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 September 2013- November 2013

[05/2014]

	Name	Signature
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Ref.: HYDHZMBEEM00_0_1913L.14 12 May 2014

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

By Fax (3698 5999) and By Post

Attention: Mr. Roger Marechal

Dear Mr. Lo,

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
Hong Kong – Zhuhai – Macao Bridge
Hong Kong Boundary Crossing Facilities – Reclamation Work
Quarterly Environmental Monitoring & Audit Report for September 2013 to November 2013

Reference is made to the Environmental Team's submission of the Quarterly Environmental Monitoring & Audit Report for September 2013 to November 2013 (letter ref. 60249820/C/RMKY14051201 dated 12 May 2014) copied to us by E-mail on 12 May 2014.

Please be informed that we have no adverse comment on the captioned report. The ET Leader and the relevant specialist(s) of the ET are reminded that our verification to your report does not release any of their obligation in the EM&A Manual under the applicable Environmental Permit(s) for this project, in particular on dolphin monitoring and checking on any change in density and distribution pattern of Chinese White Dolphin and recommending appropriate actions and mitigation measures.

Further to the reminder given since our verification of the previous quarterly report for June to August 2013, ET is urged to step up their progress to complete the appropriate statistical tests as required under the EM&A Manual and report the findings without further delay.

The ET is also reminded that it is responsibility of the ET to ensure all data are true, valid and correct on certifying the report for submission.

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

ENVIRON Hong Kong Limited 英環香港有限公司
Room 2403 Jubilee Centre, 18 Fenwick Street, Wan Chai, Hong Kong. Tel: 852 3465 2888 Fax: 852 3465 2899
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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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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 24 April 2013 (EP-353/2009/F) 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 September 2013 and 30 November 2013. As informed by the Contractor, major activities in the reporting quarter were:-

Marine-based Works

- Cellular structure installation
- Connecting arc cell installation
- Laying geo-textile
- Sand blanket laying
- Sand filling
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Stone column installation
- Laying stone blanket
- Band drain installation
- Backfill cellular structure
- Instrumentation works
- Rubble mound seawall construction
- Construction of temporary seawall
- Ground investigation

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
- 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	12 sessions
Impact water quality monitoring	38 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. Five (5) 24-hour TSP results recorded at AMS3A exceeded the Action Level and one (1) 24-hour TSP results recorded at AMS3A exceeded the Limit Level in the reporting quarter. Investigation results show that the exceedances were 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

Twenty eight (28) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. (2) Limit Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. Investigation results show that the exceedances were not related to Project.

Breaches of Action and Limit Levels for Impact Dolphin Monitoring

Two (2) Action Level exceedances of dolphin monitoring were recorded in the reporting quarter. The investigation results showed that 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.

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

One (1) complaint was logged by the Contractor regarding the leakage from work barges causing water pollution near Tuen Mun Richland Garden received on 26 Sept 13. With refer to the available information such as photo record of the incident cannot indicate that the leakage from work barges was caused by the vessel of this Contract and the complaint could not be concluded as project related.

As informed by the Contractor on 5 Nov 13, one (1) noise complaint received on 14 Sept 13 was referred to the Contractor of HKBCF on 1 Nov 13. After investigation, the noise complaint was considered as non-project related.

One (1) complaint received from Penta-Ocean – Gitanes Joint Venture (CV/2012/03) mentioned that the formation works of the Contaminated Mud Pit CMP1 to the South of the Brothers (CMP1 of SB) which has been completed in mid-August 2013 and the pit has been commissioned for receiving contaminated marine mud from other projects starting from 16 August 2013. However, it was recently observed that some of the

project vessels of HY/2010/02 had berthed within the said pit and those anchorages would likely cause disruption to the underlying contaminated mud and thus induce unfavourable contamination impact to the surrounding marine environment. In this regard, they reminded the contractor to avoid berthing of their vessels within the boundary of CMP1 of SB thereafter for the sake of environmental concern. After investigation, the complaint is considered not likely to be related to the construction works.

One (1) follow up enquiry of the same issue mentioned in a complaint reported in the EM&A report (Sept 13) was logged by the Contractor on 9 Oct 2013. The enquirer expressed concern of the leakage from work barges causing water pollution at sea near Tuen Mun Richland Garden and the impact of fishery activities. Although with refer to the available information such as photo record of the incident cannot indicate that the leakage from work barges was caused by the vessel of this Contract and the complaint could not be concluded as project related.

No notification of summons and successful prosecution was received in the reporting period.

1 INTRODUCTION

1.1 Background

1.1.1 Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong 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 seventh 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 September 2013 and 30 November 2013.

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

- Cellular structure installation
- Connecting arc cell installation
- Laying geo-textile
- Sand blanket laying
- Sand filling
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Stone column installation
- Laying stone blanket
- Band drain installation
- Backfill cellular structure
- Instrumentation works
- Rubble mound seawall construction
- Construction of temporary seawall

- Ground investigation

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
- 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 (AMS3A) 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 (NMS3A) 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, AMS3A, 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		
		September 13	October 13	November 13
1-hr TSP	AMS2	16	18	16
	AMS3A	16	18	16
	AMS7	16	18	16
24-hr TSP	AMS2	5	6	5
	AMS3A	5	6	5
	AMS7	5	6	5

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

Monitoring Parameter	Location	Level of Exceedance	Level of Exceedance		
			September 13	October 13	November 13
1-hr TSP	AMS2	Action	0	0	0
		Limit	0	0	0
	AMS3A	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
	AMS3A	Action	**1**	**2**	**2**
		Limit	0	0	**1**
	AMS7	Action	0	0	0
		Limit	0	0	0
		Total	***1***	***2***	***3***

3.1.5 All 1-Hour TSP results were below the Action and Limit Level in the reporting quarter. Five (5) 24-hour TSP results recorded at AMS3A exceeded the Action Level and one (1) 24-hour TSP results recorded at AMS3A exceeded the Limit Level in the reporting quarter. Investigation results show that the exceedances were not related to Project.

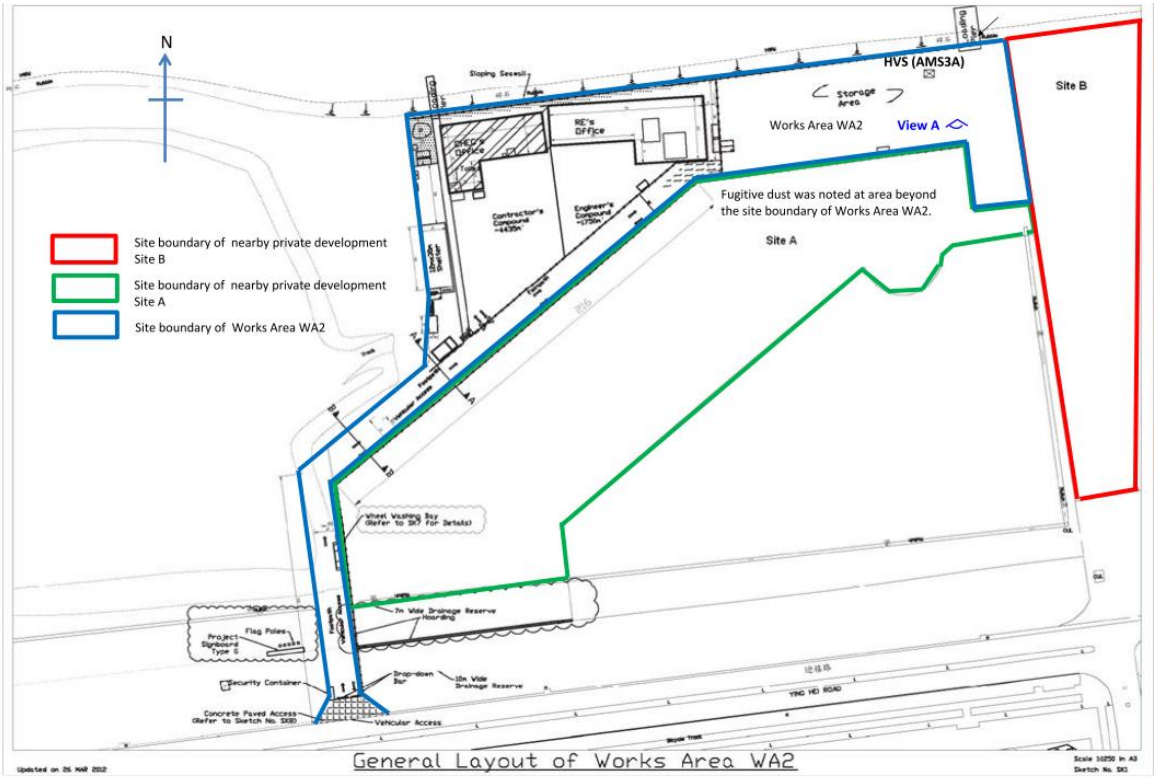
3.1.6 For the 24Hr TSP Action Level exceedance recorded at AMS3A, a result of 173μg/L was recorded on 19 Sept13 (24-hr TSP).

3.1.6.1 According to information provided by the Contractor, land-based construction activity such as installing and transloading of sand bags, deliver & transloading band drain material to site container and stitching geotextile were being undertaken at Works Area WA2 during the monitoring period.

