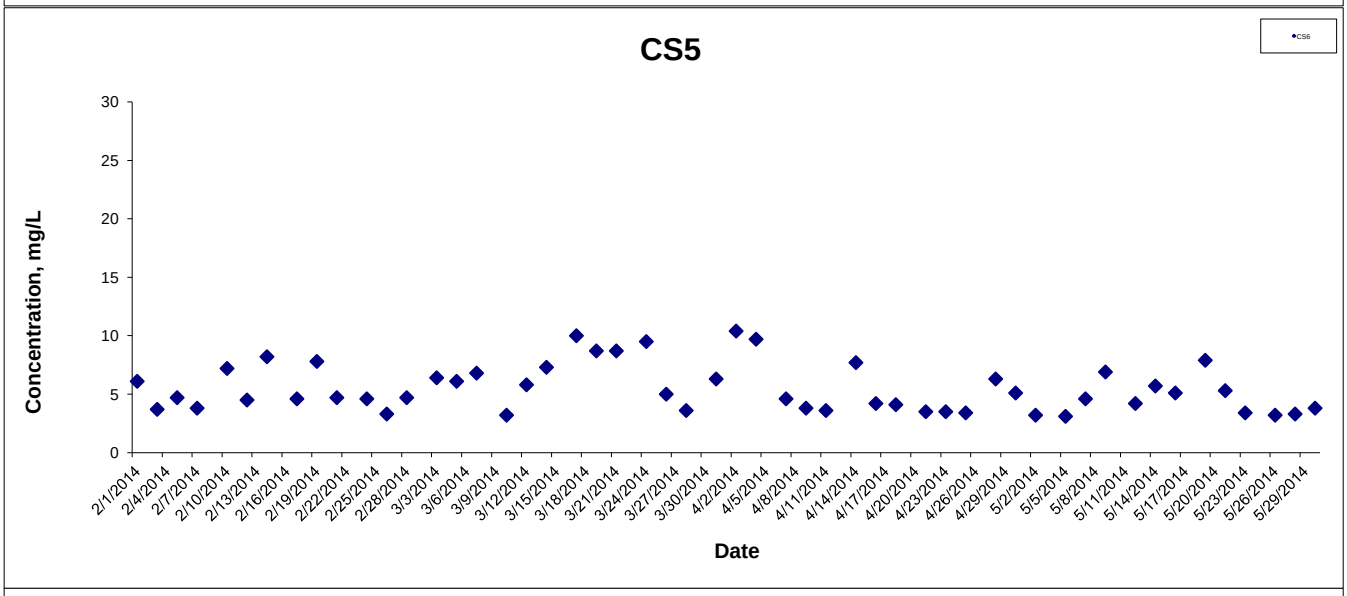
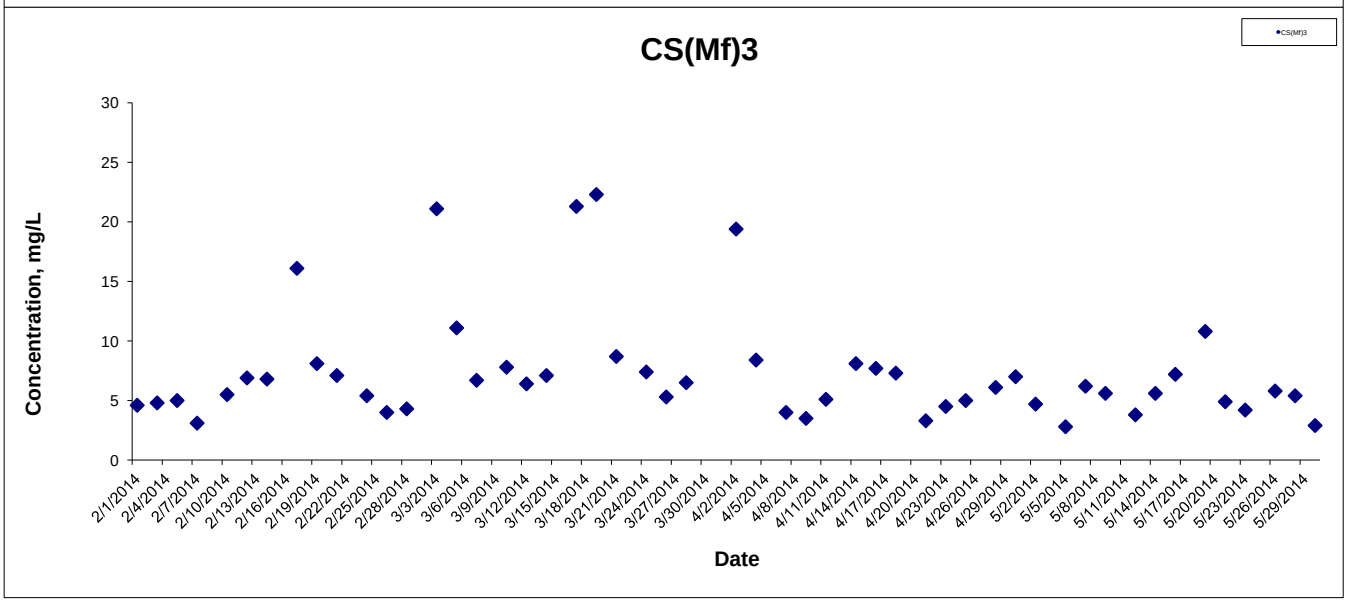


Suspended Solids at Mid-Flood Tide







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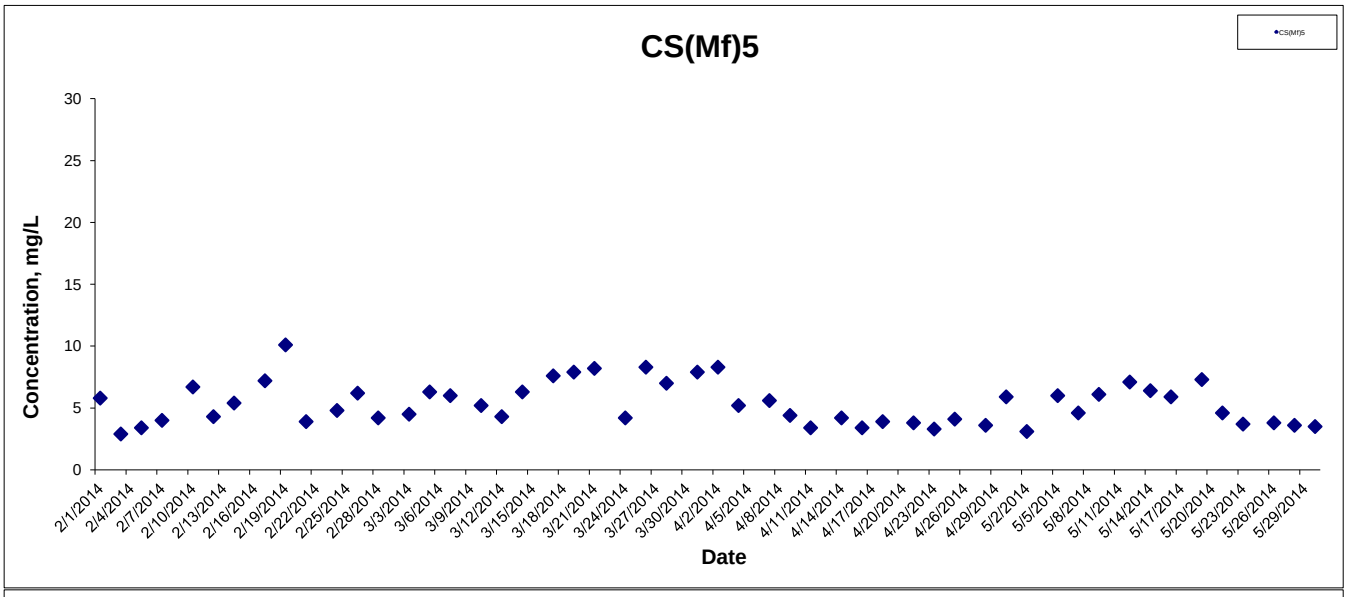
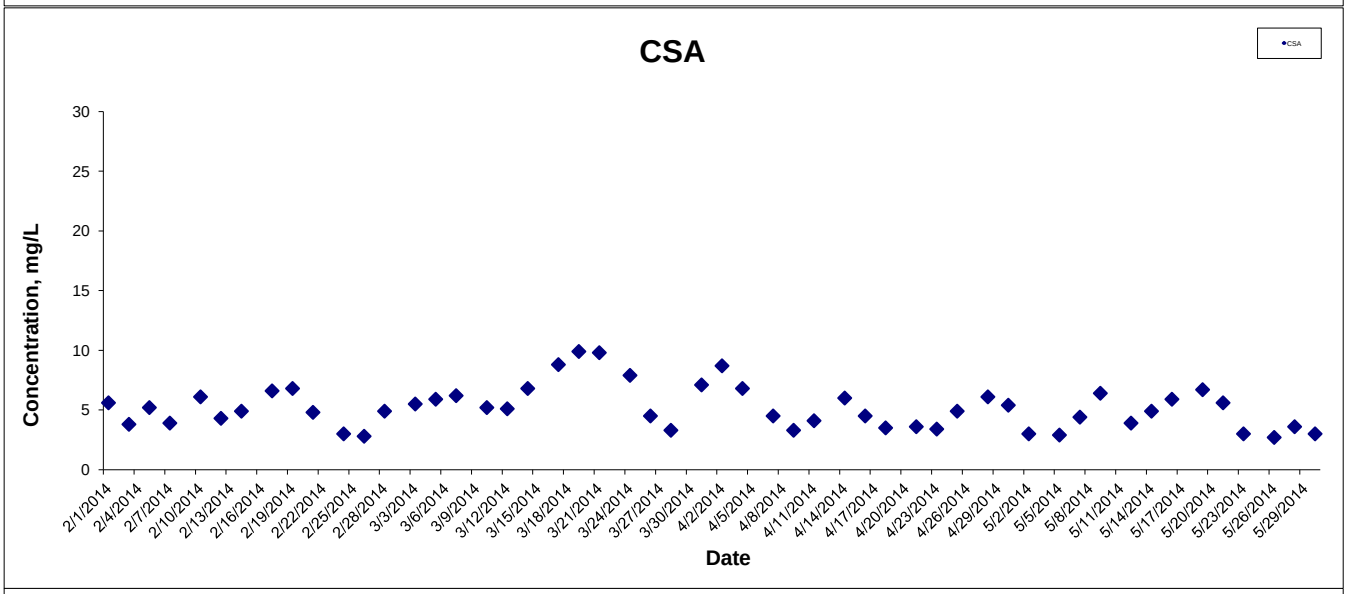
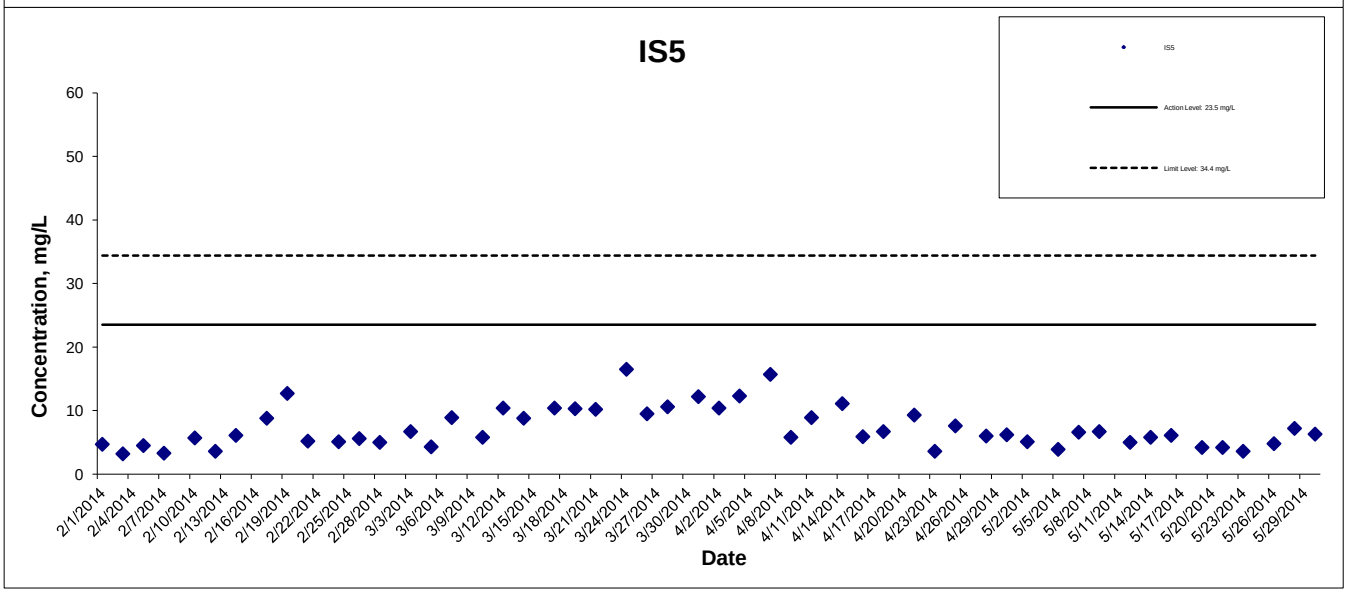