3.1.6.2 Functional checking on HVS at AMS3A was done. Air flow of the HVS was checked and the flow was steady during the 24-hr TSP sampling at AMS3A. 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 18 and 19 September 13, East South East winds was prevailing during the monitoring period.

3.1.6.4 Photo record shows that fugitive dust was emitted from the construction sites of nearby private development project located close to the monitoring station AMS3A but beyond the site boundary of Works Area WA2. With reference to the prevailing East South East wind direction, construction works carried out at construction sites of nearby private development project may contribute to the measured dust levels at the monitoring station AMS3A. (Please also see photo and layout map below for reference of site conditions.)



Conditions of the construction sites near Works Area WA2:

View of Works Area WA2 : the hard paved ground next to monitoring station AMS3A (View A on layout map)

3.1.6.5 Construction works carried out at construction sites of nearby private development project may contribute to the measured dust levels at the monitoring station AMS3A. The 1-hr TSP values recorded at AMS3A on 19 Sept 13, which are within the monitoring period of the 24-hr TSP, were 78 $\mu g/m^3$, 77 $\mu g/m^3$ and 77$\mu g/m^3$ respectively. All measured values are well below the Action and Limit Levels.

3.1.6.6 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 79 $\mu g/m^3$ and 70 $\mu g/m^3$ respectively, which are below the Action and Limit Levels.

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
2. Vehicle washing facility was provided at vehicle exit points,
3. Measures for preventing fugitive dust emission are provided, e.g. tarpaulin covers.

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

3.1.6.9 The Contractor was recommended to continue implementing existing dust mitigation measures.

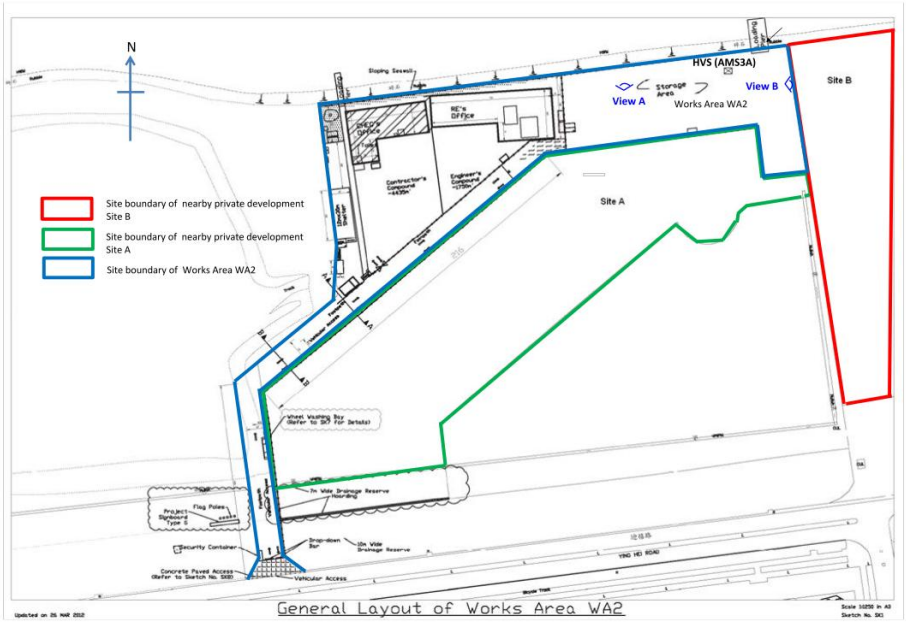
3.1.7 For the 24Hr TSP Action Level exceedance recorded at AMS3A, a result of 198μg/m^3 was recorded on 15 Oct 13 (24-hr TSP).

3.1.9.1 According to information provided by the Contractor, land-based construction activity such as using canvas to cover sand material, sampling geotextile material and stitching geotextile were being undertaken at Works Area WA2 during the monitoring period.

3.1.9.2 Functional checking on HVS at AMS3A was done. Air flow of the HVS was checked and the flow was steady during the 24-hr TSP sampling at AMS3A. The filter paper was re-weighted by the assigned HOKLAS laboratory and the result was reconfirmed.

3.1.9.3 Photo records shows that vehicle would travel on exposed soil surfaces at those construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA2. (Please also see photo and layout map attached for reference of site conditions.)

3.1.9.4 As refer to the wind data collected at wind station at Works Area WA2 during the monitoring period on 15 and 16 Oct 13 (as attached) East South East winds was prevailing during the monitoring period. Traffics at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA 2 may contribute to the measured dust levels at the monitoring station AMS3A.



General Layout of Works Area WA2

Conditions of the construction sites near Works Area WA2:

View A: (Canvas was used to cover sand material stored at WA2):

View B: (Traffic on dusty surface observed at nearby construction site which do not belongs to this Contract)

3.1.9.5 The 1-hr TSP values recorded at AMS3A on 15 Oct 13, which are within the monitoring period of the 24-hr TSP, were 87μg/m^3, 85μg/m^3 and 87μg/m^3 respectively. All measured values are well below the Action and Limit Levels.

3.1.9.6 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 97μg/m^3 and 92μg/m^3 respectively, which are below the Action and Limit Levels.

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

1. Canvas/tarpaulin sheet was used to cover sand material stored at WA2 (please refer to photo record – View A above)
2. Works Area WA2's surface was hard-paved, compacted or hydro-seeded
3. Vehicle washing facility was provided at vehicle exit points,

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

3.1.9.9 The Contractor was recommended to continue implementing existing dust mitigation measures.

3.1.8 For the 24Hr TSP Action Level exceedance recorded at AMS3A, a result of 194μg/m3 was recorded on 19 Oct 13 (24-hr TSP).

3.1.8.1 According to information provided by the Contractor, land-based construction activity such as stitching geotextile, transloading stitching geotextile and tidy up the stitching area were being undertaken at Works Area WA2 during the monitoring period.

3.1.8.2 Functional checking on HVS at AMS3A was done. Air flow of the HVS was checked and the flow was steady during the 24-hr TSP sampling at AMS3A. The filter paper was re-weighted by the assigned HOKLAS laboratory and the result was reconfirmed.

3.1.8.3 Photo records shows that vehicle would travel on exposed soil surfaces at those construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA2. (Please also see photo and layout map attached for reference of site conditions (View A.)

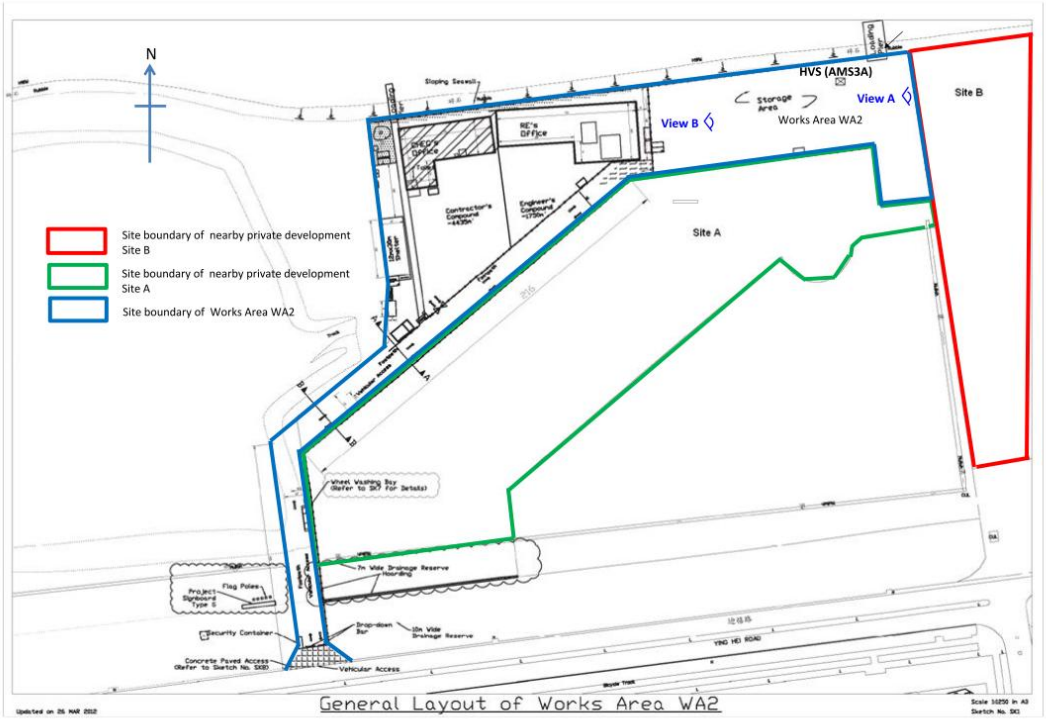


Photo record:

View A (Traffic on dusty surface observed at nearby construction site which do not belongs to this Contract)

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

3.1.8.4 As refer to the wind data collected at wind station at Works Area WA2 during the monitoring period on 18 and 19 Oct 13 (as attached) south-southeast winds was prevailing during the monitoring period. Traffics at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA 2 may contribute to the measured dust levels at the monitoring station AMS3A.

3.1.8.5 The 1-hr TSP values recorded at AMS3A on 19 Oct 13, which are within the monitoring period of the 24-hr TSP, were 85$\mu g/m^3$, 85$\mu g/m^3$ and 84$\mu g/m^3$ respectively. All measured values are well below the Action and Limit Levels.

3.1.8.6 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 116$\mu g/m^3$ and 101$\mu g/m^3$ respectively, which are below the Action and Limit Levels.

3.1.8.7 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.

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

3.1.8.9 The Contractor was recommended to continue implementing existing dust mitigation measures.

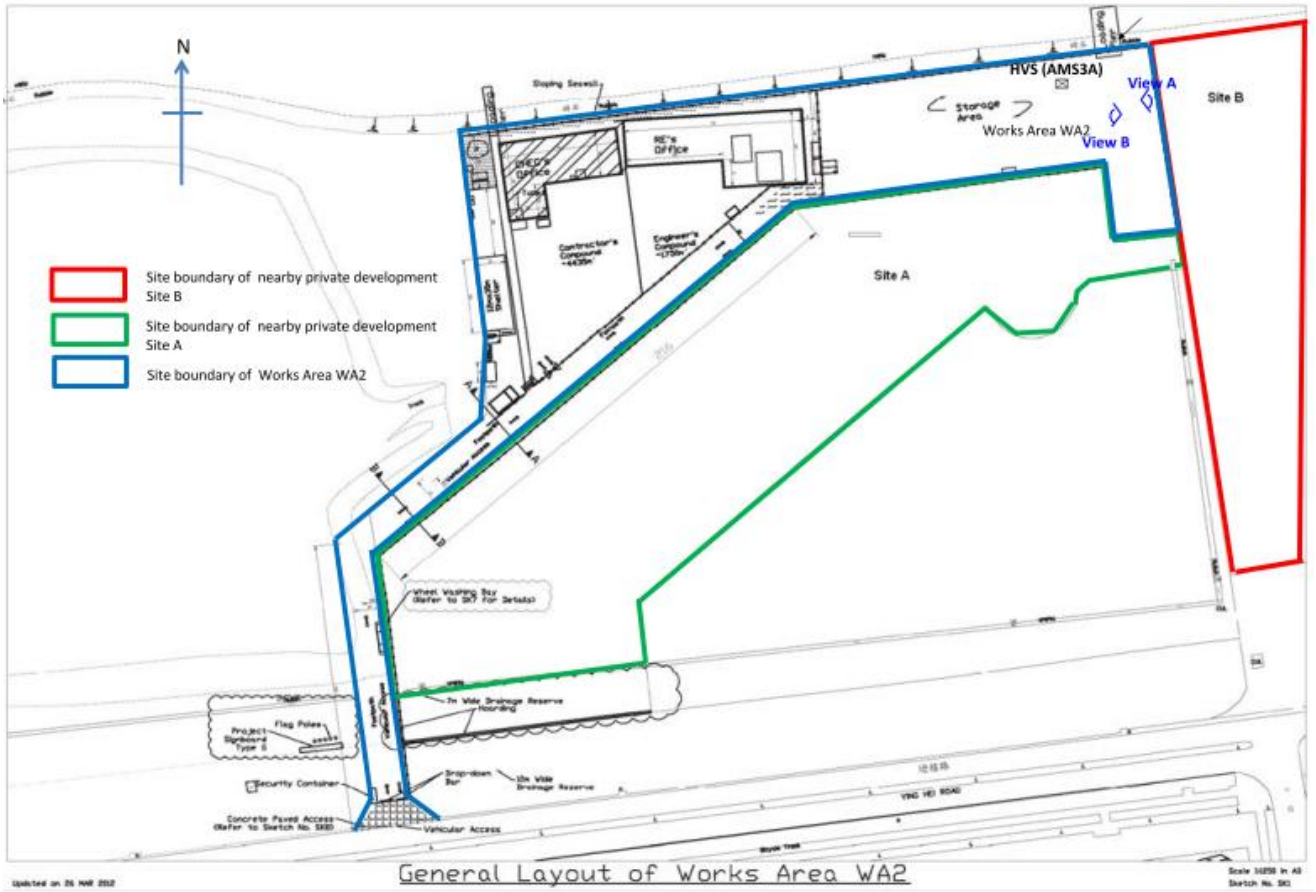
3.1.9 For the 24Hr TSP Action Level exceedance recorded at AMS3A, a result of 221μg/m3 was recorded on 12 Nov 13 (24-hr TSP).

3.1.9.1 According to information provided by the Contractor, land-based construction activity such as installation of sand bags, transloading band drain material and sampling for Type 2 geotextile were being undertaken at Works Area WA2 during the monitoring period.

3.1.9.2 Functional checking on HVS at AMS3A was done. Air flow of the HVS was checked and the flow was steady during the 24-hr TSP sampling at AMS3A. The filter paper was re-weighted by the assigned HOKLAS laboratory and the result was reconfirmed.

3.1.9.3 Photo records shows vehicle parking activities were observed inside an area at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA2. (Please also see photo and layout map attached for reference of site conditions (View A.))

3.1.9.4 As refer to the wind data collected at wind station at Works Area WA2 during the monitoring period on 11 and 12 Nov 13 (as attached) southeast winds was prevailing during the monitoring period. Traffic activities at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA 2 may contribute to the measured dust levels at the monitoring station AMS3A.



General Layout of Works Area WA2

Conditions of the construction sites near Works Area WA2:

View A: (Parking lot observed at nearby construction site which do not belongs to this Contract):

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

3.1.9.5 The 1-hr TSP values recorded at AMS3A on 12 Nov 13, which are within the monitoring period of the 24-hr TSP, were 86μg/m3, 87μg/m3 and 86μg/m3 respectively. All measured values are well below the Action and Limit Levels.

3.1.9.6 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 60μg/m3 and 57μg/m3 respectively, which are below the Action and Limit Levels.

3.1.9.7 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.

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

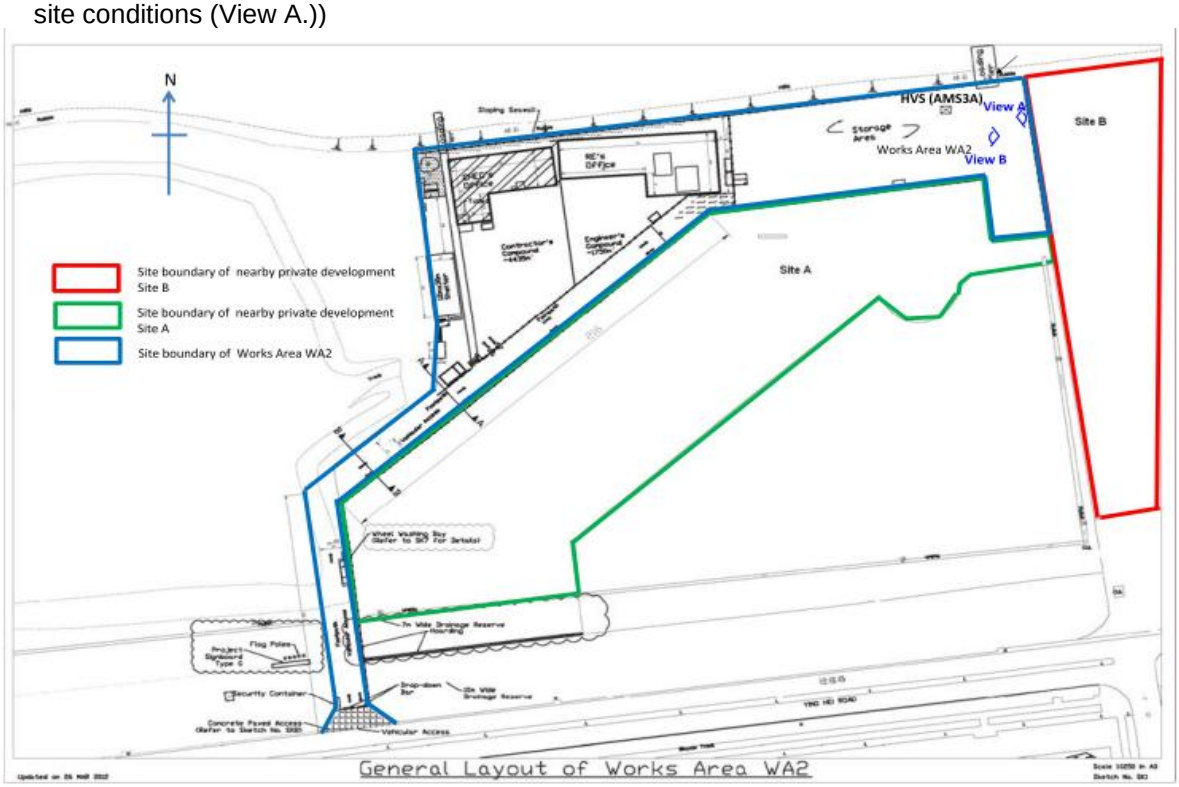
3.1.9.9 The Contractor was recommended to continue implementing existing dust mitigation measures.

3.1.10 For the 24Hr TSP Action Level exceedance recorded at AMS3A, a result of 244μg/m3 was recorded on 18 Nov 13 (24-hr TSP).

3.1.10.1 According to information provided by the Contractor, land-based construction activity such as installation of sand bags and stitching Type 2 geotextile were being undertaken at Works Area WA2 during the monitoring period.