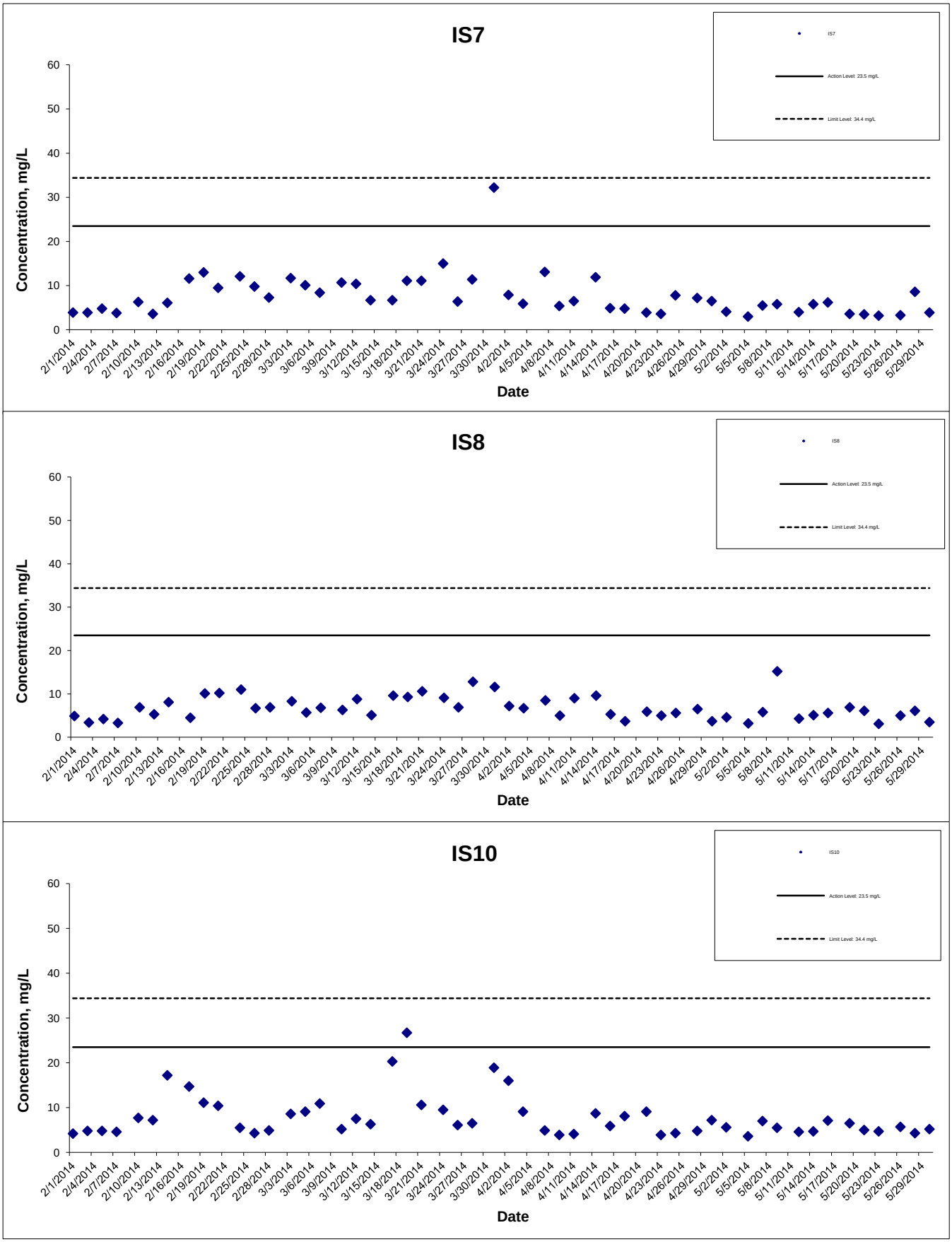


HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

Graphical Presentation of Impact Water Quality Monitoring Results

Project No.: 60249820 **Date: June 2014** **Appendix G**

Suspended Solids at Mid-Flood Tide



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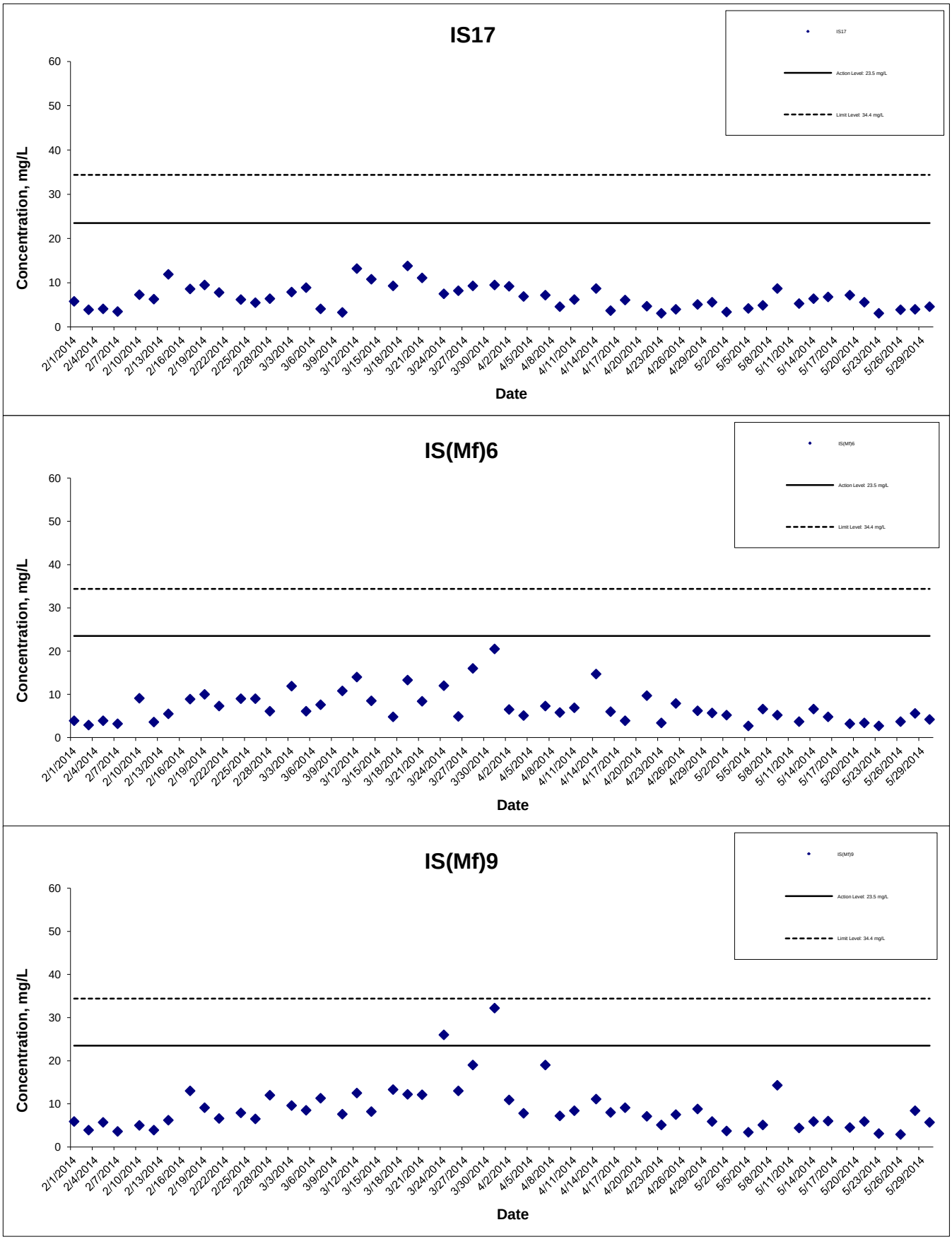

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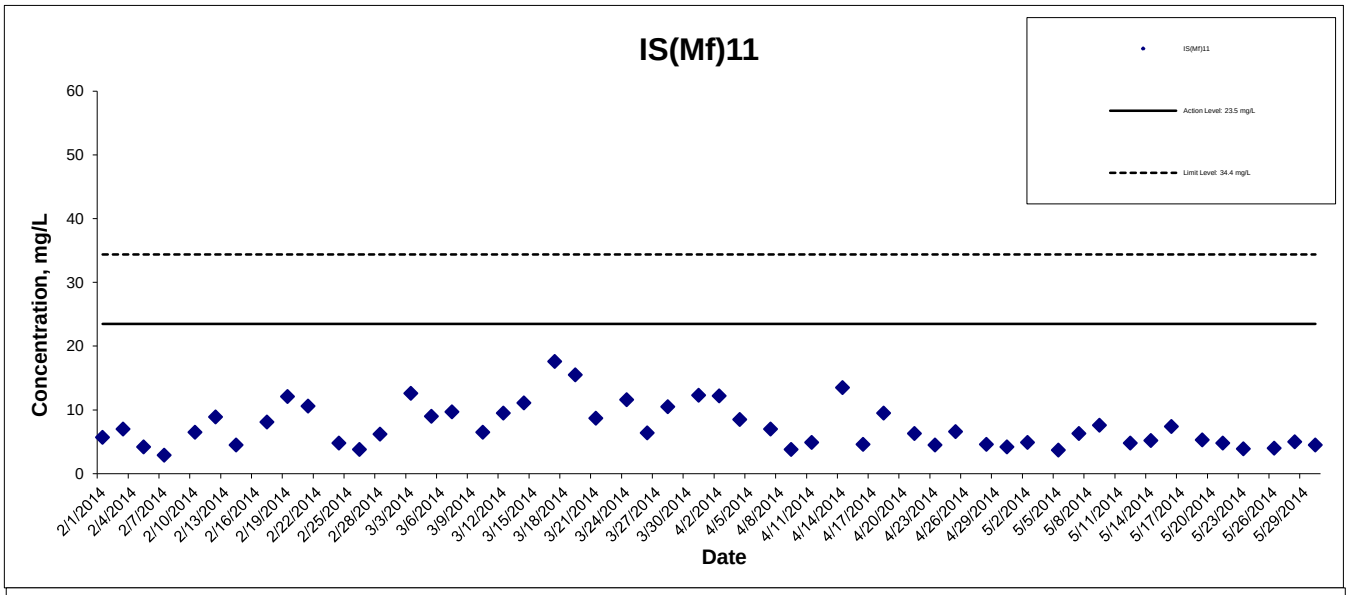
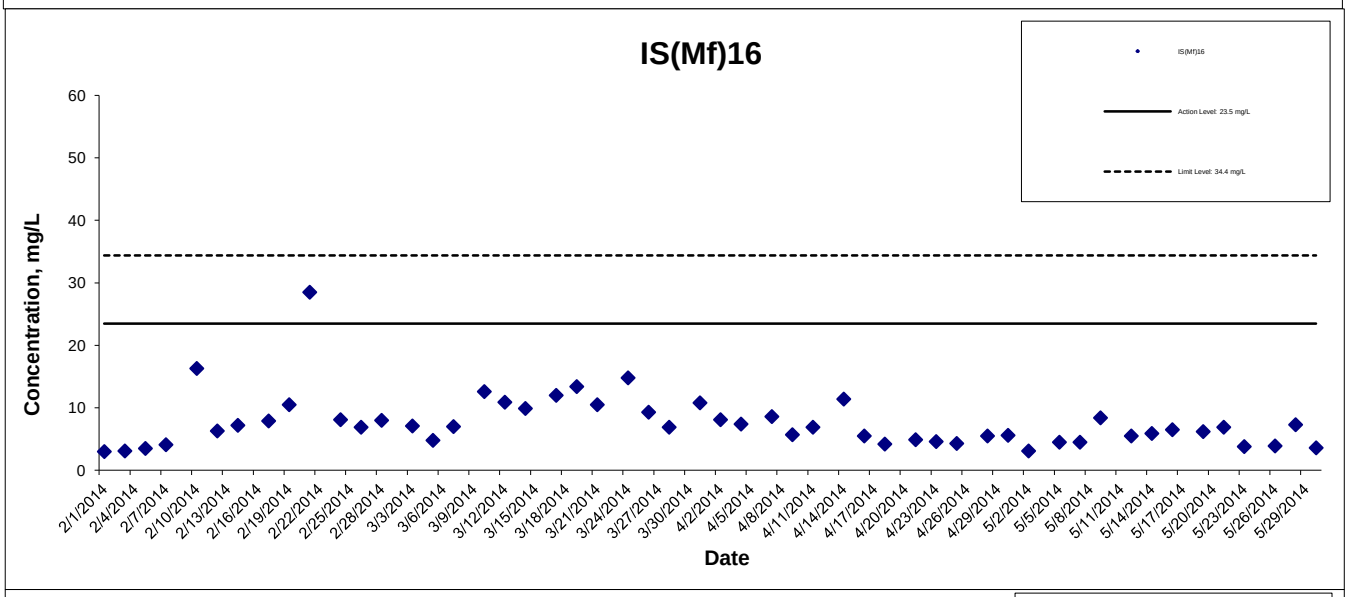
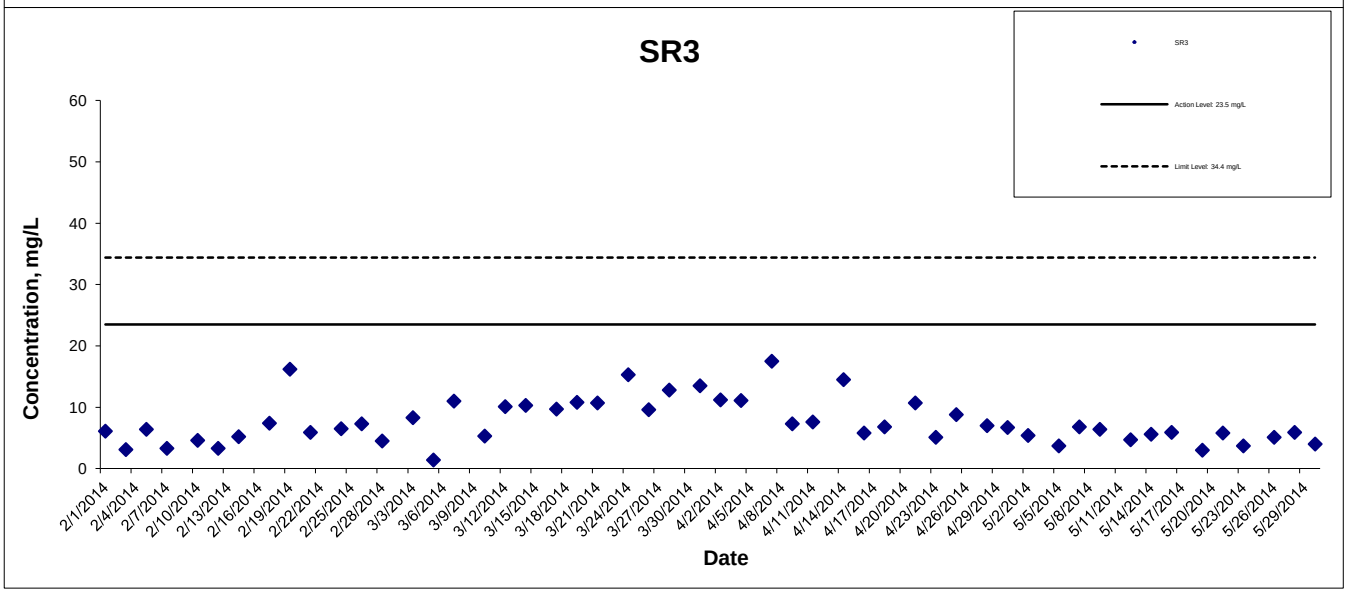
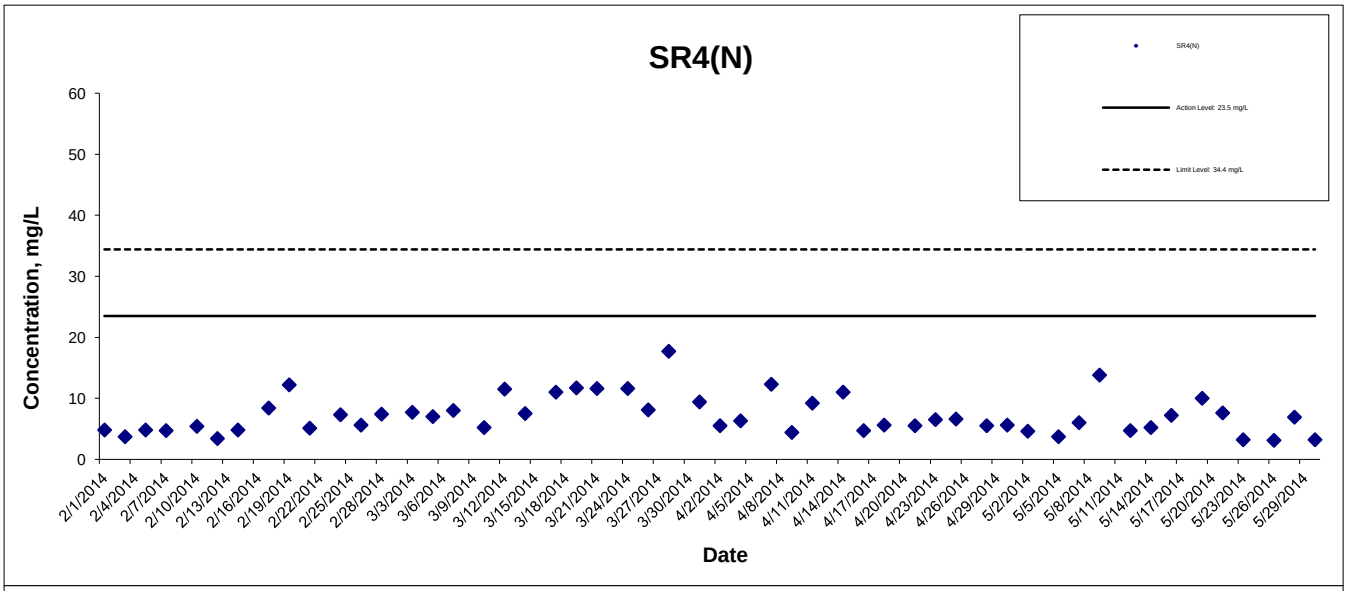
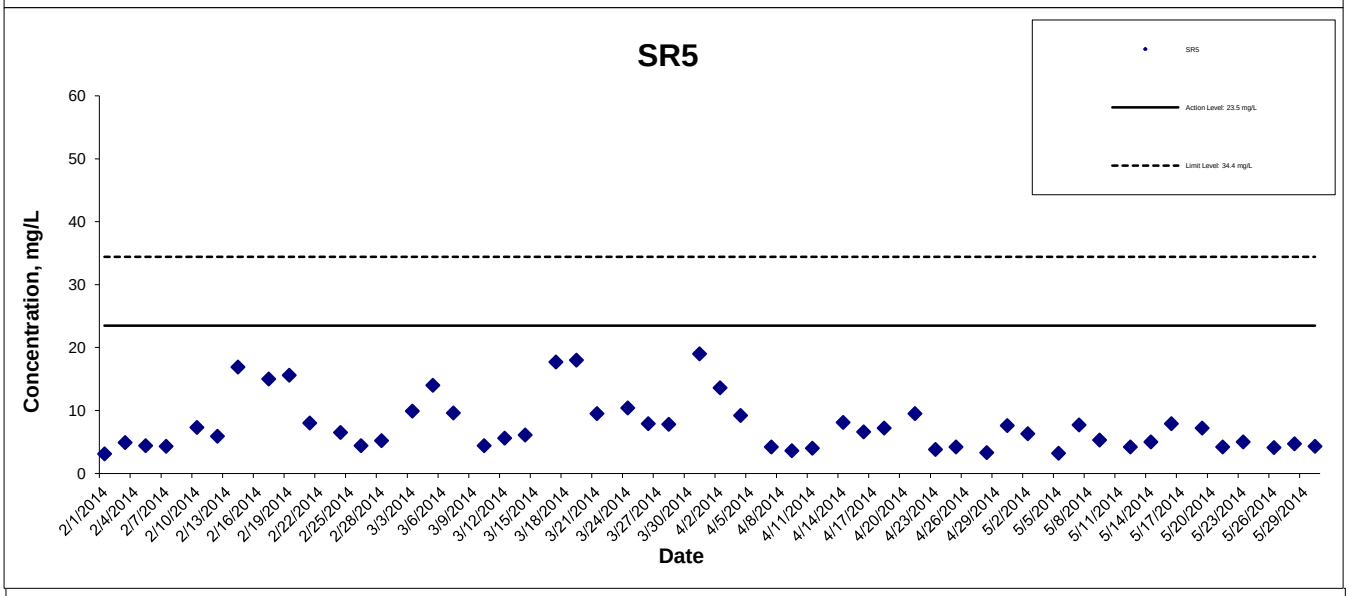