3.1.10.2 Functional checking on HVS at AMS3A was done. Air flow of the HVS was checked and the flow was steady during the 24-hr TSP sampling at AMS3A. The filter paper was re-weighted by the assigned HOKLAS laboratory and the result was reconfirmed.

3.1.10.3 Photo records shows vehicle parking activities were observed inside an area at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA2. (Please also see photo and layout map attached for reference of site conditions (View A.))



General Layout of Works Area WA2

Photo record:

View A (parking lot observed at nearby construction site which do not belongs to this Contract)

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

3.1.10.4 As refer to the wind data collected at wind station at Works Area WA2 during the monitoring period on 18 and 19 Nov 13 (as attached) southeast winds was prevailing during the monitoring period. Traffic activities at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA 2 may contribute to the measured dust levels at the monitoring station AMS3A.

3.1.10.5 The 1-hr TSP values recorded at AMS3A on 18 Nov 13, which are within the monitoring period of the 24-hr TSP, were 84μg/m3, 84μg/m3 and 86μg/m3 respectively. All measured values are well below the Action and Limit Levels.

3.1.10.6 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 125μg/m3 and 118μg/m3 respectively, which are below the Action and Limit Levels.

3.1.10.7 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.

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

3.1.10.9 The Contractor was recommended to continue implementing existing dust mitigation measures.

3.1.11 For the 24Hr TSP Action Level exceedance recorded at AMS3A, a result of 518μg/m^3 was recorded on 23 Nov 13 (24-hr TSP).

3.1.11.1 According to information provided by the Contractor, land-based construction activity such as installation of sand bags, transloading band drain material and sampling for Type 2 geotextile were being undertaken at Works Area WA2 during the monitoring period.

3.1.11.2 Functional checking on HVS at AMS3A was done. Air flow of the HVS was checked and the flow was steady during the 24-hr TSP sampling at AMS3A. The filter paper was re-weighted by the assigned HOKLAS laboratory and the result was reconfirmed.

3.1.11.3 Photo records shows vehicle parking activities were observed inside an area at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA2. (Please also see photo and layout map attached for reference of site conditions (View A.))

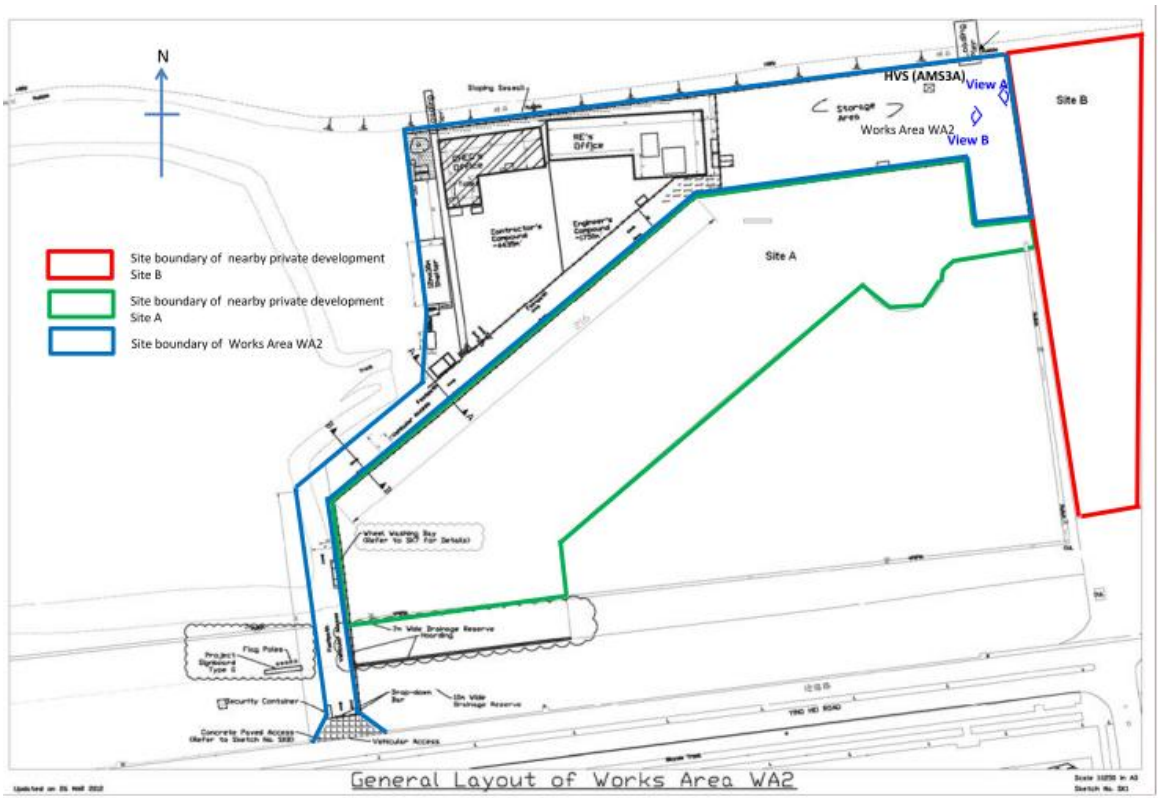


Photo record:

View A (parking lot observed at nearby construction site which do not belongs to this Contract)

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

3.1.11.4 As refer to the wind data collected at wind station at Works Area WA2 during the monitoring period on 22 and 23 Nov 13 (as attached) southeast winds was prevailing during the monitoring period. Traffic activities at construction sites of nearby private development project which are close to the monitoring station AMS3A but beyond the site boundary of Works Area WA 2 may contribute to the measured dust levels at the monitoring station AMS3A.

3.1.11.5 The 1-hr TSP values recorded at AMS3A on 23 Nov 13, which are within the monitoring period of the 24-hr TSP, were 86μg/m3, 87μg/m3 and 86μg/m3 respectively. All measured values are well below the Action and Limit Levels.

3.1.11.6 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 60μg/m3 and 57μg/m3 respectively, which are below the Action and Limit Levels.

3.1.11.7 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.

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

3.1.11.9 The Contractor was recommended to continue implementing existing dust mitigation measures.

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

3.1.13 The event action plan is annexed in Appendix L.

3.2 Noise Monitoring

3.2.1 Impact noise monitoring was conducted at the 2 monitoring stations (NMS2 and NMS3A) for at least once per week during 07:00 – 19:00 in the reporting quarter.

3.2.2 The monitoring locations used during the reporting quarter are depicted in Figure 2.

3.2.3 No Action or Limit Level Exceedance of construction noise was recorded in the reporting quarter.

3.2.4 Major noise sources during the noise monitoring included construction activities of the Project and nearby traffic noise.

3.2.5 The number of impact noise monitoring events and exceedances are summarized in Table 3.3 and Table 3.4 respectively

Table 3.3 Summary of Number of Monitoring Events for Impact Noise

Monitoring Parameter	Location	No. of monitoring events		
		September 13	October 13	November 13
	NMS2	4	4	4
	NMS3A	4	4	4

Table 3.4 Summary of Number of Monitoring Exceedances for Impact Noise

Monitoring Parameter	Location	Level of Exceedance	Level of Exceedance		
			September 13	October 13	November 13
	NMS2	Action	0	0	0
		Limit	0	0	0
	NMS3A	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 Twenty seven (28) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting Quarter. (2) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter.

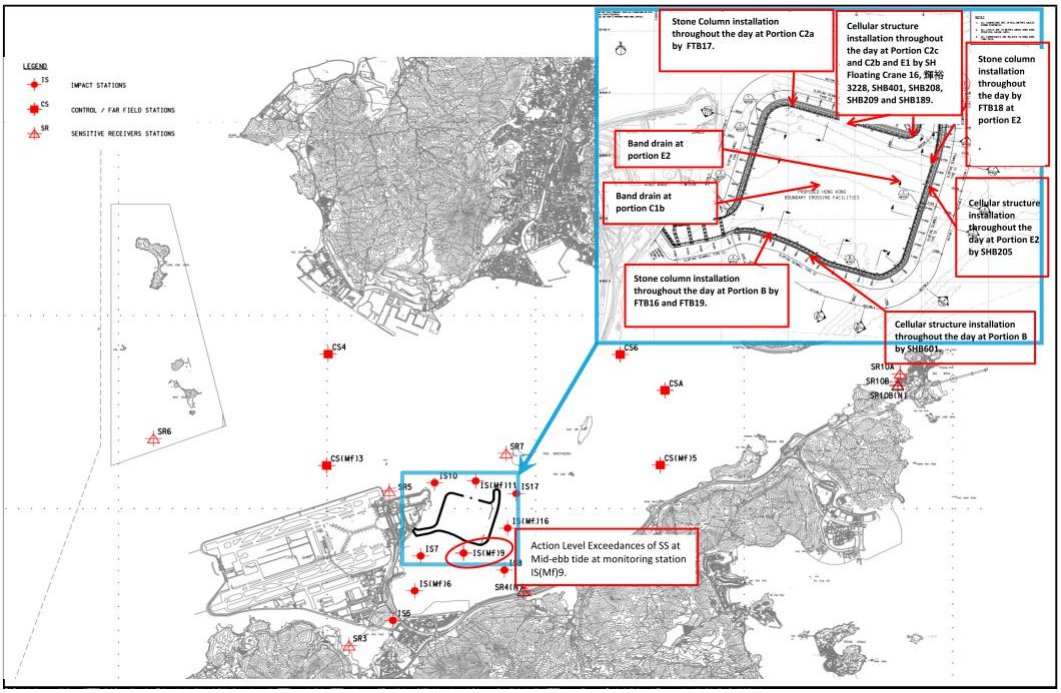
Table 3.5 Summary of Water Quality Exceedances in Sept 13- Nov 13

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
IS5	Action	0	0	0	0	0	0	0	**(1) 22 Nov13**	0	**1**
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)6	Action	0	0	0	0	0	0	**(2) 11 Nov 13 and 16 Sept 13**	**(2) 11 & 20 Nov 13**	**2**	**2**
	Limit	0	0	0	0	0	0	0	0	0	0
IS7	Action	0	0	0	0	0	0	0	**(2) 20 Nov13 and18 Oct 13**	0	**2**
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)9	Action	0	0	0	0	0	0	0	**(3) 15 Nov13, 4 Oct 13 and 6 Sept 13**	0	**3**
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	0	0	0	0	0	0	0	**(3) 6 Nov13, 7 Oct 13 and 30 Sept 13**	0	**3**
	Limit	0	0	0	0	0	0	0	**(1) 25 Oct 13**	0	**1**
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	**(3) 4 & 22 Nov 13 and 04 Oct 13**	**(1) 16 Oct 13**	**3**	**1**
	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
IS17	Action	0	0	0	0	0	0	**(2) 4 &15 Nov 13**	0	**2**	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR3	Action	0	0	0	0	0	0	0	**(1) 22 Nov13**	0	**1**
	Limit	0	0	0	0	0	0	0	0	0	0
SR4(N)	Action	0	0	0	0	0	0	0	**(2) 13 Nov13 and 18 Sept 13**	0	**2**
	Limit	0	0	0	0	0	0	0	0	0	0
SR5	Action	0	0	0	0	0	0	0	**(3) 6 Nov13, 7 Oct 13 and 30 Sept 13**	0	**3**
	Limit	0	0	0	0	0	0	0	**(1) 25 Oct 13**	0	**1**
SR6	Action	0	0	0	0	0	0	0	**(1) 6 Nov13**	0	**1**
	Limit	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	**(2) 6 Nov13 and 21 Oct 13**	0	**2**
	Limit	0	0	0	0	0	0	0	0	0	0
Total	**Action**	0	0	0	0	0	0	**7**	**21**	**28**	
	Limit	0	0	0	0	0	0	**0**	**2**	**2**	

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

3.3.3 One (1) Action Level exceedance at measured Suspended Solids (mg/L) where recorded on 06 September 2013 during mid-flood tide at monitoring station IS(Mf)9. For Action Level exceedance at measured Suspended Solids (mg/L), 30.3 mg/L was recorded at Monitoring Station IS(Mf)9.



3.3.3.1 For locations and type of active works carried out on 6 Sept 13, please refer to the above layout map.

3.3.3.2 For action level exceedance of depth averaged SS (in mg/L) recorded at IS(Mf)9 during mid flood tide, active works were carried out at almost the same locations on 4, 6 and 9 Sept 13, but all depth averaged SS (in mg/L) results recorded at all monitoring location on 4 and 9 Sept 13 were all below the Action and Limit Level, which indicates that active works are unlikely to contribute to the action level exceedance recorded at IS(Mf)9.

3.3.3.3 Monitoring results of depth averaged suspended solid (mg/L) at IS10 and IS(Mf)11 which are located downstream to active works during flood tide were 6.2 mg/L and 7.6 mg/L which are below active and limit level and shows that depth averaged suspended solid (mg/L) at downstream to active works were not adversely affected.

3.3.3.4 Turbidity level (NTU) results recorded at IS(Mf)9 is 11.8 NTU during flood tide on 6 Sept 13 which was well below the Action and Limit Level which indicates turbidity level was not adversely affected.

3.3.3.5 When impact water quality monitoring was carried out during mid flood tide at monitoring location IS(Mf)9, no discoloration of sea water was observed and no silty plume were observed to flow from the inside to the outside of the site boundary.

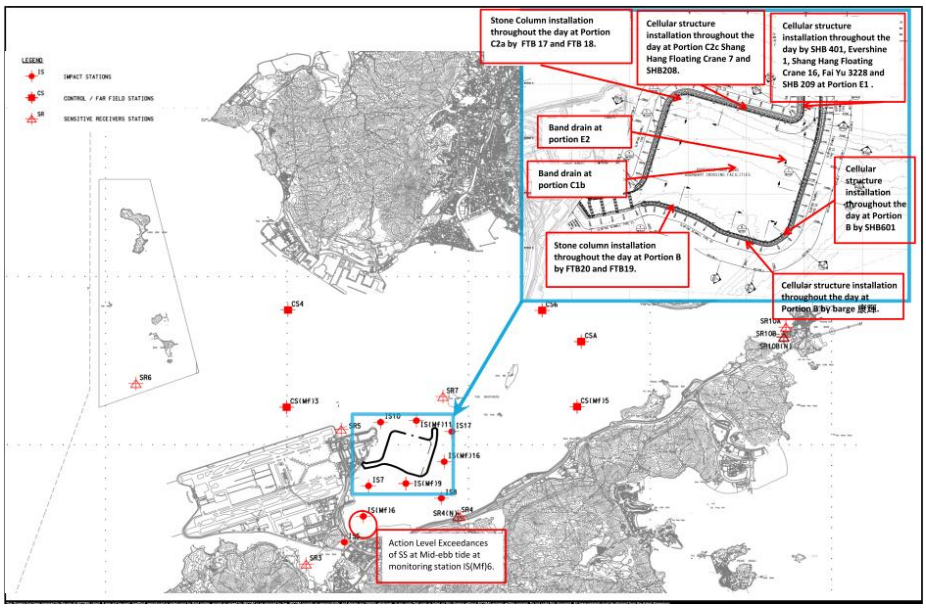
3.3.3.6 The exceedance was likely due to local effects in the vicinity of IS(Mf)9.

3.3.3.7 The exceedance was considered as non-Project related.

3.3.3.8 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.

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

3.3.4 One (1) Action Level exceedance at measured Suspended Solids (mg/L) where recorded on 16 September 2013 during mid-ebb tide at monitoring station IS(Mf)6. For Action Level exceedances at measured Suspended Solids (mg/L), 25 mg/L was recorded at Monitoring Station IS(Mf)6.



3.3.4.1 For locations and type of active works carried out on 16 Sept 13, please refer to the above layout map.

3.3.4.2 For action level exceedance of depth averaged SS (in mg/L) recorded at IS(Mf)6 during mid ebb tide, Suspended solids values recorded at Impact Station IS7, IS(Mf)9 and IS8 located downstream to and closer to active works than IS(Mf)6 during Mid-Ebb tide were below the Action and Limit Level during the same tide on the same day. This indicates project works is unlikely to contribute to the action level exceedance recorded at IS(Mf)6.

3.3.4.3 Same type of works was carried out at the same locations on 13 and 18 Sept 13 but Suspended Solids values recorded at IS(Mf)6 on 13 and 18 Sept 13 are all below the Action and Limit Level during the same tide on the these days. Turbidity level (NTU) results recorded at IS(Mf)9 is 11.8 NTU during flood tide on 6 Sept 13 which was well below the Action and Limit Level which indicates turbidity level was not adversely affected.

3.3.4.4 Turbidity measurements result at IS(Mf)6 during Ebb tide is 12.2 NTU which is well below the Action and Limit Level. It is considered that the turbidity recorded at IS(Mf)6 were not adversely affected by active works.

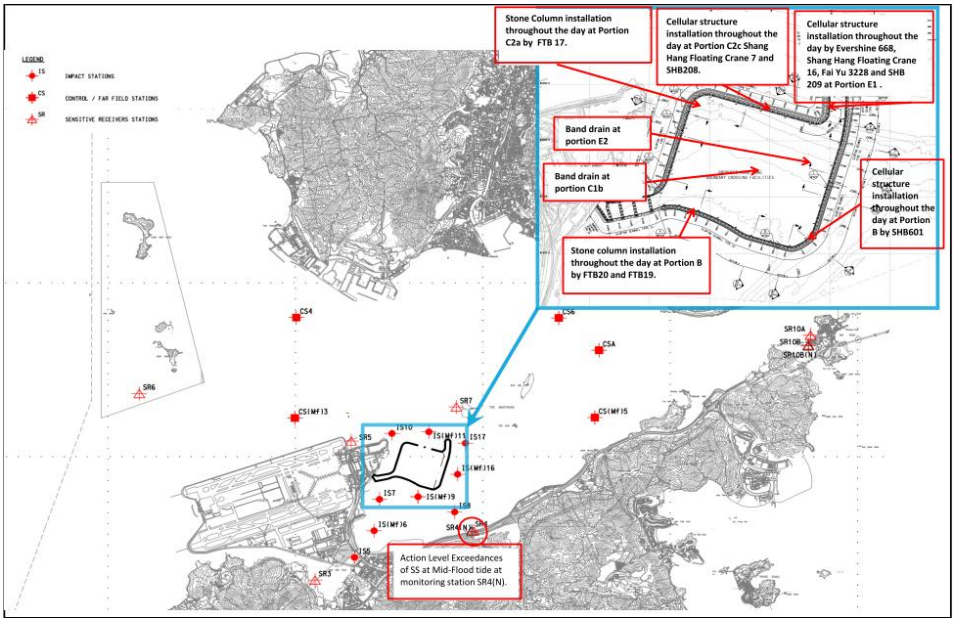
3.3.4.5 The exceedances were likely due to local effects in the vicinity of IS(Mf)6.