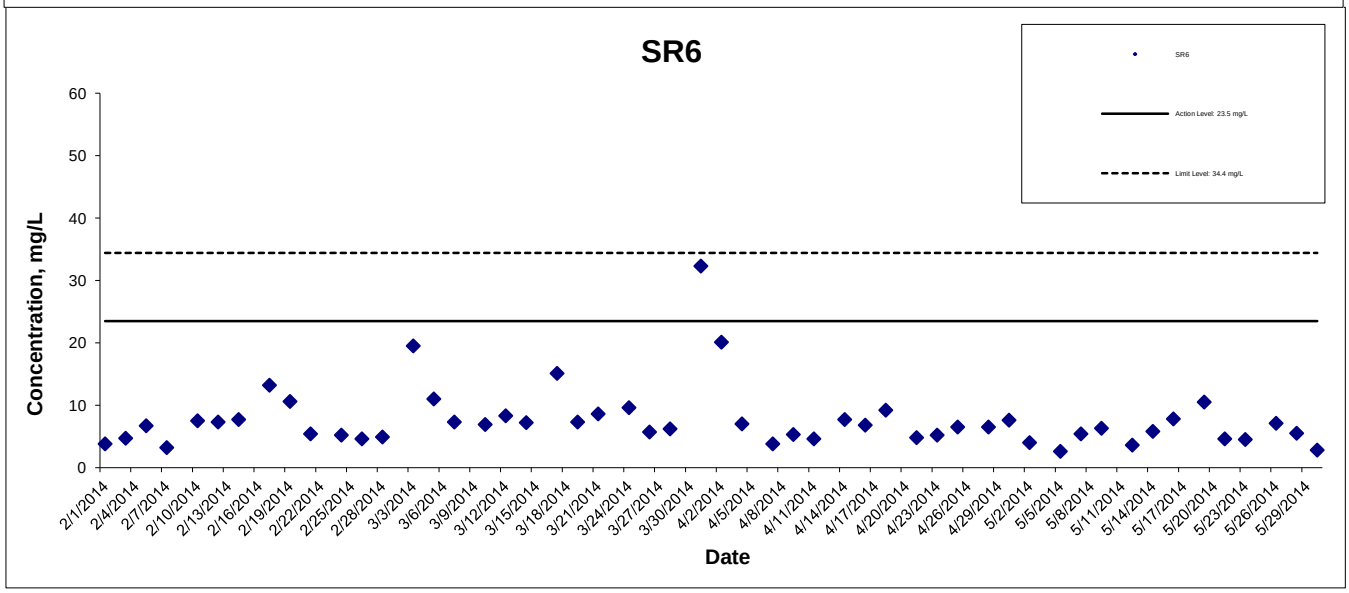




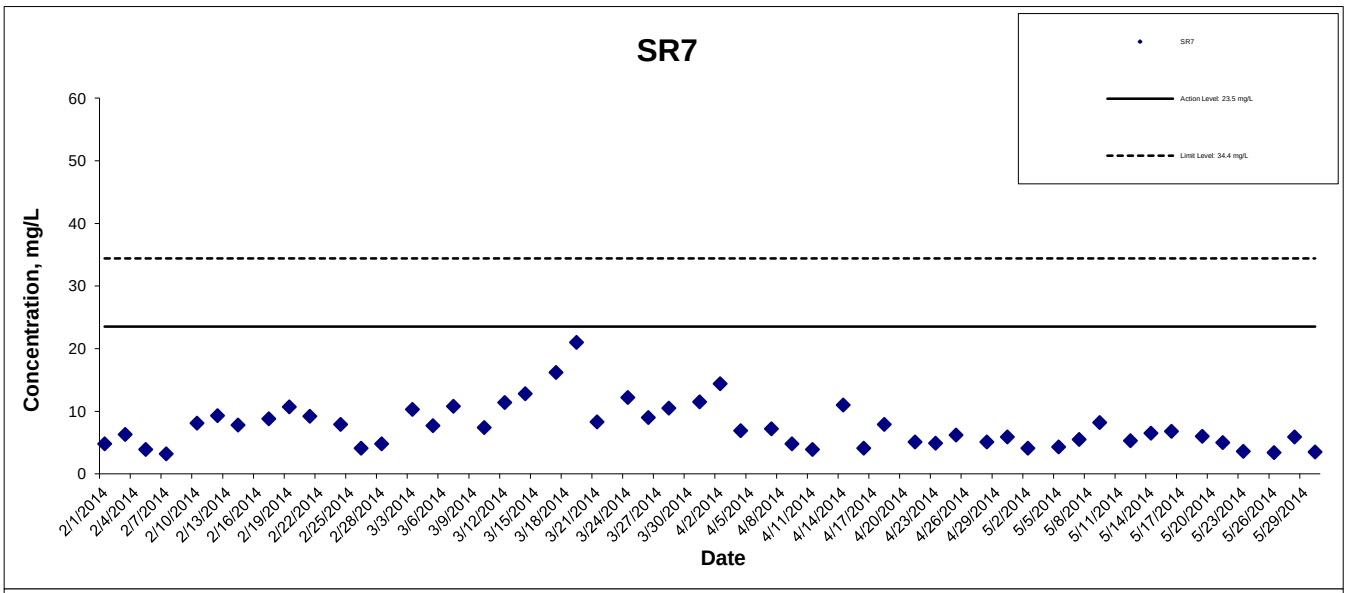
Suspended Solids at Mid-Flood Tide

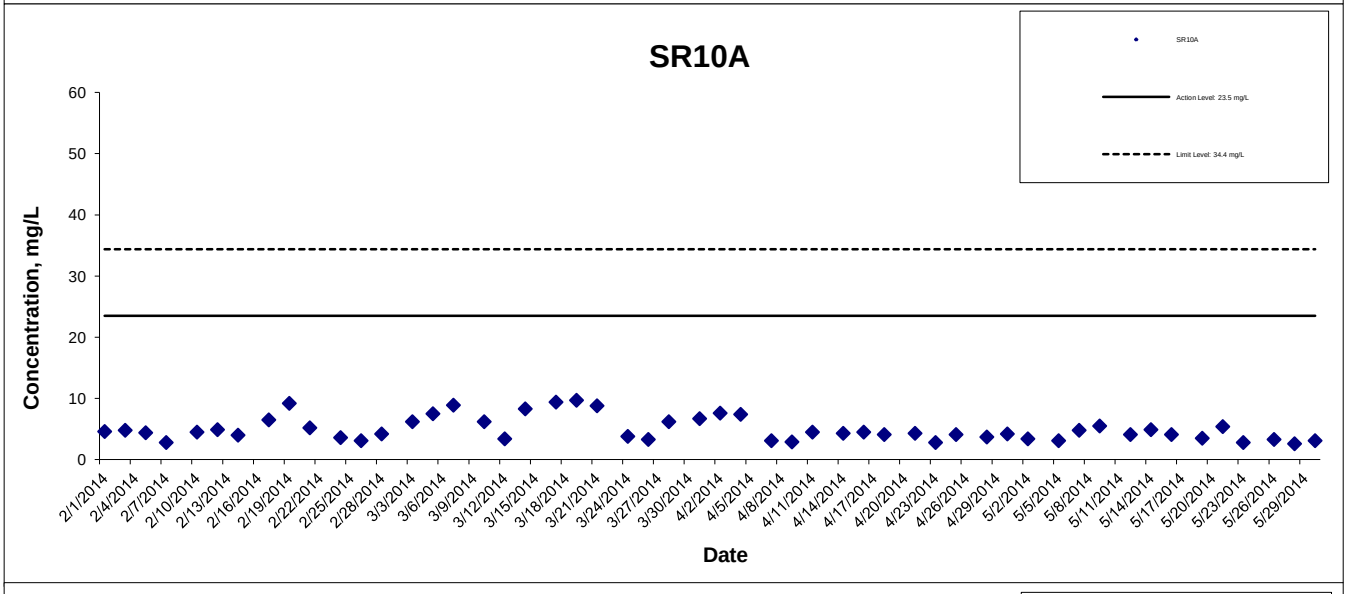


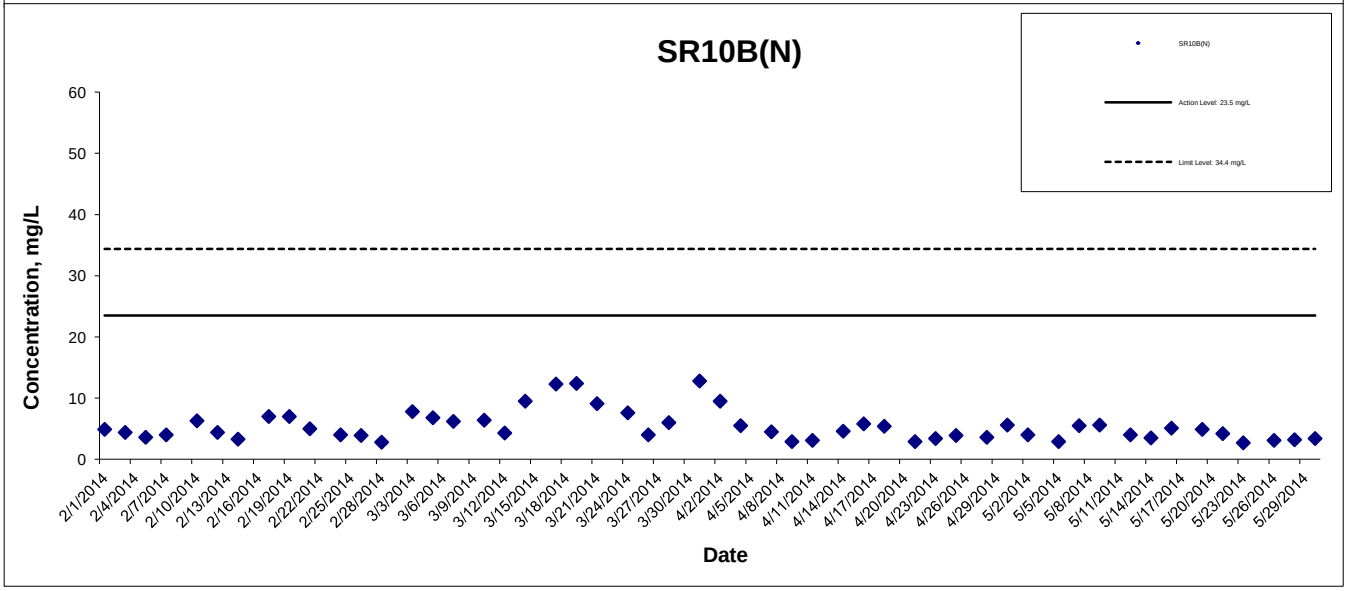




Suspended Solids at Mid-Flood Tide







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

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Graphical Presentation of Impact Water Quality Monitoring Results

Project No.: 60249820 **Date: June 2014**

Appendix G

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

March – May 2014
Quarterly Report

Dolphin Impact Monitoring

TABLE OF CONTENTS

Tables

Figures

ANNEXES

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).

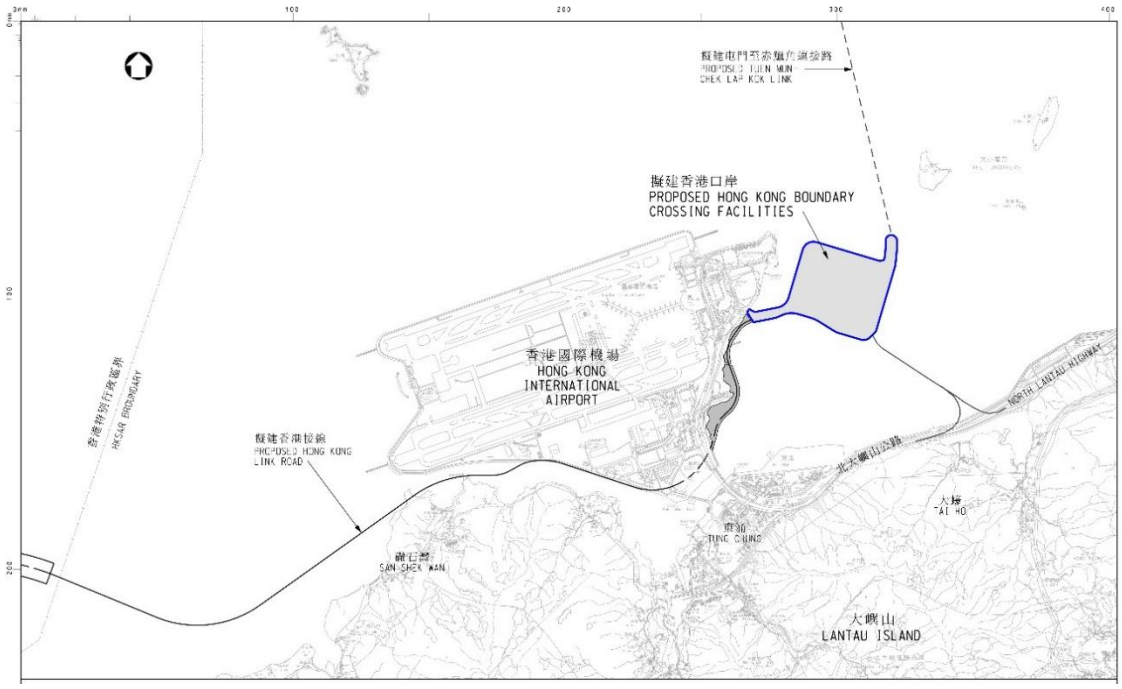

Figure 1. The Hong Kong Boundary Crossing (HKBCF) Reclamation Sites, North Lantau, Hong Kong (http://www.hzmb.hk/eng/img/overview/about_overview03_p01l.jpg**)**

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 ninth quarterly (March – May 2014) 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 at the same as this quarter thus three years of quarterly monitoring can be compared in this report; 2011; 2012 and 2013. 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 incorporated[1]

[1]http://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.

2.2. Line-transect Vessel Surveys

The co-ordinates for the transect lines and layout map were provided by AFCD, however, these have been modified as the construction works at HKBCF has shortened one of the transect lines (Table 1; Figure 2). The study area now incorporates 23 transects (totalling ~111km) which are surveyed twice per month by boat. Line transect surveys should be conducted systematically and lines travelled in sequence (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". The transect line is surveyed at a speed of 7-8 knots (13-15 km/hr). During some periods, tide and current flow in the study site exceeds 7 knots and thus the vessel travels at the same speed as the current during these periods. 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 Logger[2] and is not part of the observer team. This is not standard 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.

[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).

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 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 size[3]. 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). The survey schedule and transects completed has been reported monthly throughout the impact monitoring period and 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	814577	113.870308	22.269741	12	815542	824882	113.975647	22.362962
1	804671	831404	113.869975	22.421696	13	816506	819480	113.985072	22.314192
2	805475	815457	113.878087	22.277704	13	816506	824859	113.985005	22.362771
2	805477	826654	113.877896	22.378814	14	817537	820220	113.995070	22.320883
3	806464	819435	113.887615	22.313643	14	817537	824613	113.995018	22.360556
3	806464	822911	113.887550	22.345030	15	818568	820735	114.005071	22.325550
4	807518	819771	113.897833	22.316697	15	818568	824433	114.005030	22.358947
4	807518	829230	113.897663	22.402113	16	819532	821420	114.014420	22.331747
5	808504	820220	113.907397	22.320761	16	819532	824209	114.014390	22.356933
5	808504	828602	113.907252	22.396462	17	820451	822125	114.023333	22.338117
6	809490	820466	113.916965	22.323003	17	820451	823671	114.023317	22.352084
6	809490	825352	113.916884	22.367128	18	821504	822371	114.033556	22.340353
7	810499	820690	113.926752	22.325043	18	821504	823761	114.033544	22.352903
7	810499	824613	113.926688	22.360464	19	822513	823268	114.043340	22.348458
8	811508	820847	113.936539	22.326475	19	822513	824321	114.043331	22.357971
8	811508	824254	113.936486	22.357241	20	823477	823402	114.052695	22.349680
9	812516	820892	113.946329	22.326894	20	823477	824613	114.052686	22.360610
9	812516	824254	113.946279	22.357255	21	805476	827081	113.877878	22.382668
10	813525	818270	113.956156	22.303225	21	805476	830562	113.877811	22.414103
10*	813525	824657	113.956065	22.360912	22	806464	824033	113.887520	22.355164
11	814556	818449	113.966160	22.304858	22	806464	829598	113.887416	22.405423
11	814556	820992	113.966125	22.327820	23	814559	821739	113.966142	22.334574
12	815542	818807	113.975726	22.308109	23	814559	824768	113.966101	22.361920

*Transect 10 is now 3.6km in length due to the HKBCF construction site. The total transect length for both NEL and NWL combined is 111km

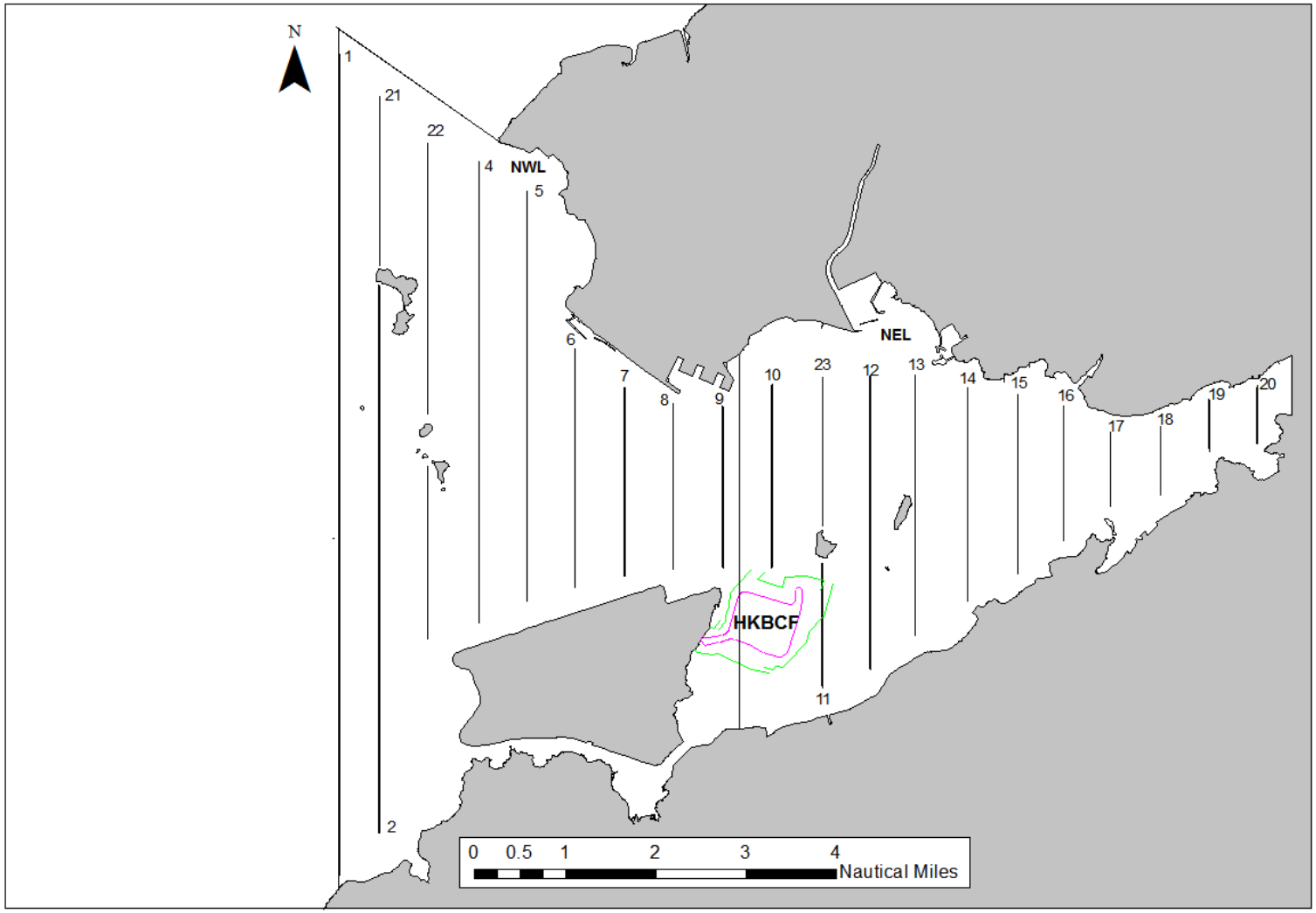

Figure 2 Location of the Transect Lines for Baseline and Impact Monitoring during HKBCF (modified to accommodate HKBCF)

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. A digital SLR camera (Nikon D90) using long lenses (Nikor 80-200mm 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.

2.4. Data Analyses

2.4.1. Distribution pattern analysis

Dolphin sightings data are mapped in the Geographic Information System (GIS) ArcView© 10.1.

2.4.2. Encounter rate analysis

For this report, the baseline encounter rates were re-calculated using the revised data provided (as presented in Annex I) rather than quoting directly from the baseline report. Calculation followed the EM&A Manuel methodology ("on-effort" sightings made during favourable weather and 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, 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

Home ranges for individual dolphins can be calculated using a variety of software (Worton 1989). 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 2.0. 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). AFCD Annual Reports use a minimum of 15 resightings for kernel analyses (AFCD 2012). To date, too few data on individual dolphins exist from impact monitoring alone, i.e., 15 or more independent resightings per individual, to map utilisation densities using the fixed kernel method. The most resightings for an individual dolphin in the baseline and impact monitoring period combined is fifteen (HZMB 054) split across baseline (six sightings) and impact monitoring (nine sightings). A comparison of baseline and impact sightings using kernel analyses will require longer term data collection.

3. RESULTS AND DISCUSSIONS

3.1. Summary of survey effort and dolphin sightings

From March – May 2014, 12 vessel surveys were conducted in NEL and NWL survey areas. A total of 662.7 km of "on-effort" transect lines were conducted, 660.6 of which were conducted under favourable conditions (Beaufort 3 or better) totaling 99.7% of survey effort (Annex II). During March – May 2014, 15 groups of dolphins, numbering 46 (min 45: max 52[4]) individuals, were sighted from the vessel surveys. Of these, 11 groups were "on-effort" and the remaining four "opportunistic" (Annex III).

All 15 sightings 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. The baseline surveys were conducted outside the winter period and as dolphin occurrence is known to change seasonally within Hong Kong waters, the same periods for 2011, 2012 and 2013 are also included for comparative purposes (Table 2). During March – May 2011 (the advanced monitoring period), 20 groups were seen in NWL and 9 in NEL. During March – May 2012, which was the first three months of the HKBCF works, 19 groups and a single group were recorded in NWL and NEL, respectively. For March – May 2013, 22 groups were seen in NWL and none in NEL and, in March – May 2014, 15 groups were seen in NWL and, again, none, in NEL. For the periods March – May, from one year prior to HKBCF works to 2014, there have been approximately the same number of dolphin groups sighted in NWL (16 to 22 groups). For NEL, there were fewer groups encountered during impact monitoring than during the same period the year before works started. These data have not been corrected for effort. Maps depicting location of sightings, also not corrected for effort, are included as Figs. 3;4;5;6.

[4] 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; March – May 2011; 2012; 2013; 2014.

Monitoring Period	Total Dolphin Sighting in NWL	Total Dolphin Sighting in NEL
	Number of Groups	Number of Groups
March – May 2011 (Advanced Monitoring)	20	9
Sep – Nov 2011 (Baseline Monitoring)	34	10
March – May 2012 (Impact Monitoring)	19	1
March – May 2013 (Impact Monitoring)	22	0
March – May 2014 (Impact Monitoring)	15	0

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 the baseline and the months March – May 2011, 2012, 2013 and 2014 were compared. The baseline study had considerably more "on effort" sightings compared to the March to May period prior to works commencement as well as the following three March to May periods. It is noted, again, that seasonal patterns must be considered when assessing differences between years. There is a decrease in absolute numbers of "on effort" groups seen between the March to May period prior to works commencement and the following three years (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; March – May 2011; 2012; 2013 and 2014

Monitoring Period	Groups of Dolphin sighted in NEL and NWL
March – May 2011 (Advanced Monitoring)	22
Sep - Nov 2011 (Baseline Monitoring)	44
March – May 2012 (Impact Monitoring)	12
March – May 2013 (Impact Monitoring)	17
March – May 2014 (Impact Monitoring)	11

3.2. Distribution

During the baseline survey, ~77% of all "on effort" sightings were made in NWL. During the March – May periods 2011, 2012, 2013 and 2014, 68%, 100%, 100% and 100% of all sightings were made in NWL, respectively. Since before construction activities at HKBCF, there is a trend for an increased use of NWL habitat for the period March – May. Further, this increase in NWL habitat use has been noted for the period December – February. This increase in use also appears to have been initiated prior to works commencing at HKBCF (see the eighth quarterly report for this project). Again, there is no correction for effort for these group sightings (Table 4). The majority of sightings occurred in the northern section of NWL and are either within or adjacent to the Sha Chau Lung Kwu Chau Marine Park (SCLKCMP). Since 1995, this area has been

consistently highlighted as important to some, but not all, of the dolphins which frequent Hong Kong waters. A few sightings occurred near the southern section of NWL, although sightings in this area has been decreased in the last two quarters (Fig. 6).

Table 4. A Comparison of "On Effort" Sightings Recorded in NEL and NWL During Sep – Nov 2011; March – May 2011, 2012, 2013 and 2014.

Monitoring Period	No. of Dolphin Groups sighted in NWL	No. of Dolphin Groups sighted in NEL
March-May 2011 (Advanced Monitoring)	15	7
Sep - Nov 2011 (Baseline Monitoring)**	34	10
March-May 2012 (Impact Monitoring)	12	0
March-May 2013 (Impact Monitoring)	17	0
March-May 2014 (Impact Monitoring)	11	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 545.6km[5] of survey effort was conducted under favourable conditions in the NEL and NWL survey areas. In NEL, there has been a decrease in encounter rates since before construction activities started at HKBCF including baseline and the period March - May 2011, 2012, 2013 and 2014. In NWL, there is a decrease in encounter rates when only the periods March – May are considered. The baseline monitoring encounter rate is the highest calculated, although note is made this was from a different season compared to this quarter (Table 5).

Table 5. A Comparison of Encounter Rates* in NEL and NWL Areas During Sep – Nov 2011; March – May 2011, 2012, 2013 and 2014.

Monitoring Period	Encounter Rate NEL	Encounter Rate NWL (*)
March - May 2011 (Advanced Monitoring)	7.5	8.8
Sept-Nov 2011 (Baseline Monitoring)	5.4	9.5
March - May 2012 (Impact Monitoring)	0.0	5.7
March - May 2013 (Impact Monitoring)	0.0	3.1
March - May 2014 (Impact Monitoring	0.0	2.5

[5] Updated data set provided April 2013

The AFCD Annual Reports describe variation in spatial distribution between areas and between seasons in NEL and NWL. Until 2012, it is 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. Both the encounter rates for NEL and NWL for this quarter (March – May 2014) are lower than the yearly average. Historically, there have been both up and down movements within **yearly** encounter rate 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, prior to new development projects in the Lantau area (AFCD 2013). The known decline in the population, in addition to the highly variable encounter rate noted historically, makes it problematic to discern any additional influence individual projects, such as HKBCF and others, may have on the dolphin population encounter rate. As the impact of the overall marine construction activities for HZMB increases and extends, in addition to dredging and other new marine works recently being initiated in both NEL and NWL, 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 March – May 2014, group size of all sightings varied from 1 to 12 individuals with an average of 3.1 in NWL. For baseline monitoring, both the NWL and NEL average group size was 3.7. For the periods March – May 2011, 2012, 2013 and 2014 the group size in NWL is approximately the same, varying between 3.1 and 3.3 individuals. The NWL group size was higher during baseline, however, this was a different season. No groups have been noted in NEL in the periods March – May 2013 and 2014 (Table 6). A map depicting group sizes of more than five shows that only one group had more than 10 individuals (Fig. 7). It has been noted previously that significantly larger groups are noted behind active fishing trawlers (Jefferson 2000). As trawlers no longer operate in Hong Kong waters, group size averages will likely decrease.

Table 6. A Comparison of Sightings Group Size Averages Recorded in NEL and NWL Areas During Baseline (Sept – Nov 2011); March – May 2014

Monitoring Period	Average Group Size (NWL)	Average Group Size (NEL)
March-May 2011 (Advanced Monitoring)	3.1	2.3
Sept – Nov 2011 (Baseline Monitoring)	3.7	3.7
March-May 2012 (Impact Monitoring)	3.2	1
March-May 2013 (Impact Monitoring)	3.3	0
March-May 2014 (Impact Monitoring)	3.1	0

As encounter rate and group size are both subject to variation from the influence of environmental and other factors, the use of other more powerful analyses may be more appropriate to discern differences over the shorter term, such as multi-variate analyses (Taylor *et al* 2007). In previous quarterly reports, a methodology was proposed for such modelling and subsequent updates have been provided on data provision from various authorities. The last update mentioned that environmental data for 2013 was being verified and internally audited prior to being released to this project by EPD. These data have recently been released and have been reformatted, edited and filtered to fit the modelling database. The modelling was initiated in July 2014 and is aimed to be completed by August. The first runs of the model have been time consuming as various parameters are tested and the model specified for the Hong Kong environment.[6].

[6] The co operation of EPD and other government departments in obtaining these data is gratefully acknowledged.

3.5. Habitat use

Quantitative grid analyses indicates that the most often frequented areas in NWL were the SCLKCMP and the western limit of NWL and (Figs. 8; 9). This is the same pattern as was observed in the last quarter and highlights areas of high density as has been published previously in the AFCD Annual Reports and the baseline monitoring report. These areas of high use have been consistent in the long term and continue to be so. Habitat use between March – May 2012 to 2014, the first three years of construction at HKBCF, were compared. The density of individuals dolphins (DSPE) using the NEL and NWL habitat in 2012, the first year of HKBCF construction, shows relatively widespread use with areas along the northeast of the airport platform, northeast Lung Kwu Chau, south west Sha Chau, the western maritime border and Tai O all as areas of use, although not high density use. In 2013, year two HKBCF, the area of highest use was the marine park area at SCLKC and the density of dolphins was higher when compared with the first year of monitoring. In 2014, this quarter, the area usage is the same as 2013, however, the density of dolphins using the habitat has decreased (Figure 10). For groups of dolphins (SPSE), there are obvious parallels with DSPE, however, it is noted the density of groups using the habitat of SCLKC increased between year 2012 and 2013. The density of group use has remained similar between 2013 and 2014. In summary, during the first year of HKBCF work, there was widespread use of the NWL habitat in a lower density compared to the higher, more concentrated habitat use calculated for 2013 and 2014 (Fig. 11).

3.6. Mother-calf pairs

Two of the groups sighted contained mother and calf pairs. Both groups were sighted in NWL (Fig. 12). Calves comprised 4.3% of all dolphins sighted, lower than that reported in the last two quarterly reports (10.3 % and 6.7% respectively).

3.7. Activities

Of the 15 groups sighted (using all sightings), five (33%) were engaged in feeding activities which is approximately the same as the frequency noted last quarter; five (33%) were travelling which is approximately the same as that noted in the last quarter; three (20%) were feeding/travelling/surface active which is similar to the last quarter; one (7%) were milling (other) which is approximately the same as the same activity noted in the last quarter and it was not possible to define the behavior of one (7%) groups. Feeding and travelling were the predominant activities during daylight hours in March – May 2014 (Fig. 13). In NWL, feeding occurred most often at east SCLKCMP and the western limits of NWL (Fig. 14).

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 VI. 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 which have been identified in the last quarter are from the baseline study and the catalogue now stands at 109 individuals. There are 13 dolphins which have been sighted six or more times, seven of which are known from the AFCD catalogue (HZMB 002 [WL111]; HZMB 011 [EL01]; HZMB 041 [NL24]; HZMB 044 [NL98]; HZMB 051 [NL213]; HZMB 054 [CH34]; HZMB 098 [NL104]). Two of these well known individuals were not seen during the baseline study (HZMB 002 AND HZMB 044). When both baseline and impact monitoring data is pulled, HZMB 54 has been seen the most on 15 different days. HZMB 002 has been sighted 12 times; HZMB 041 and HZMB 044 have been sighted nine times and HZMB 011 has been sighted eight times. Two new individuals were

added to the catalogue (HZMB 119 and HZMB 120) during March – May 2014 and one new calf was recorded in NWL (Annex VI; Table1).

4. CONCLUSION

The data from March – May 2014, shows some consistencies with the baseline data (conducted during a different season) and with the same periods in 2011, 2012 and 2013. Habitat use, group size and behavioural trends all fall within those reported in AFCD Long Term Monitoring reports. 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 depicted key areas of frequent use within NWL, in particular, SCLKMP, and an increasing trend of habitat use in this area has been noted for the second and third year of the HKBCF impact monitoring period. Areas to the south of SCLKC and Tai O have seen diminished use in 2013 and 2014. In general, the encounter rate, habitat use and group size information suggests that more dolphins are using the northern area of NWL and less dolphins using the areas at NEL and to the west and south of NWL. This is only for the period March to May. There is a low re-sighting rate of calves born in 2013 and to date, only one new calf for 2014 was recorded in this quarter.

The decreases in encounter rates in both NEL and NWL is noted. HKBCF monthly reporting notes that the conditions of EM&A Manuel have been consistently upheld and that all measures published to minimise disturbance to dolphins remain in place. Although it is likely that the increase in HKBCF activities is having an effect on dolphin encounter rates in NEL, it is also noted that other HZMB projects have increased activities over the last quarter. In addition, extensive dredging has been on going in NEL and also in parts of NWL. Further, new projects have been initiated along the airport platform area. As there has been shifts in the habitat use to, but no increase in dolphin mortality, it is likely that the dolphins have shifted to other parts of Hong Kong and adjacent waters. To better understand how habitat use is changing, extending the survey area to other parts of Hong Kong that dolphins are known to occur in may be useful to fully understand habitat shifts in all local waters. Further, collaboration with cross border authorities involved in the HZMB Project, in particular with regards to sharing photo ID catalogues, may provide additional information on habitat use outside Hong Kong.