3.3.4.6 The exceedances were considered as non-Project related.

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

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

3.3.5 One (1) Action Level exceedance at measured Suspended Solids (mg/L) where recorded on 18 September 2013 during mid-flood tide at monitoring station SR4(N). For Action Level exceedance at measured Suspended Solids (mg/L), 24 mg/L was recorded at Monitoring Station SR4(N)



3.3.5.1 Please refer the above layout map for activity carried out on 18 Sept 13.

3.3.5.2 IS(Mf)9 and IS(Mf)16 are located closer to the active works than monitoring station SR4(N). Depth Averaged Suspended Solids (SS) values (in mg/L) recorded during the flood tide on the same day at IS(Mf)9 and IS(Mf)16 were below the Action and Limit Level which indicates project works is unlikely to contribute to the action level exceedance recorded at SR4(N).

3.3.5.3 The monitoring location of monitoring station SR4(N) are considered upstream to the active works of this project. Therefore it was unlikely that the exceedances recorded at SR4(N) were due to active construction activities of this project.

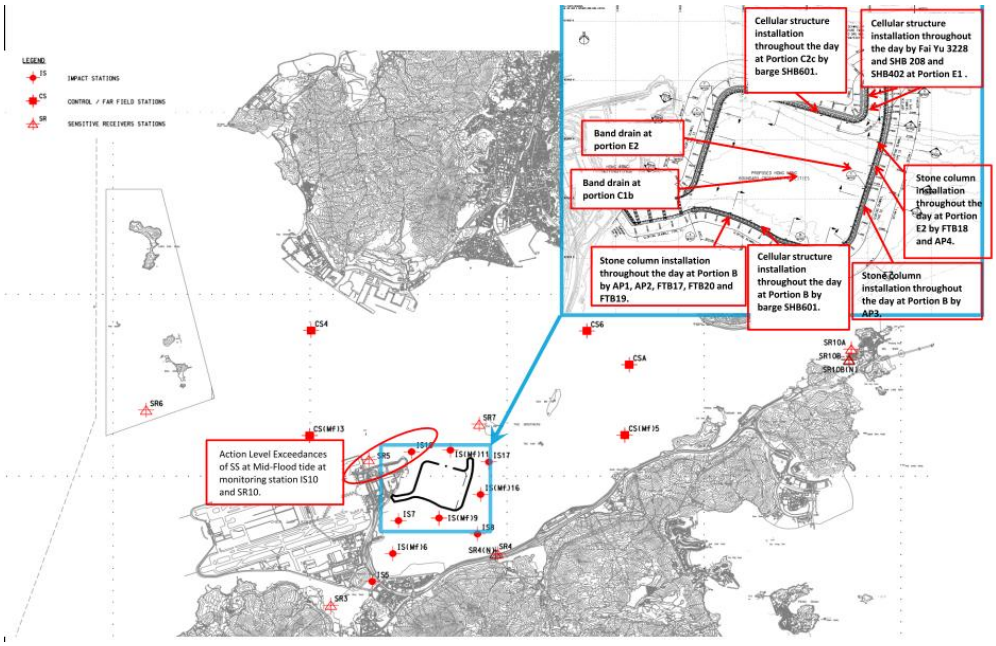
3.3.5.4 Cellular structure installation works were conducted at Portion E2 and at Portion B by construction vessels during mid flood tide on 18 Sept 13 but cellular structure installation was considered unlikely to contribute to elevation of Suspended Solids.

3.3.5.5 The exceedance was likely due to local effects in the vicinity of SR4(N).

3.3.5.6 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.

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

3.3.6 Two (2) Action Level exceedance at measured Suspended Solids (mg/L) where recorded on 30 Sept 13 during mid-flood tide at monitoring station SR5 and IS (10). For Action Level exceedance at measured Suspended Solids (mg/L), 24.5 mg/L were recorded at Monitoring Station SR5 and IS(10).



3.3.6.1 Please refer the above layout map for activity carried out on 30 Sept 13.

3.3.6.2 No active works were carried out portion C2a, Portion A and Portion C1a. Installation of band drain was carried out at Portion C1b and Cellular Structure installation was carried out at Portion C2c and E1 on 30 Sept 13. These works were unlikely to generate silt plumes or suspended solid. Stone column installation was conducted at Portion B and E2 which is far away from IS10 and SR5. (For location of each portion please refer to below Layout - Portion of Marine Work)

3.3.6.3 Suspended solids values recorded at Impact Stations IS(Mf)11 and IS7 which is closer to the active works at Portion E2 and Portion B respectively than monitoring station IS10 and SR5 were below the action and limit level which indicates that active works from portion E2 and B is unlikely to cause SS exceedance at monitoring station IS10 and SR5.

3.3.6.4 Turbidity level (NTU) results recorded at IS10 and SR5 were 14.2 NTU and 20.4 NTU respectively during flood tide on 30 Sept 13 which was below the Action and Limit Level which indicates turbidity level was not adversely affected.

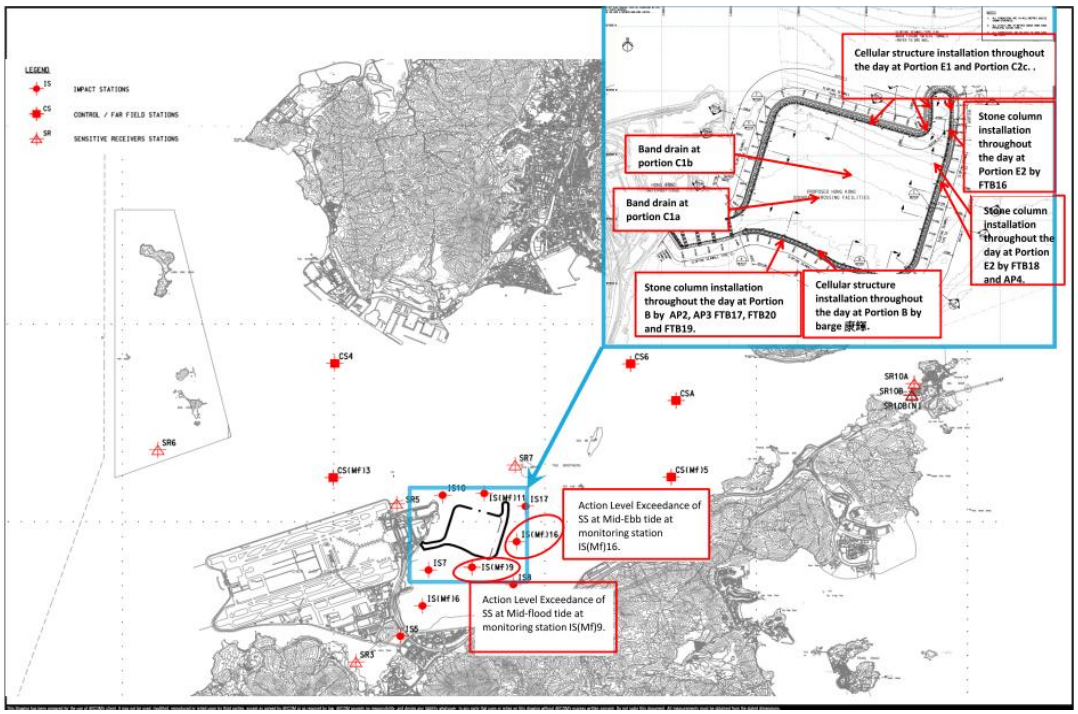
3.3.6.5 When impact water quality monitoring was carried out during mid flood tide at monitoring location IS10 and SR5, no discoloration of sea water was observed and no silty plume were observed to flow from the inside to the outside of the site boundary.

3.3.6.6 The exceedance was likely due to local effects in the vicinity of IS10 and SR5.

3.3.6.7 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.

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

3.3.7 Two (2) Action Level exceedances at measured Suspended Solids (mg/L) were recorded on 04 Oct 2013 at monitoring station IS(Mf) 16 and IS(Mf)9 at Mid-Ebb tide and Mid-Flood tide respectively. For Action Level exceedances at measured Suspended Solids (mg/L), 32.9 mg/L and 25.4 mg/L was recorded at Monitoring Station IS(Mf)16 and IS(Mf)9 respectively.



3.3.7.1 For locations and type of active works carried out on 4 Oct 13, please refer to the above layout map.

3.3.7.2 Impact Stations IS10 and IS(Mf)11 are downstream and closer to the active works at Portion E1 and E2 than monitoring station IS(Mf)9 during flood tide. Suspended solids value recorded on 4 Oct 13 at Impact Stations IS10 and IS(Mf)11 is 9.1mg/L and 7.5mg/L during flood tide respectively which were below the action and limit level. Hence active works from portion E1 and E2 were unlikely to cause SS exceedance at monitoring station IS(Mf)9 during mid flood tide.

3.3.7.3 IS(Mf)9 was considered upstream to active works at Portion B during flood tide which SS level were unlikely to be adversely affected by active works at Portion B.