At this stage when there is an ongoing and increasing number of activities occurring in the dolphins habitat. The population is in decline, as stated by both the AFCD long term monitoring programme for Hong Kong waters and independent studies for adjacent PRE waters (Huang *et al* 2012). 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 are 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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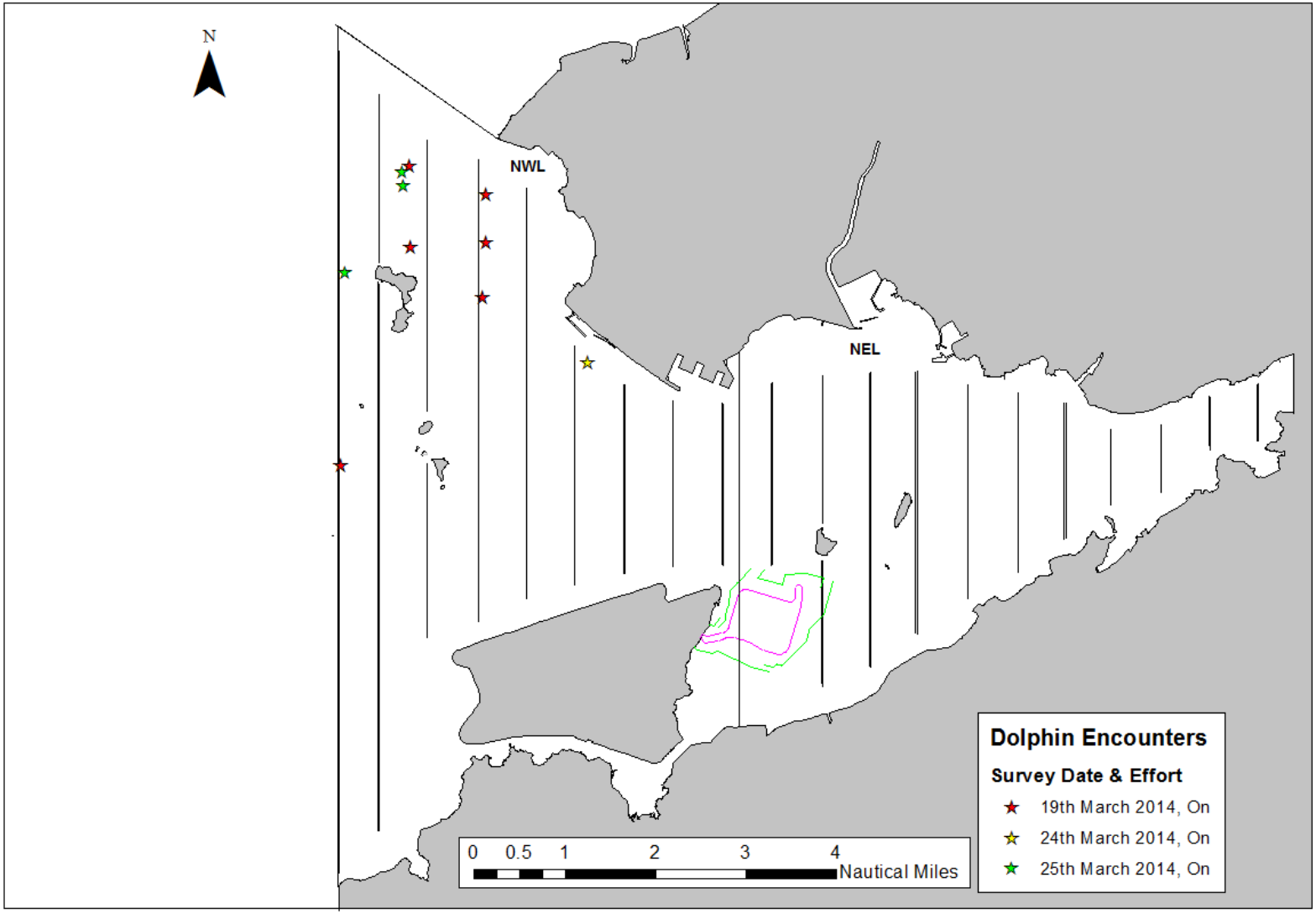

Figure 3 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (March 2014)

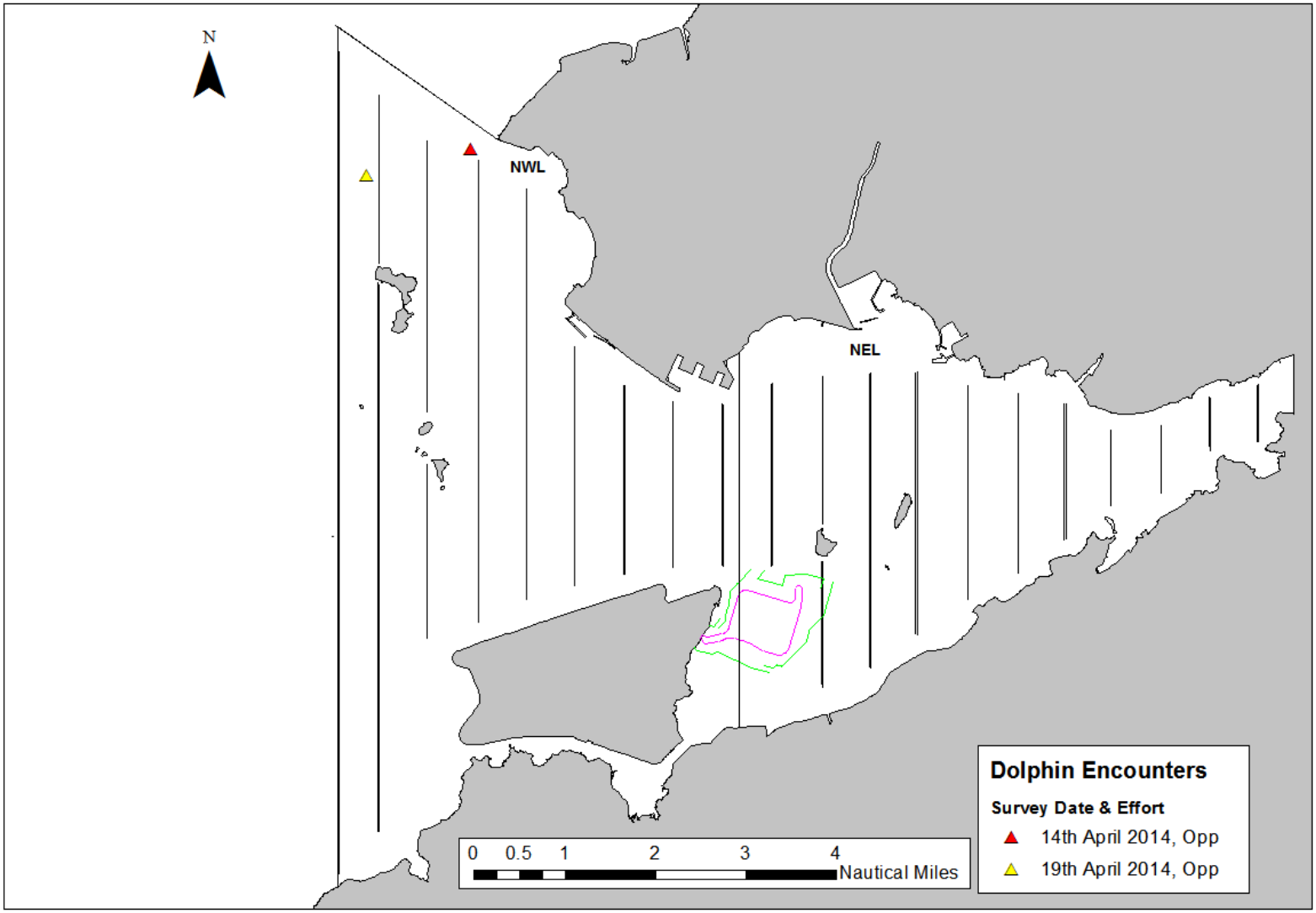

Figure 4 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (April 2014)

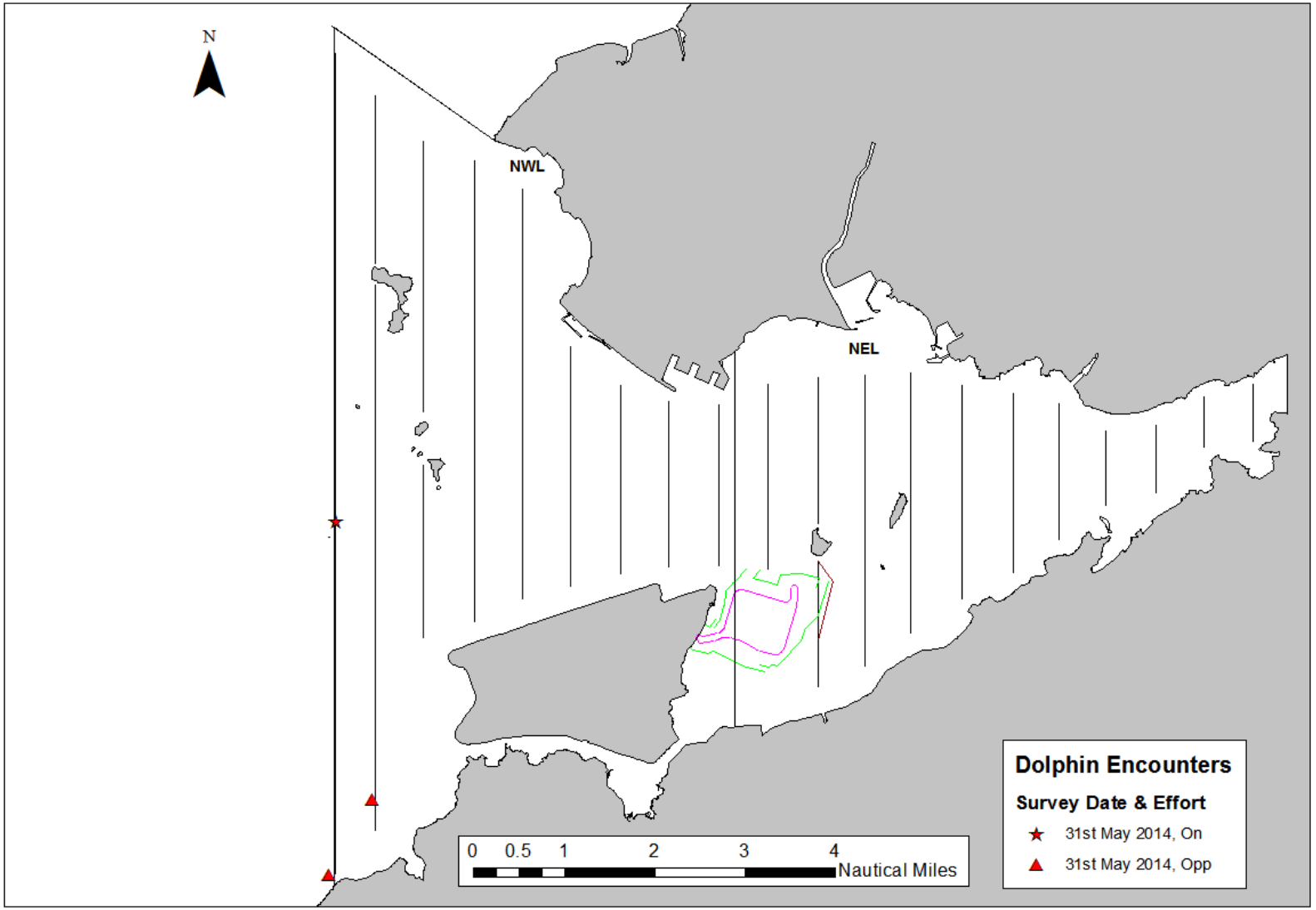

Figure 5 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (May 2014)

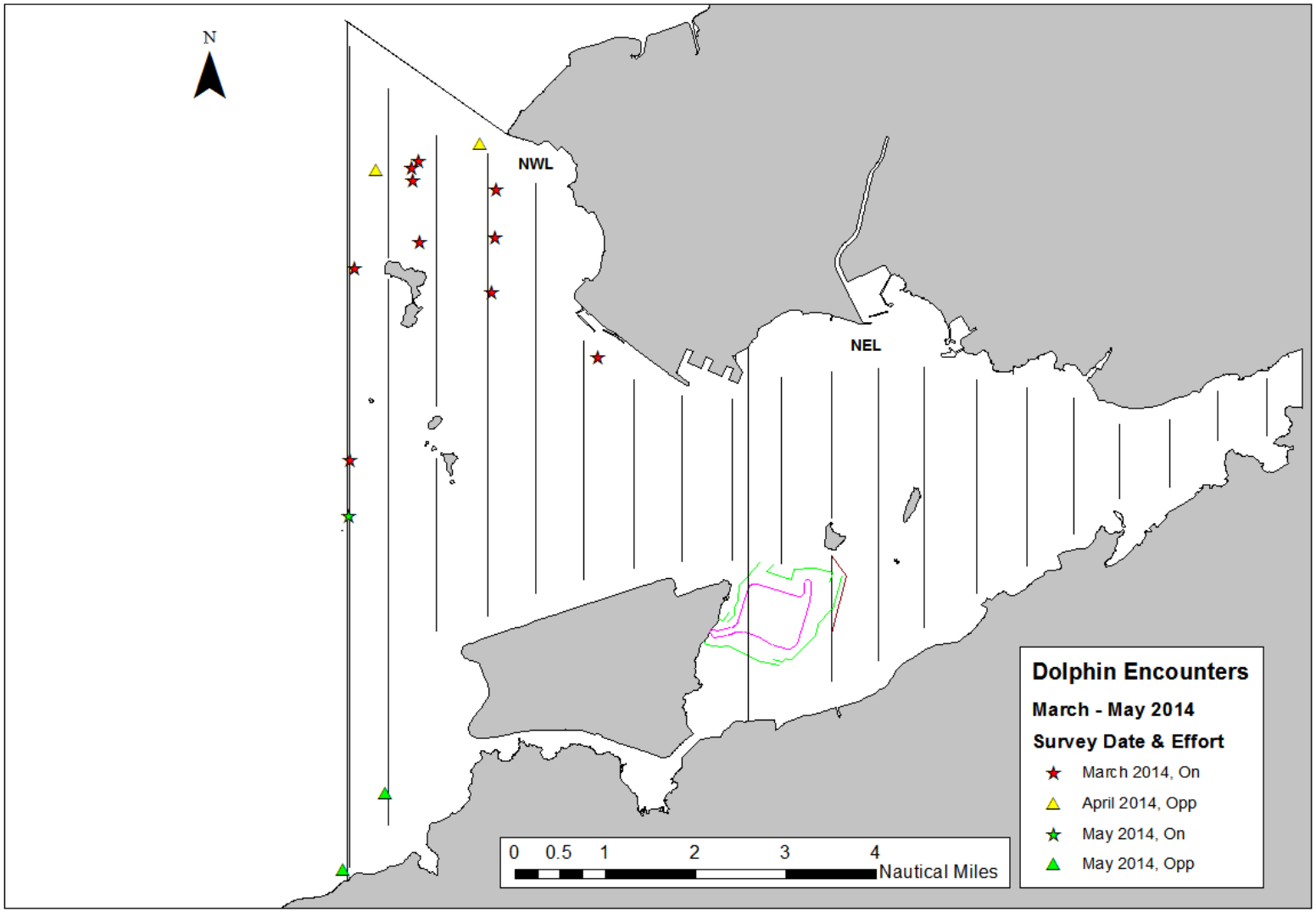

Figure 6. Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (March – May 2014)

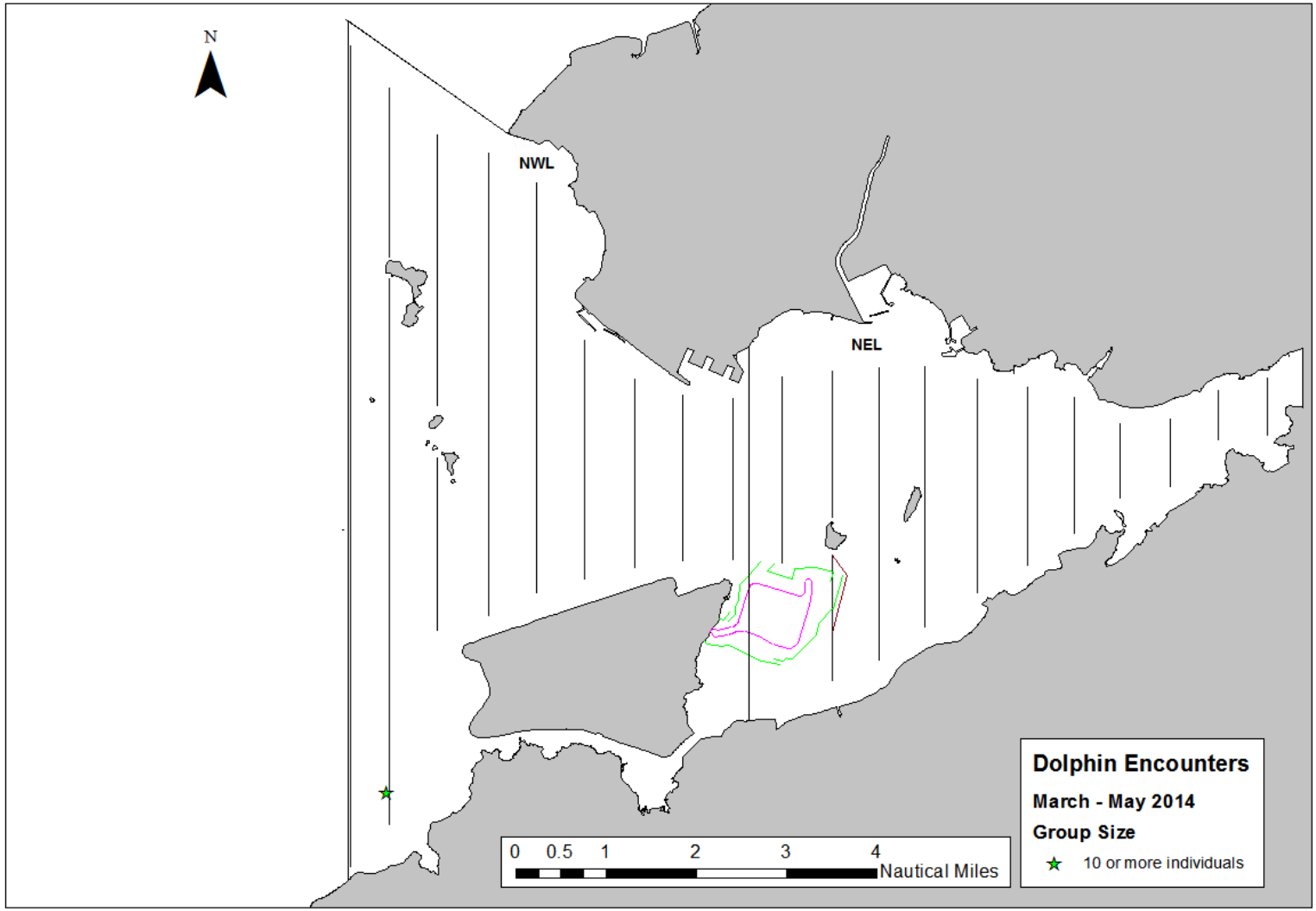

Figure 7. The Location of Dolphin Groups Numbering Five and Above Individuals (March – May 2014)

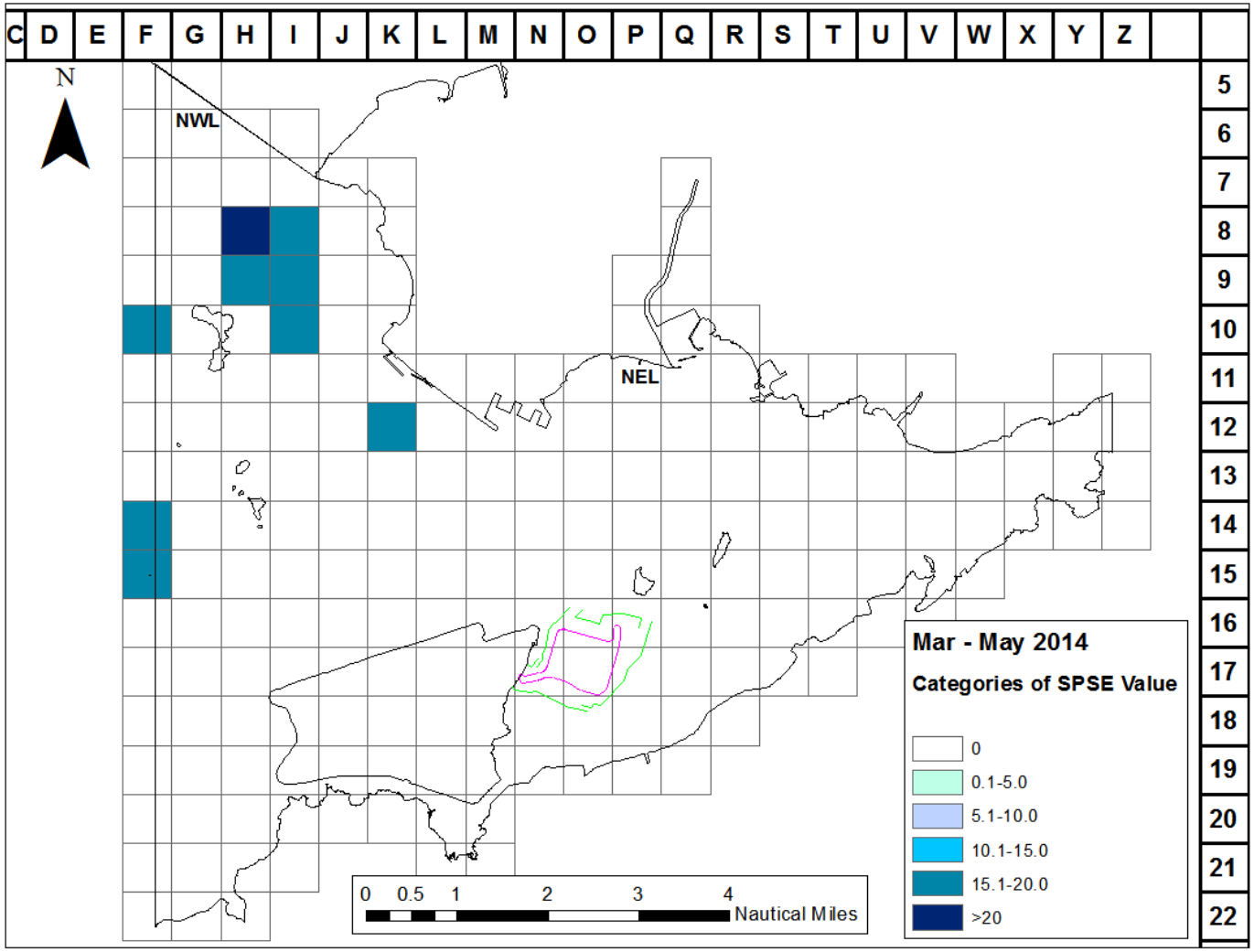

Figure 8. Sighting density SPSE (number of on-effort sightings per 100 units of survey effort) for March – May 2014

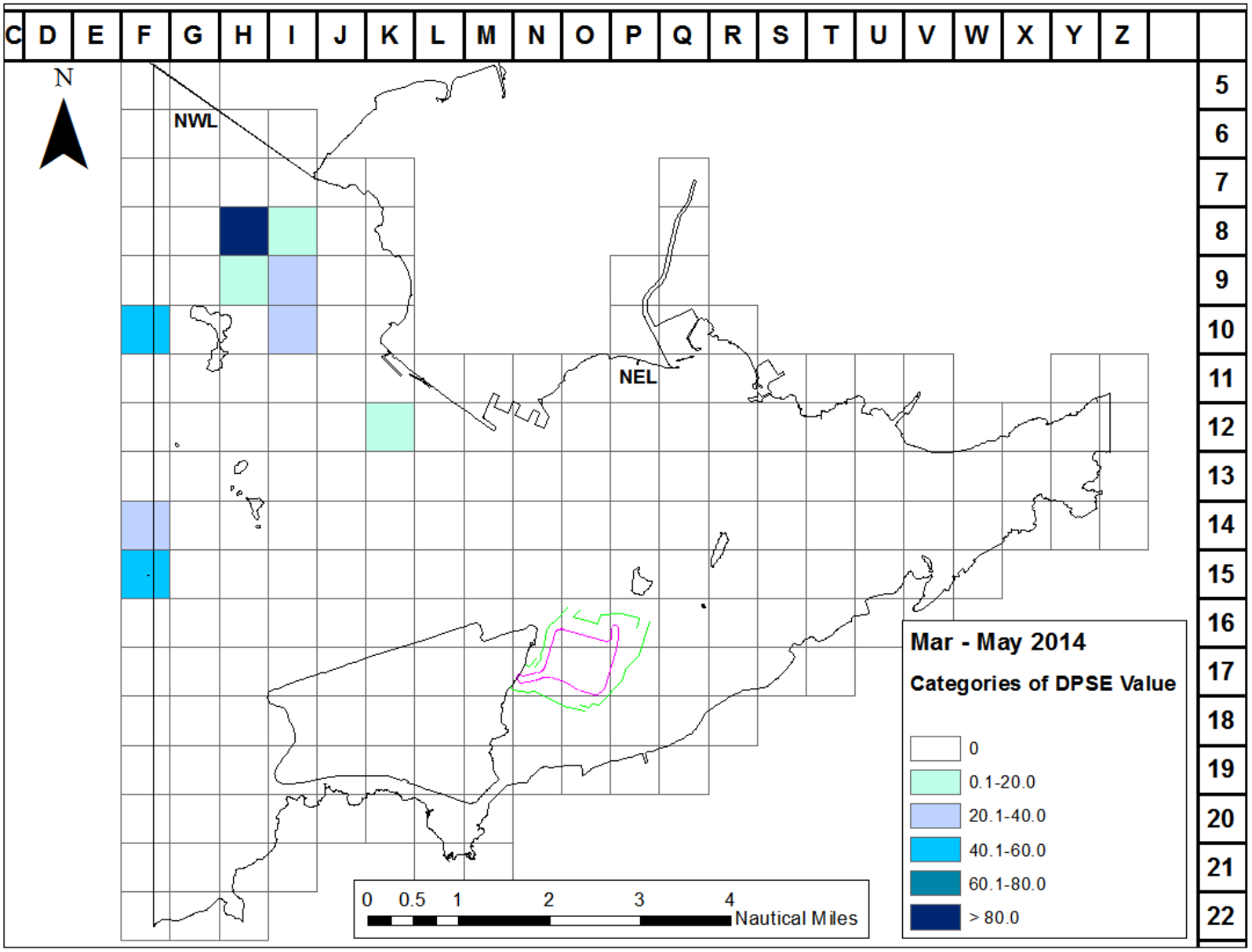

Figure 9. Dolphin density DPSE (number of dolphins per 100 units of survey effort) for March – May 2014.

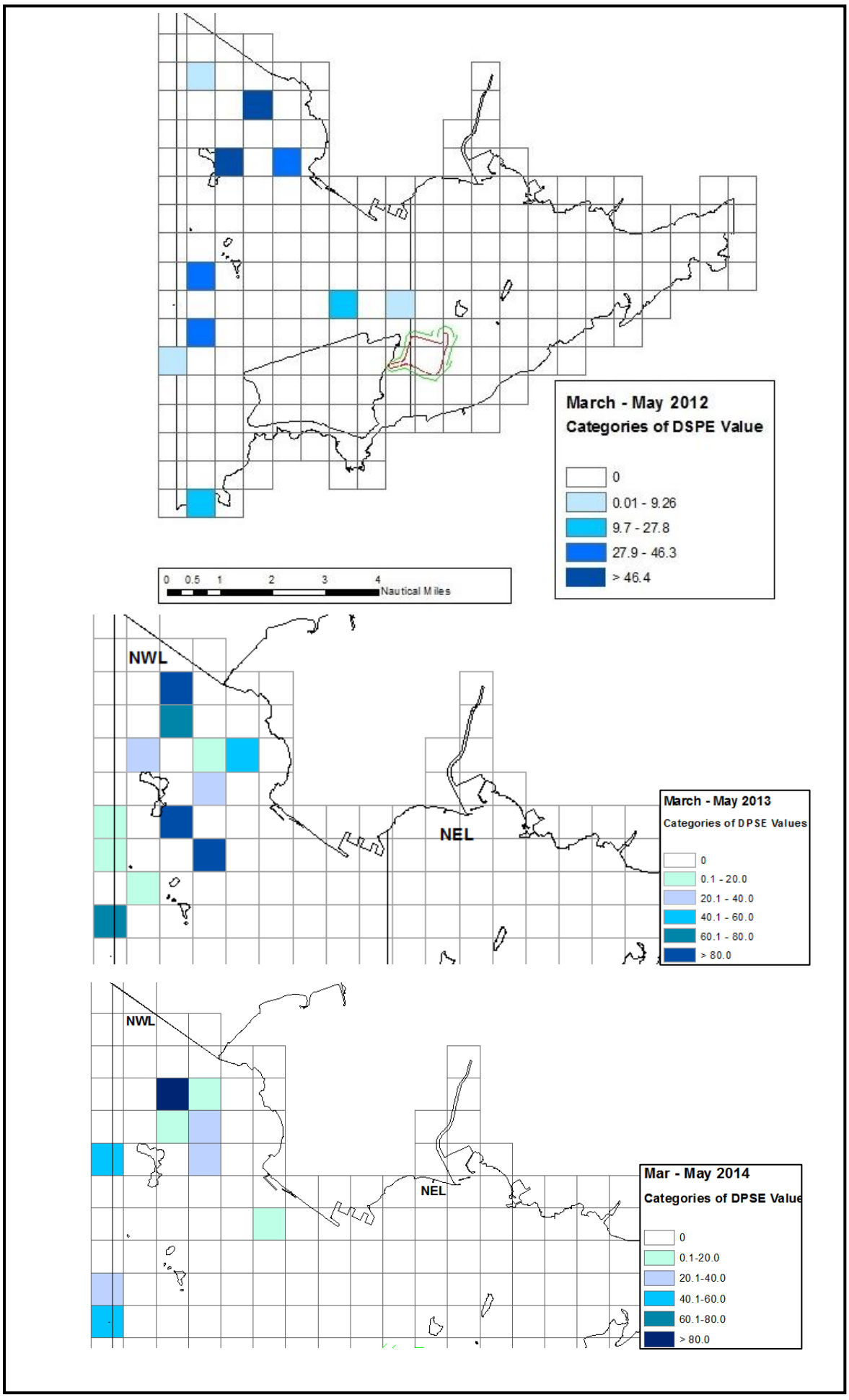

Figure 10. DSPE Shifts from NEL to NWL Waters during the Periods March – May 2012 - 2014

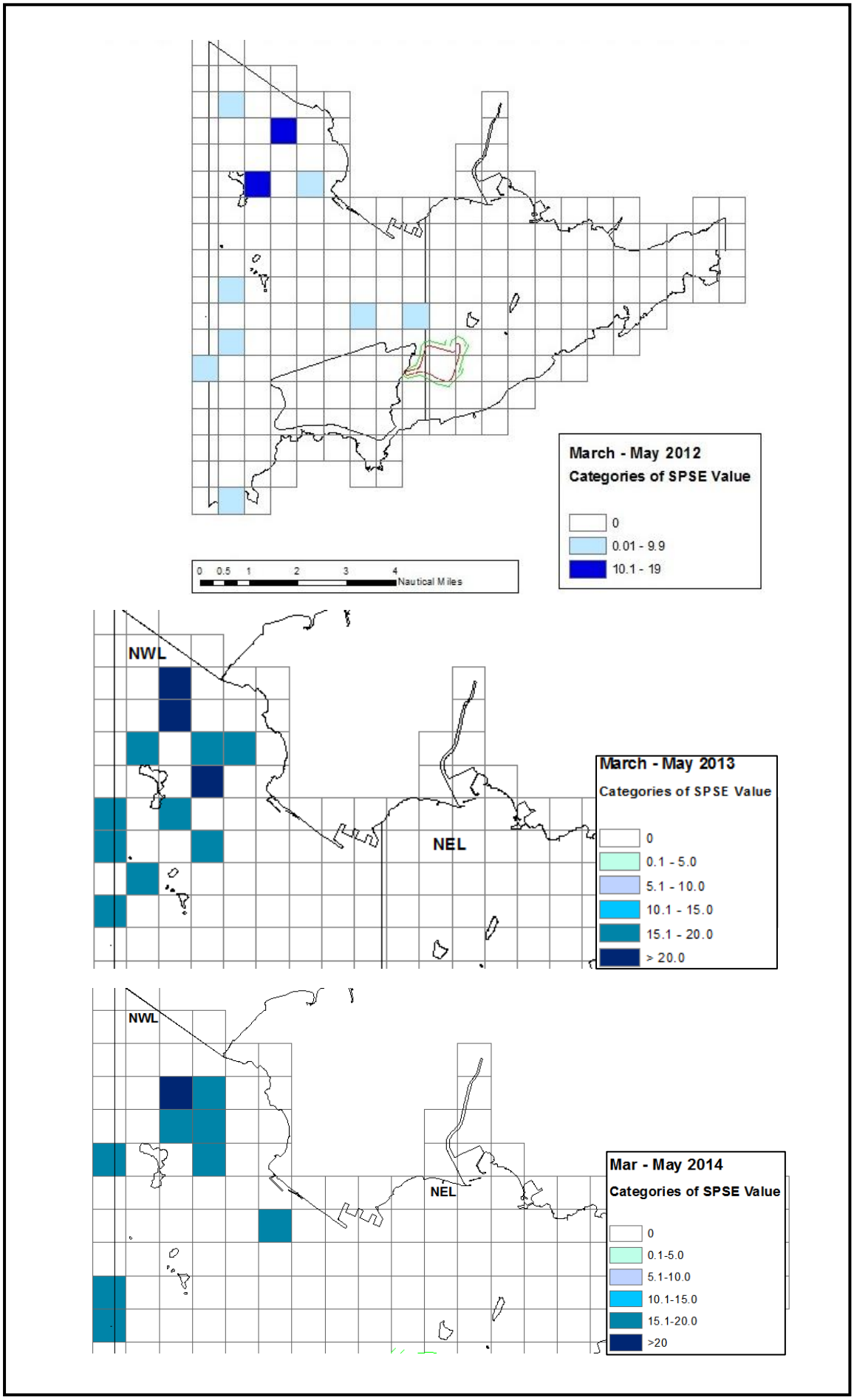

Figure 11. SPSE Shifts from NEL to NWL Waters during the Periods March – May 2012 - 2014

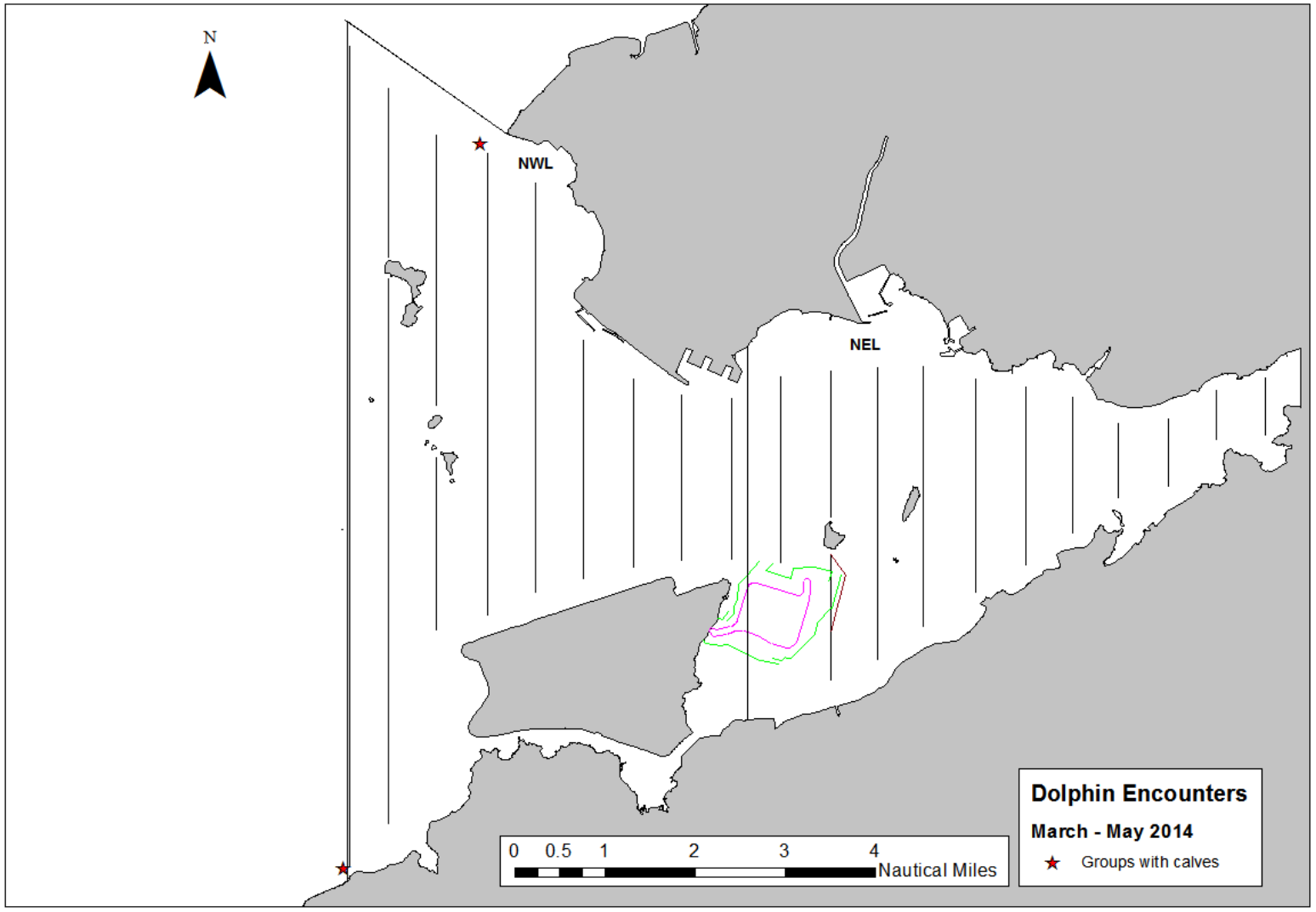

Figure 12. Location of groups containing mother and calf pairs during March – May 2014.