3.3.7.4 Turbidity level (NTU) result recorded on 4 Oct 13 at IS(Mf)16 during ebb tide and IS(Mf)9 during flood tide is 22.7 NTU and 22.6 NTU respectively which were below the Action and Limit Level, this indicates turbidity level was not adversely affected.

3.3.7.5 Same type of works were carried out at the same location on 2 and 7 Oct 13 but Suspended Solids values recorded at IS(Mf)16 and IS(Mf)9 on 2 and 7 Oct 13 are all below the Action and Limit Level during the same tide on the same day which indicates active works is unlikely to adversely affect the water quality at IS(Mf)16 and IS(Mf)9.

3.3.7.6 When impact water quality monitoring was carried out at IS(Mf)16 during mid ebb tide and at IS(Mf)9 during mid flood tide, no discoloration of sea water was observed and no silty plume were observed to flow from the inside to the outside of the site boundary.

Photo record shows that no defect was observed on the perimeter silt curtain nearby IS(Mf)9.

Photo record shows that no defect was observed on the perimeter silt curtain nearby IS(Mf)16.

Photo record shows that localised silt curtain was implemented during stone column installation.

3.3.7.7 The recorded suspended solids values recorded on 4 Oct 13 at monitoring station IS7, IS8 & IS17 during both tide were below the action and limit level which shows that the water quality nearby IS(Mf)16 during ebb tide and IS(Mf)9 during flood tide were not adversely affected.

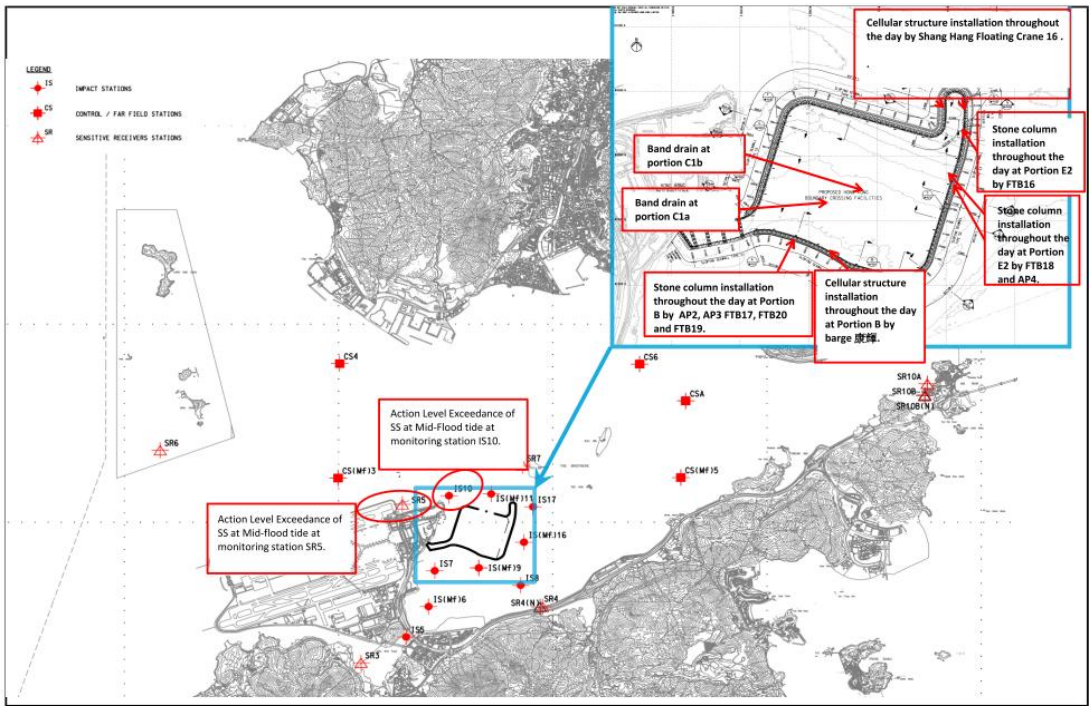
3.3.7.8 The exceedances were likely due to local effects in the vicinity of IS(Mf)16 and IS(Mf)9.

3.3.7.9 The exceedance was considered as non-Project related.

3.3.7.10 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.

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

3.3.8 Two (2) Action Level exceedances at measured Suspended Solids (mg/L) were recorded on 7 Oct 2013 during mid-flood tide at monitoring station IS10 and SR5. For Action Level exceedances at measured Suspended Solids (mg/L), 25 mg/L and 24.8 mg/L were recorded at Monitoring Station IS10 and SR5 respectively.



3.3.8.1 Please refer attached Layout Map for work activity carried out on 7 Oct 13.

3.3.8.2 No active works were carried out at portion C2a, C2c and Portion A. Installation of band drain was carried out at Portion C1b & Portion C1a and Cellular Structure installation was carried out at Portion E1 and C2b on 7 Oct 13. These works were unlikely to generate silt plumes or suspended solid. Stone column installation was conducted at Portion B, E1 and E2 which are far away from IS10 and SR5. (For location of each portion please refer to attached Layout - Portion of Marine Work)

3.3.8.3 IS(Mf)11 and IS17 which are closer to the active works at Portion E2 than it is for monitoring station IS10 and SR5 and the suspended solid value of IS(Mf)11 and IS17 at mid flood tide were below the action and limit level which indicates that active works from portion E2 were unlikely to cause SS exceedance at monitoring station IS10 and SR5.

3.3.8.4 IS7 which is closer to the active works at portion B than it is for monitoring station IS10 and SR5 and the suspended solids level of IS7 at mid flood tide were below the action and limit level which indicates that active works from portion B were unlikely to cause SS exceedance at monitoring station IS10 and SR5.

3.3.8.5 Turbidity level (NTU) result recorded at IS10 and SR5 is 11.7 NTU and 12.6 NTU respectively during flood tide on 7 Oct 13 which was below the Action and Limit Level which indicates turbidity level was not adversely affected. (Please see attached photo record of the sea condition taken on 7 Oct 13)

3.3.8.6 When impact water quality monitoring was carried out during mid flood tide at monitoring location IS10 and SR5, no silty plume were observed to flow from the inside to the outside of the site boundary.

3.3.8.7 Strong wind and rough sea condition were experienced during impact water quality monitoring conducted during mid flood tide at monitoring. (Please see photo record which shows the sea condition recorded on 7 Oct 13.)

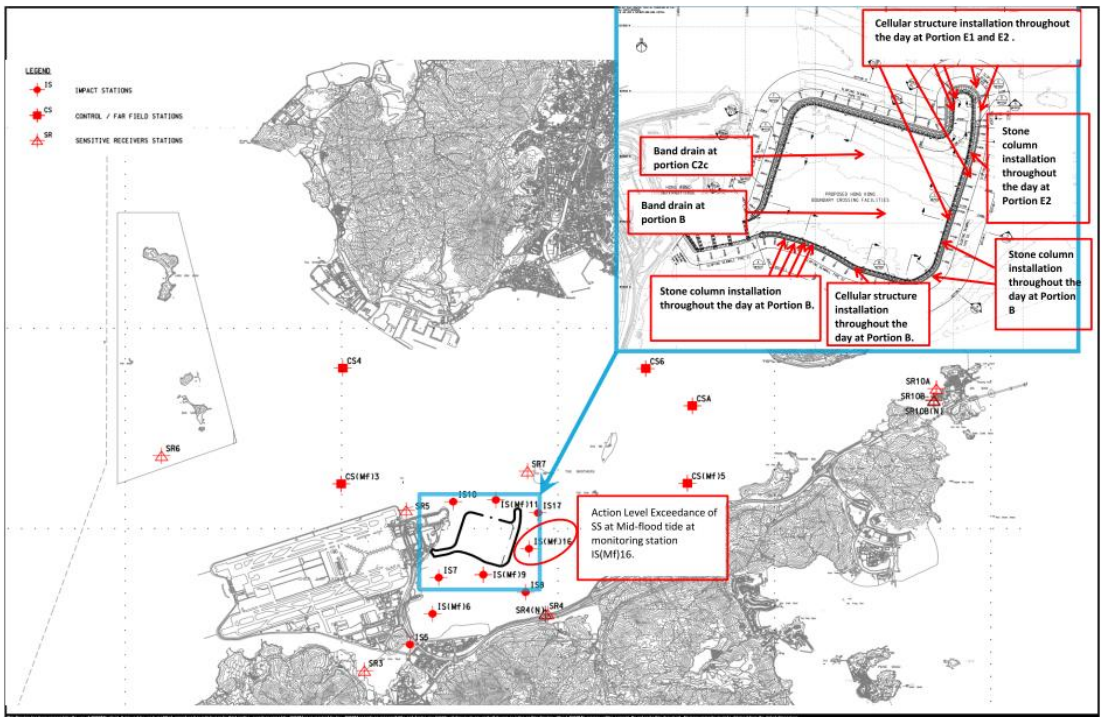
3.3.8.8 The exceedances were likely due to local effects in the vicinity of IS10 and SR5..

3.3.8.9 The exceedances were considered as non-Project related.

3.3.8.10 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.