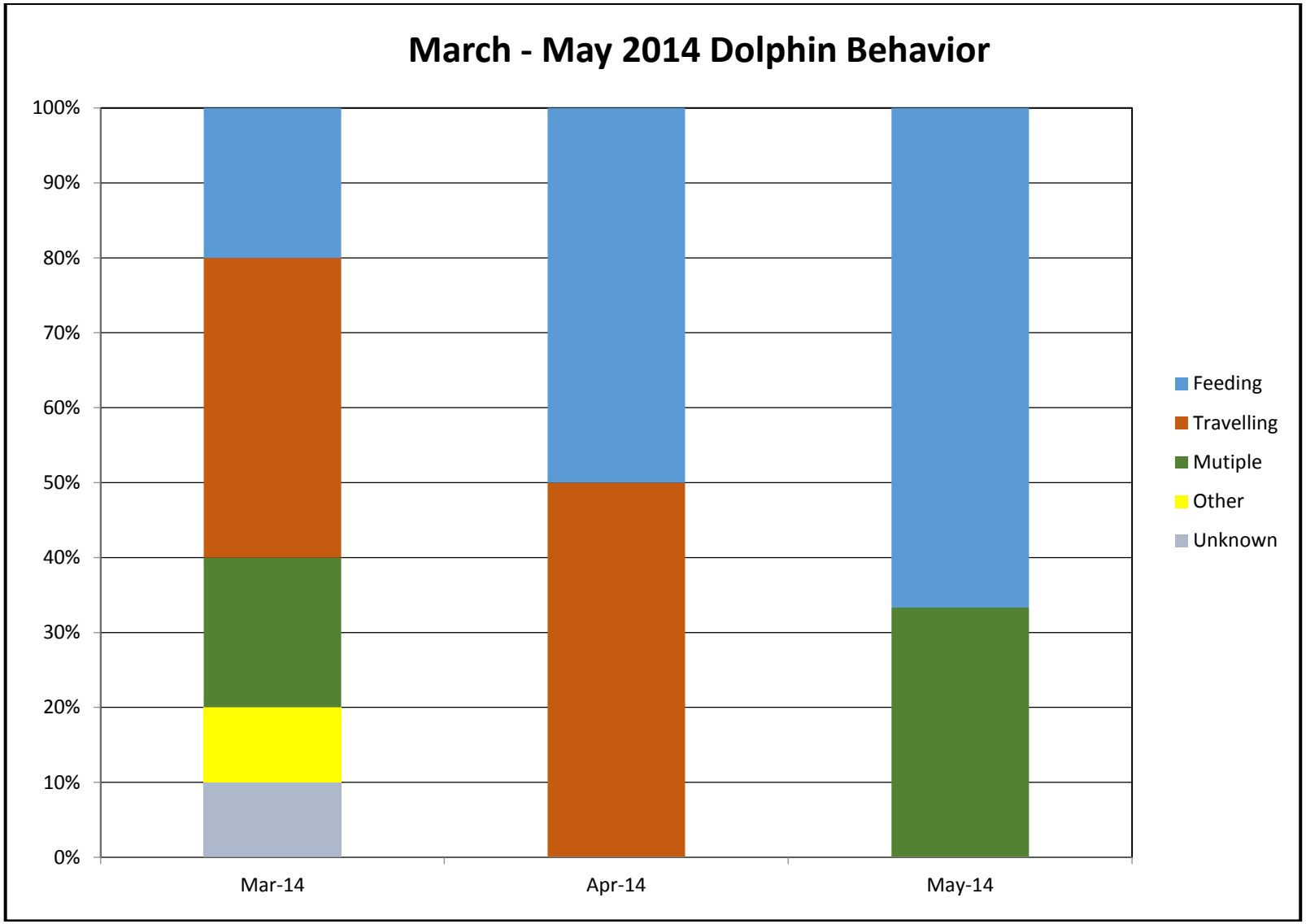

Figure 13. Activity Budget for Dolphin Behaviour March – May 2014.

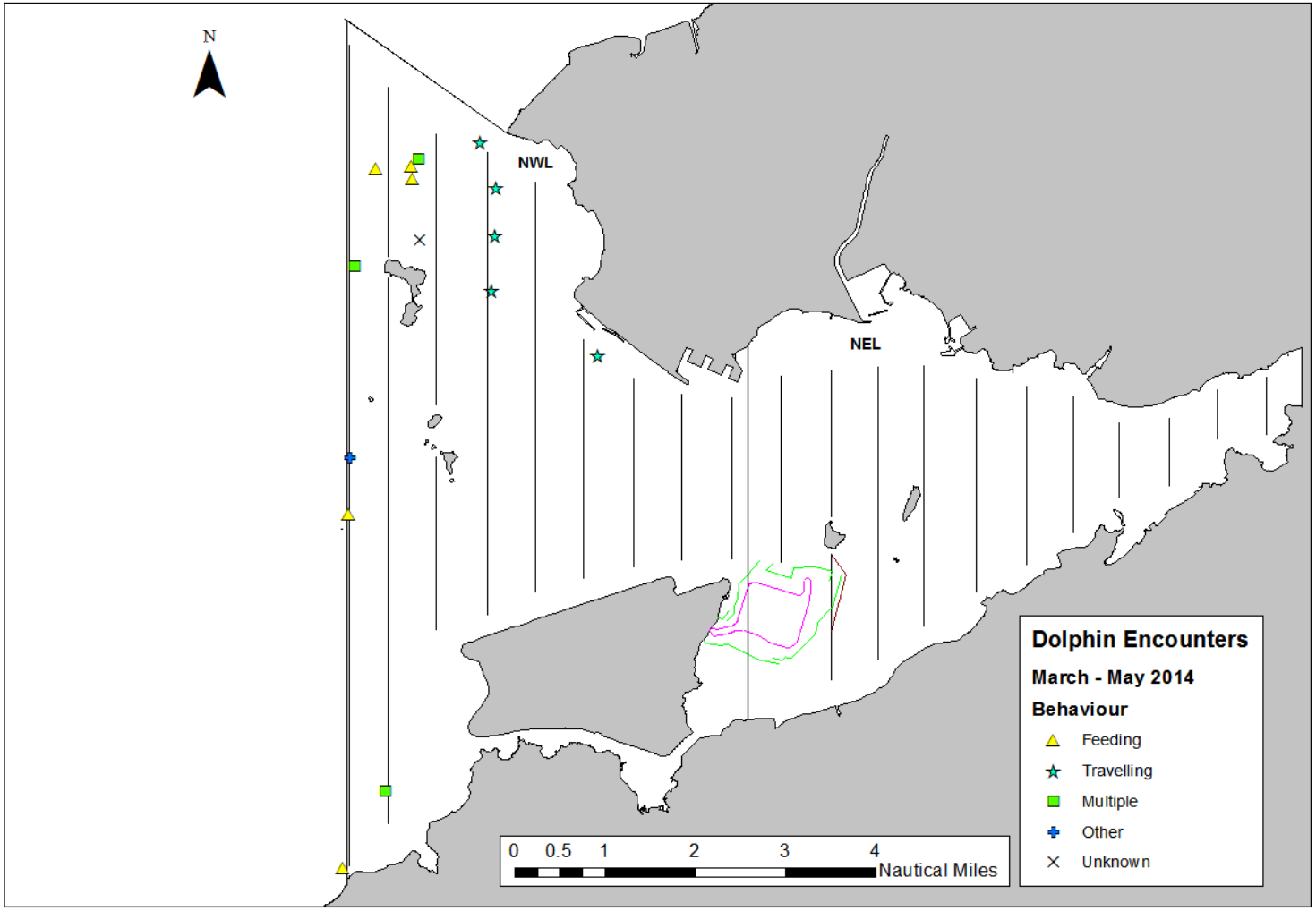

Figure 14. The Location of Different Behavioural Activities March – May 2014

Annex I. Impact Monitoring Survey Schedule and Details (March – May 2014)

Date	Location of Survey	No. Sightings ON	No. Sightings Opp	Total km "on effort"
03/17/2014	NE and NW Lantau (5-20,23)	0	0	60.8
03/19/2014	NWL (1-4, 21, 22)	6	0	50.1
03/24/2014	NE and NW Lantau (5-20,23)	1	0	60.8
03/25/2014	NWL (1-4, 21, 22)	3	0	49.9
04/02/2014	NWL (1-5, 21, 22)	0	0	58.3
04/03/2014	NE and NW Lantau (6-20,23)	0	0	52.1
04/14/2014	NE and NW Lantau (7-20,23)	0	1	63.1
04/19/2014	NWL (1-6, 21, 22)	0	1	46.6
05/08/2014	NWL (1-6, 21, 22)	0	0	63.0
05/12/2014	NE and NW Lantau (7-20,23)	0	0	47.6
05/27/2014	NE and NW Lantau (5-20,23)	0	0	60.8
05/31/2014	NWL (1-4, 21, 22)	1	2	49.6
	Total	**11**	**4**	**662.7**

All effort in all sea states is listed

Annex II. Impact Monitoring Survey Effort Summary (March – May 2014)

Date	Area	Sea State (on effort)	Effort (km)	Season	Vessel	Type
03/17/2014	NWL	0	4.6	SPRING	HKDW	IMPACT
03/17/2014	NWL	1	19	SPRING	HKDW	IMPACT
03/17/2014	NEL	0	8	SPRING	HKDW	IMPACT
03/17/2014	NEL	1	29.2	SPRING	HKDW	IMPACT
03/19/2014	NWL	0	0.1	SPRING	HKDW	IMPACT
03/19/2014	NWL	1	35.4	SPRING	HKDW	IMPACT
03/19/2014	NWL	2	14.6	SPRING	HKDW	IMPACT
03/24/2014	NWL	0	0.1	SPRING	HKDW	IMPACT
03/24/2014	NWL	1	20.3	SPRING	HKDW	IMPACT
03/24/2014	NWL	2	3.3	SPRING	HKDW	IMPACT
03/24/2014	NEL	0	0.1	SPRING	HKDW	IMPACT
03/24/2014	NEL	1	20.5	SPRING	HKDW	IMPACT
03/24/2014	NEL	2	14.8	SPRING	HKDW	IMPACT
03/24/2014	NEL	3	1.7	SPRING	HKDW	IMPACT
03/25/2014	NWL	0	0.1	SPRING	HKDW	IMPACT
03/25/2014	NWL	1	49.8	SPRING	HKDW	IMPACT
04/02/2014	NWL	0	2.4	SPRING	HKDW	IMPACT
04/02/2014	NWL	1	13	SPRING	HKDW	IMPACT
04/02/2014	NWL	2	35.2	SPRING	HKDW	IMPACT
04/02/2014	NWL	3	7.7	SPRING	HKDW	IMPACT
04/03/2014	NWL	1	15	SPRING	HKDW	IMPACT
04/03/2014	NEL	1	34.3	SPRING	HKDW	IMPACT
04/03/2014	NEL	2	2.8	SPRING	HKDW	IMPACT
04/14/2014	NWL	1	1.7	SPRING	HKDW	IMPACT
04/14/2014	NWL	2	24.6	SPRING	HKDW	IMPACT
04/14/2014	NWL	3	34.7	SPRING	HKDW	IMPACT
04/14/2014	NWL	4	2.1	SPRING	HKDW	IMPACT
04/19/2014	NWL	1	3.7	SPRING	HKDW	IMPACT
04/19/2014	NWL	2	6.3	SPRING	HKDW	IMPACT
04/19/2014	NEL	1	15.4	SPRING	HKDW	IMPACT
04/19/2014	NEL	2	21.2	SPRING	HKDW	IMPACT
05/08/2014	NWL	1	26.5	SPRING	HKDW	IMPACT
05/08/2014	NWL	2	36.5	SPRING	HKDW	IMPACT
05/12/2014	NWL	1	7.2	SPRING	HKDW	IMPACT
05/12/2014	NWL	2	3.1	SPRING	HKDW	IMPACT
05/12/2014	NEL	1	16.3	SPRING	HKDW	IMPACT

Annex II. Impact Monitoring Survey Effort Summary (March – May 2014) (con)

Date	Area	Sea State (on effort)	Effort (km)	Season	Vessel	Type
05/12/2014	NEL	2	21	SPRING	HKDW	IMPACT
05/27/2014	NWL	1	19.3	SPRING	HKDW	IMPACT
05/27/2014	NWL	2	4.3	SPRING	HKDW	IMPACT
05/27/2014	NEL	1	27.4	SPRING	HKDW	IMPACT
05/27/2014	NEL	2	9.8	SPRING	HKDW	IMPACT
05/31/2014	NWL	1	12.4	SPRING	HKDW	IMPACT
05/31/2014	NWL	2	37.2	SPRING	HKDW	IMPACT

Annex III. Impact Monitoring Sighting Database (March – May 2014)

Project	Contract	Date	Sighting No.	Time	Group Size	Area	Beaufort	PSD	Effort	Type	Latitude	Longitude	Season	Boat Assoc.
HKBCF	HY/2010/02	19-Mar-14	920	13:45	2	NWL	1	73	On	Impact	22.34542	113.8704	Spring	No
HKBCF	HY/2010/02	19-Mar-14	921	14:48	1	NWL	2	800	On	Impact	22.38591	113.8842	Spring	No
HKBCF	HY/2010/02	19-Mar-14	922	16:46	4	NWL	1	223	On	Impact	22.40084	113.8839	Spring	No
HKBCF	HY/2010/02	19-Mar-14	923	17:29	1	NWL	1	108	On	Impact	22.39552	113.8993	Spring	No
HKBCF	HY/2010/02	19-Mar-14	924	17:45	2	NWL	1	185	On	Impact	22.38671	113.8993	Spring	No
HKBCF	HY/2010/02	19-Mar-14	925	17:57	2	NWL	2	31	On	Impact	22.37654	113.8985	Spring	No
HKBCF	HY/2010/02	24-Mar-14	927	13:58	1	NWL	1	142	On	Impact	22.36447	113.9196	Spring	No
HKBCF	HY/2010/02	25-Mar-14	929	11:00	2	NWL	1	891	On	Impact	22.39716	113.8829	Spring	No
HKBCF	HY/2010/02	25-Mar-14	930	11:25	4	NWL	1	880	On	Impact	22.39957	113.8826	Spring	No
HKBCF	HY/2010/02	25-Mar-14	931	14:18	3	NWL	1	139	On	Impact	22.38102	113.8712	Spring	No
HKBCF	HY/2010/02	14-Apr-14	938	21:33	4	NWL	2	N/A	Opp	Impact	22.40411	113.8962	Spring	No
HKBCF	HY/2010/02	19-Apr-14	940	18:49	2	NWL	2	N/A	Opp	Impact	22.39919	113.8756	Spring	No
HKBCF	HY/2010/02	31-May-14	951	9:28	12	NWL	1	N/A	Opp	Impact	22.26958	113.8691	Spring	No
HKBCF	HY/2010/02	31-May-14	953	11:10	3	NWL	1	124	On	Impact	22.33514	113.8703	Spring	No
HKBCF	HY/2010/02	31-May-14	954	13:26	3	NWL	2	N/A	Opp	Impact	22.28360	113.8776	Spring	No

Annex IV

March 2012– May 2014

(and Baseline September – November 2011)

Photo Identification Information

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 120		2014/05/31	951	NWL
HZMB 119		2014/04/19	940	NWL
HZMB 118		2014/01/06	890	NWL
HZMB 117		2014/01/06	888	NWL
HZMB 116		2013/12/26	879	NWL
HZMB 115		2013/12/26	879	NWL
HZMB 114		2013/10/24	827	NWL
HZMB 113		2013/10/24	827	NWL
HZMB 112		2013/10/15	815	NWL
HZMB111		2013/10/15	815	NWL
HZMB 110		2013/10/15	812	NWL
HZMB 108		2013/08/30	780	NEL
HZMB 107		2013/08/21	770	NWL
HZMB 106		2013/08/21	769	NWL
HZMB 105		2014/05/31	951	NWL
		2013/07/08	711	NWL
HZMB 104		2013/07/08	711	NWL
HZMB 103		2013/07/08	711	NWL
HZMB 102		2013/07/08	706	NWL
HZMB 101		2013/07/08	706	NWL
HZMB 100		2013/07/08	706	NWL
HZMB 099		2013/06/13	681	NWL
		2013/06/13	680	NWL
HZMB 098	NL104	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
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		2014/05/31	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		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
HZMB 089		2013/02/15	579	NWL
HZMB 088		2013/02/15	579	NWL
HZMB 087		2013/02/15	579	NWL
HZMB 086	NL242	2013/05/09	642	NWL
		2013/02/15	579	NWL
		2011/10/10	Baseline	NWL
HZMB 085		2014/05/31	954	NWL
		2013/06/26	703	NWL
		2013/02/15	579	NWL
HZMB 084		2013/02/14	575	NWL
HZMB 083	NL136	2013/12/19	863	NWL
		2013/03/28	607	NWL
		2013/02/15	579	NWL
		2013/01/28	568	NWL
		2012/01/28	564	NWL
HZMB 082		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
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		2013/08/21	774	NWL
		2013/07/08	711	NWL
		2012/10/24	476	NWL
HZMB 068		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
HZMB 064		2013/05/09	647	NWL
		2013/01/28	561	NWL
		2012/10/24	475	NWL
		2012/10/12	466	NWL
HZMB 063		2013/05/09	647	NWL
		2012/10/12	466	NWL
HZMB 062		2012/12/06	525	NEL
		2012/10/11	457	NWL
HZMB 060		2012/09/18	447	NWL
HZMB 059		2013/02/21	591	NWL
		2012/09/18	445	NWL
HZMB 057		2012/09/18	440	NWL
HZMB 056		2012/09/18	442	NWL
		2012/09/05	433	NEL
HZMB 055		2012/09/04	425	NWL

HZMB 054	CH34	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	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		2014/01/10	900	NWL
		2014/01/06	888	NWL
		2013/02/15	579	NWL
		2012/09/04	421	NWL
HZMB 049		2012/09/03	419	NWL
HZMB 048		2012/09/03	419	NWL
HZMB 047		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	2014/02/17	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
HZMB 043		2012/09/03	407	NWL
HZMB 042	NL260	2013/12/19	863	NWL
		2012/11/01	495	NWL
		2011/11/07	Baseline	NWL
HZMB 041	NL24	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		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
HZMB 026		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		2014/01/06	888	NWL
		2013/07/08	715	NWL
		2013/07/08	711	NWL
		2013/04/01	619	NWL
		2013/02/21	589	NWL
		2013/02/15	579	NWL
		2012/07/10	330	NWL
HZMB 022		2014/01/06	888	NWL
		2013/10/24	827	NWL
		2013/07/08	715	NWL
		2013/07/08	711	NWL
		2013/04/01	619	NWL
		2013/02/21	589	NWL
		2013/02/15	579	NWL
		2012/07/10	330	NWL
HZMB 021	NL37	2012/07/10	330	NWL
		2011/09/16	Baseline	NWL
HZMB 020		2012/07/10	330	NWL
HZMB 019		2012/07/10	330	NWL
HZMB 018		2014/02/17	910	NWL
		2013/05/09	647	NWL
		2013/02/21	594	NEL
		2012/12/10	529	NEL
		2012/07/10	330	NWL
HZMB 017		2012/07/10	330	NWL

HZMB 016		2013/07/08	706	NWL
		2012/12/11	539	NWL
		2012/09/18	446	NWL
		2012/09/04	421	NWL
		2012/07/10	330	NWL
HZMB 015		2012/07/10	330	NEL
HZMB 014	NL176	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		2012/05/28	281	NWL
HZMB 008		2012/05/28	281	NWL
HZMB 007	NL246	2012/12/10	529	NEL
HZMB 006		2013/02/21	594	NEL
		2012/12/11	539	NWL
		2012/11/01	495	NWL
		2012/03/29	250	NWL
HZMB 005		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		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
HZMB 001	WL46	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
	NL37	2011/09/16	Baseline	NWL
	NL46	2011/10/28	Baseline	NWL

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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

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

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

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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

HZMB 022 2013-04-01_10-38-57_03

HZMB 023 2012-07-10_10-42-20_02

HZMB 023 2013-04-01_10-43-27

HZMB 024 2012-06-14_13-09-40_03

HZMB 024 2012-06-14_13-12-02_01

HZMB 025 2012-06-13_12-51-58

HZMB 025 2013-02-21_16-49-44

HZMB 026 2012-06-13_12-59-46_01 2C

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HZMB 033 2012-10-12_14-55-22_06

HZMB 034 2012-11-01_13-30-58_02

HZMB 035 2012-11-01_11-59-54

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HZMB 037 2012-11-01_11-47-18_03

HZMB 038 2012-11-01_11-40-32_01

HZMB 040 2012-11-01_13-22-54_03

HZMB 040 2013-02-21_13-27-55_01

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HZMB 042 2012-11-01_17-01-20_02

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HZMB 047 2012-09-03_10-11-52_01

HZMB 048 2012-09-03_15-33-04_03

HZMB 049 2012-09-03_15-39-04_02

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HZMB 064 2012-10-24_14-02-40_05

HZMB 067 2012-10-24_14-40-28_01

HZMB 068 2012-10-24_14-32-56_02

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HZMB 070 2012-10-24_14-38-06

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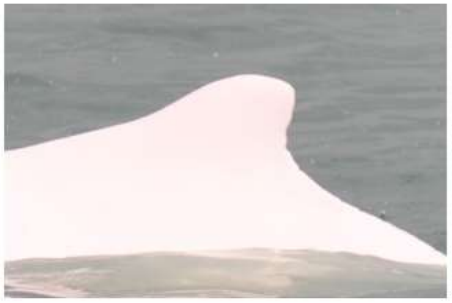

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HZMB 100 2013-07-08_09-43-16 _03

HZMB 101 2013-07-08_09-35-35 _01

HZMB 101 WL 2013-07-08_09-42-35 _03

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HZMB 103 2013-07-08_13-52-32 _02

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HZMB 104 2013-07-08_14-08-35 _02

HZMB 105 WL 2013-07-08_14-17-45

HZMB 106 WL_2013-08-21_09-37-43

HZMB 107 2013-08-21_11-54-23_02

HZMB 107 2013-08-21_12-01-31_01

HZMB 108 2013-08-30_16-04-04_02

HZMB 110 2013-10-15_09-39-45

HZMB 111 2013-10-15_10-21-46 _01

HZMB 112 2013-10-15_10-20-30

HZMB 113 2013-10-24_11-04-54 _01

HZMB 114 2013-10-24_11-06-19

HZMB 115 2013-12-26_13-54-54 _01

HZMB 116 2013-12-26_13-59-59

HZMB 117 2014-01-06_11-39-43 _03

HZMB 118 2014-01-06_13-40-50 _01

HZMB 119 2014-04-19_10-55-28

HZMB 120 2014-05-31 09-50-10_02

HZMB 120 2014-05-31 09-50-27

China Harbour Engineering Company Limited

Monthly Summary Waste Flow Table for May / 2014 (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	Metals	Paper/ cardboard packaging	Plastics (see Note 2)	Chemical Waste (see Note 4)	Others, e.g. general refuse (see Note 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 '000 m^3)
Jan-14	0.0000	0.0000	0.0000	0.0000	0.0000	1158.9828	0.0000	0.1680	0.0000	2.0000	0.0325
Feb-14	0.0000	0.0000	0.0000	0.0000	0.0000	1064.5957	0.0000	0.2520	0.0000	0.0000	0.0520
Mar-14	0.0000	0.0000	0.0000	0.0000	0.0000	1111.9982	0.0000	0.0000	0.0000	1.4000	0.1690
Apr-14	0.0000	0.0000	0.0000	0.0000	0.0000	1294.8080	0.0000	0.0000	0.0000	0.0000	0.0845
May-14	0.0000	0.0000	0.0000	0.0000	0.0000	1181.4168	0.0400	0.0240	0.0000	1.0000	0.0910
Jun-14											
Sub-total	0.0000	0.0000	0.0000	0.0000	0.0000	5811.8015	0.0400	0.4440	0.0000	4.4000	0.4290
Jul-14											
Aug-14											
Sep-14											
Oct-14											
Nov-14											
Dec-14											
Total	0.0000	0.0000	0.0000	0.0000	0.0000	5811.8015	0.0400	0.4440	0.0000	4.4000	0.4290

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 6.5m^3 by volume.

(4) Chemical waste refer to spent “battery” and “oil with water”.

Appendix J

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

Cumulative statistics on Exceedances

		Total no. recorded in this reporting quarter	Total no. recorded since project commencement
1-Hour TSP	Action	-	-
	Limit	-	-
24-Hour TSP	Action	-	-
	Limit	-	-
Noise	Action	-	-
	Limit	-	-
Water Quality	Action	-	1
	Limit	-	1
Dolphin Monitoring	Action	-	-
	Limit	-	-

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

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

	Date Received	Subject	Status	Total no. received in this quarter	Total no. received since project commencement
Environmental complaints	17 March 2014	EPD referred a complaint on 17 March 2014 from complainant who advised that there was sea water coloured in blue observed in vicinity of Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Facilities (HKBCF) where stone column installation was taking place. The complainant suspected that the filling material was stained	Closed	1	16

		and contaminated the sea water after being filled into the sea. With reference to the available information, it is indicated that the abovementioned sea water coloured in blue observed in vicinity of HKBCF is unlikely to be project related.			
	22 March 2014	EPD referred a complaint from a complainant who advised that muddy water was found being discharged from the construction site of Hong Kong-Zhuhai-Macau Bridge Hong Kong Boundary Crossing Facilities (HKBCF) – Reclamation Works on 22 March 2014. After investigation, it is considered that the complaint is unlikely to be project related.	Closed	2	17
	25 March 2014	As informed by the Contractor, a complaint was received by the Contractor on 25 March 14 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. With refer to the available information; it is unable to conclude whether the complaint is project related.	Closed	3	18
	7 May 14	As informed by the Contractor on 7 May 14, a complaint was received by the Contractor on 17 April 14 concerning sand and dust	Closed	4	19

		emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. Investigation result shows that the complaint is unlikely to be related to this Contract.			
	30 May 14	As informed by the Contractor on 30 May 14, an environmental complaint had been received on 28 May 2014. The complainant mentioned that waste such as earth and concrete were being felled into the sea everyday at the Hong Kong-Zhuhai-Macao Bridge at location where construction works are being conducted, causing pollution to the marine environment. After investigation, it is concluded that the complaint is unlikely to be related to this Contract.	Closed	5	20
Notification of summons	-	-	-	-	2
Successful Prosecutions	28 April 2014	In relation to the notification of summons received March 2014 due to works carried out on 6 October 13 contrary to conditions of NCO, Cap.400. The Contractor pledged guilty to the charge during the court appearance on 28 April 2014.	-	1	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	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.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
Exceedance for two or more consecutive samples	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.	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.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	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	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.	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.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	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	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.	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.	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.	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	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.	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.	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.	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals.
Limit Level	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.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	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.	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	1. Repeat *in situ* 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.	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.	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.	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	1. Repeat *in situ* 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.	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.	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.	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	1. Repeat *in-situ* 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.	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.	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.	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	1. Repeat *in-situ* 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.	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.	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.	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	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.	1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and finding with the ET and the Contractor.	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.	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	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;	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	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.	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

	6. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary. 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.	by ET and Contractor and advise ER/SOR of the results and findings accordingly. 5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise ER/SOR the results and findings accordingly.	3. Supervise the implementation of additional monitoring and/or any other mitigation measures.	and/or any other mitigation measures.

Report No. **D005**
Monitoring Period **March - May 2014**

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	2.5	5.7	

[#] 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 and NWL.
- Other source of impact: from various sources (please refer to item 2 of the attachment for the identified sources of impacts).
- 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.

Although no unacceptable changes in environmental parameters of this project have been measured, at this time it is not possible to make a conclusive assessment of this Project's specific impact on dolphins.

b) Action required under the action plan
Please refer to corresponding Event and Action Plan.

c) Action taken under the action plan
1. Data review 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 souce 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 to Project works.

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 exisiting mitigation measures.

e) Contractor's actions to implement the mitigation
N/A

Please refer to the attachment for the full investigation result.

ET Leader Signature & Date: 15-Oct-14

Report No. **D005**
Monitoring Period **March - May 2014**

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.

The data from water quality from the reporting quarter were reviewed no project related water quality exceedence for HKBCF was recorded during March – May 2014. In addition, on review of recent AFCD annual monitoring reports (AFCD 2014; 2013; 2012; 2011), it is stated that a decline in dolphin density and abundance has been apparent in all areas of Hong Kong for some time. Further a summary of a regression analyses presented in last year's report (AFCD 2013) shows that there has been a significant decrease in dolphin abundance since the early 2000's, more than a decade prior to Project commencement. A paper published which incorporates data from throughout the populations known extent, confirms the ongoing and severe decline of the dolphin population and estimates that 74.27% of the population will be lost within the next three generations (Huang *et al* 2012). Moreover, it is predicted that the current calculated rate is likely to accelerate given what is understood from other cetacean population collapses in the South China Sea region. There was no similar population modeling conducted as part of the EIA for this Project, however, the EIA reports this decline and from information therein and the data currently available from elsewhere, there is a well-documented and substantial population decline. Given that the population has been in significant decline since prior to Project onset and as there has been no recorded exceedences of this Projects water quality plus all dolphin monitoring has been conducted as per EM&A Manual, there is no evidence to indicate a direct link between this Project and the encounter rates throughout the NWL and NEL area for March – May 2014.

2. Identify source(s) of impacts.

There is a documented significant population decline of the Hong Kong dolphin and, as yet, no detailed assessment of causal factors is available. Recent population modelling studies do show a significant and, possibly, accelerating population decline since 2000 (see 1) and, prior to 2008, an expert panel concluded that the anthropogenic activities which occur in the Hong Kong and adjacent habitat which have considerable potential to affect the PRE dolphin population through pollution, infection, lowered prey availability, intense and low noise levels, collisions, behavioural changes, disturbance, entanglement in fishing gear and habitat modification are; 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 (as the trawling ban progresses "lowered prey availability" should alter) and a general reduction in fishing activities will reduce the potential for entanglement in fishing gear. 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). It is known from studies elsewhere that dredging and all piling activities cause significant disturbance to marine mammals (David 2006; Jefferson *et al.* 2009; Bailey *et al* 2010). These activities do not occur as part of this Project but may do elsewhere in the NEL and NWL areas as well as in Hong Kong and

adjacent habitat. Activities which are stressful to dolphins are usually associated with increased underwater noise levels. Sources of increased underwater noise levels in NEL and NWL include, but may not be limited to;

- HZMB Project marine construction work (all areas, some areas involve piling)
- Other marine works in Hong Kong waters (extensive dredging was reported in NWL as part of shipping lane maintenance)
- Vessel traffic (this Project, HZMB projects, other infrastructure projects and, of course, Hong Kong and adjacent waters are the world's busiest port facility with heavy shipping traffic)
- Other activities that may catalyse a shift in habitat use that is not noise related is an alteration in prey resources. And further, an analysis of the cumulative impact of all of these anthropogenic impacts has yet to be conducted.

Further, a recent publication (Gui *et al* 2014) indicated that the dolphins which live in the Pearl River Estuary are subject to high levels of pollution and analyses tissue samples show both bioaccumulation and biomagnification of heavy metals and persistent organic pollutants (POPs). This indicates the health status of the dolphin population is poor and may have been be impacting population reproductive success and mortality rates for decades.

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 was in place depending on site activities, i.e., Dolphin Exclusive Zone for silt curtain laying (if any) 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 construction works associated with the Project can be found to coincide with the observed dolphin encounter rates.

In summary, no causal relationship with any one construction activity at the Project site can be found to link directly with the reduced habitat use of NEL and NWL during March – May 2014. NWL has seen increasing work activities not as part of this project works. In addition, It was observed that both NEL and NWL areas have been affected by construction and transport activities which are not related to this Contract. These activities may cause impact to marine mammals, usually manifested as a shift in distribution although we do not yet know the long term effect of these activities which are not part of this Contract.

Although no unacceptable changes in environmental parameters of this project have been measured, at this time it is not possible to make a conclusive assessment of this Project's specific impact on dolphins.

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