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

3.3.9 One (1) Action Level exceedance at measured Suspended Solids (mg/L) where recorded on 16 Oct 13 2013 during mid-flood tide at monitoring station IS(Mf)16. For Action Level exceedance at measured Suspended Solids (mg/L), 32 mg/L was recorded at Monitoring Station IS(Mf)16



3.3.10.1 Please refer the above layout map for activity carried out on 16 Oct 13.

3.3.10.2 Impact Stations IS10 and IS(Mf)11 are downstream and closer to the active works at Portion E1 and E2 than monitoring station IS(Mf)16 during flood tide. Suspended solids value recorded on 16 Oct 13 at Impact Stations IS10 and IS(Mf)11 is 4.2mg/L and 6.4mg/L during flood tide respectively. The recorded suspended solids values are below the action and limit level which indicate that active works at Portion E1 and E2 on 16 Oct 13 were unlikely to cause SS exceedance at monitoring station IS(Mf)16 during mid flood tide.

3.3.10.3 IS(Mf)16 is considered upstream to active works during flood tide, therefore active works is unlikely to cause SS exceedance at monitoring station IS(Mf)16 during mid flood tide.

3.3.10.4 Turbidity level (NTU) result recorded on 16 Oct 13 at IS(Mf)16 is 20.5 NTU during flood tide which were below the Action and Limit Level, this indicates turbidity level was not adversely affected. (Please see below photo record of the sea condition taken on 16 Oct 13.)

Photo record of the sea condition taken on 16 Oct 13

3.3.10.5 When impact water quality monitoring was carried out at IS(Mf)16 during mid flood tide, no discoloration of sea water was observed and no silty plume were observed to flow from the inside to the outside of the site boundary.

3.3.10.6 No defect was observed on the perimeter silt curtain during monitoring conducted at nearby IS(Mf)16 on 16 Oct 13.

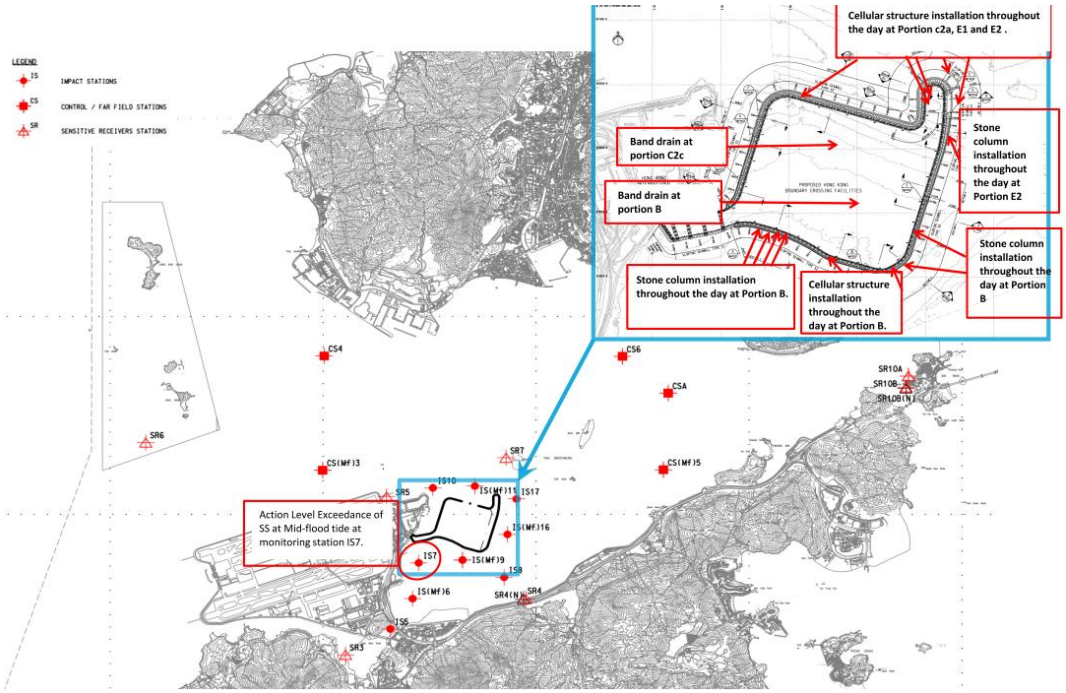
3.3.10.7 The exceedances were likely due to local effects in the vicinity of IS(Mf)16.

3.3.10.8 The exceedances were considered as Non-project related

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

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

3.3.10 One (1) Action Level exceedance at measured Suspended Solids (mg/L) was recorded on 18 Oct 2013 at monitoring station IS7 at Mid-Flood tide. For Action Level exceedance at measured Suspended Solids (mg/L) at IS17, 27.6 mg/L were recorded.



3.3.10.1 For locations and type of active works carried out on 18 Oct 13, please refer to the above layout map.

3.3.10.2 Same type of works were carried out at the same location on 16 and 21 Oct 13 but Suspended Solids values recorded at IS7 on 16 and 21 Oct 13 are all below the Action and Limit Level during the same tide.

3.3.10.3 Turbidity level (NTU) result recorded on 18 Oct 13 at IS7 is 8.7 NTU during flood tide which was below the Action and Limit Level, this indicates turbidity level was not adversely affected. (Please see attached photo record of the sea condition taken on 18 Oct 13.)

3.3.10.4 When impact water quality monitoring was carried out at IS7 during mid flood tide on 18 Oct 13, no discoloration of sea water was observed and no silty plume were observed to flow from the inside to the outside of the site boundary.

3.3.10.5 Photo record shows that no defect was observed on the perimeter silt curtain nearby IS7 on 18 Oct 13.

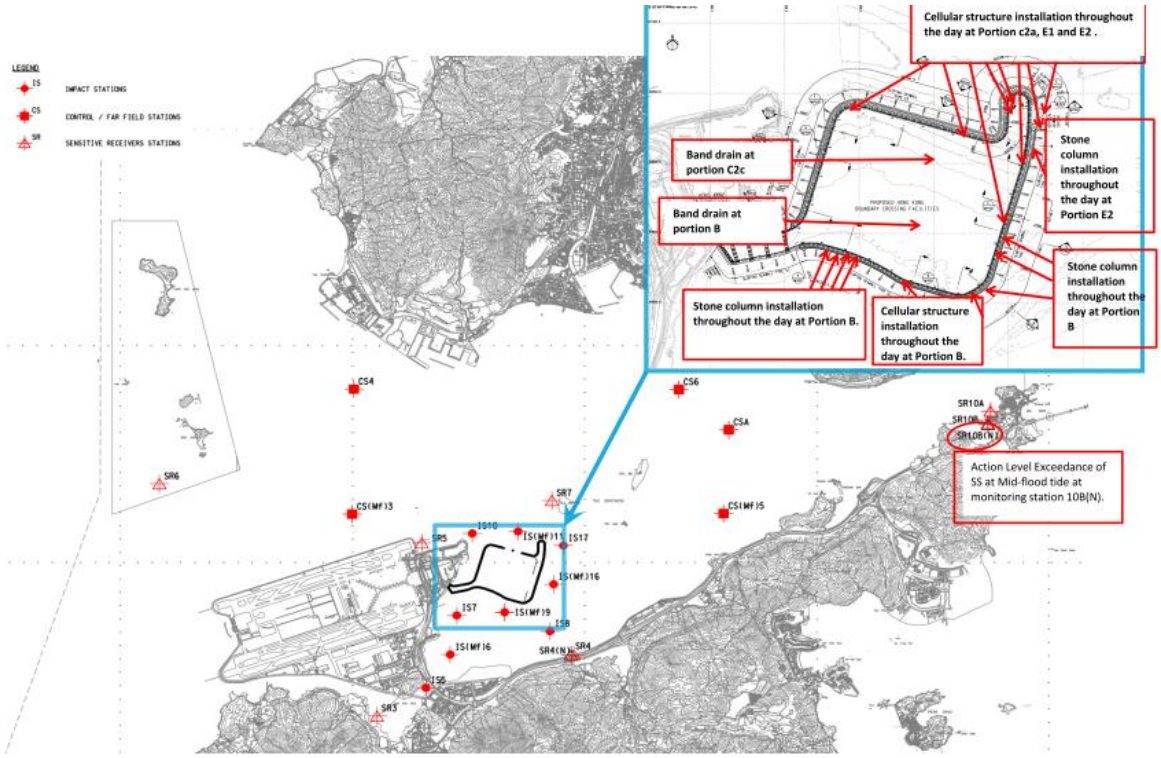
3.3.10.6 The exceedances were likely due to local effects in the vicinity of IS7.

3.3.10.7 The exceedances were considered as Non-project related.

3.3.10.8 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.

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

3.3.11 One (1) Action Level exceedances at measured Suspended Solids (mg/L) were recorded on 21 Oct 2013 at monitoring station SR10B(N) at Mid-Flood tide. For Action Level exceedance at measured Suspended Solids (mg/L), 23.8 mg/L were recorded at Monitoring Station SR10B(N).



3.3.11.1 For locations and type of active works carried out on 21 Oct 13, please refer to the above layout map.

3.3.11.2 IS(Mf)11 and IS10 are located downstream and closer to the active works than monitoring station SR10B(N) during flood tide. Depth Averaged Suspended Solids (SS) values (in mg/L) recorded during flood tide on the same day at IS(Mf)11 and IS10 were below the Action and Limit Level which indicates project work is unlikely to contribute to the action level exceedance recorded at SR10B(N).

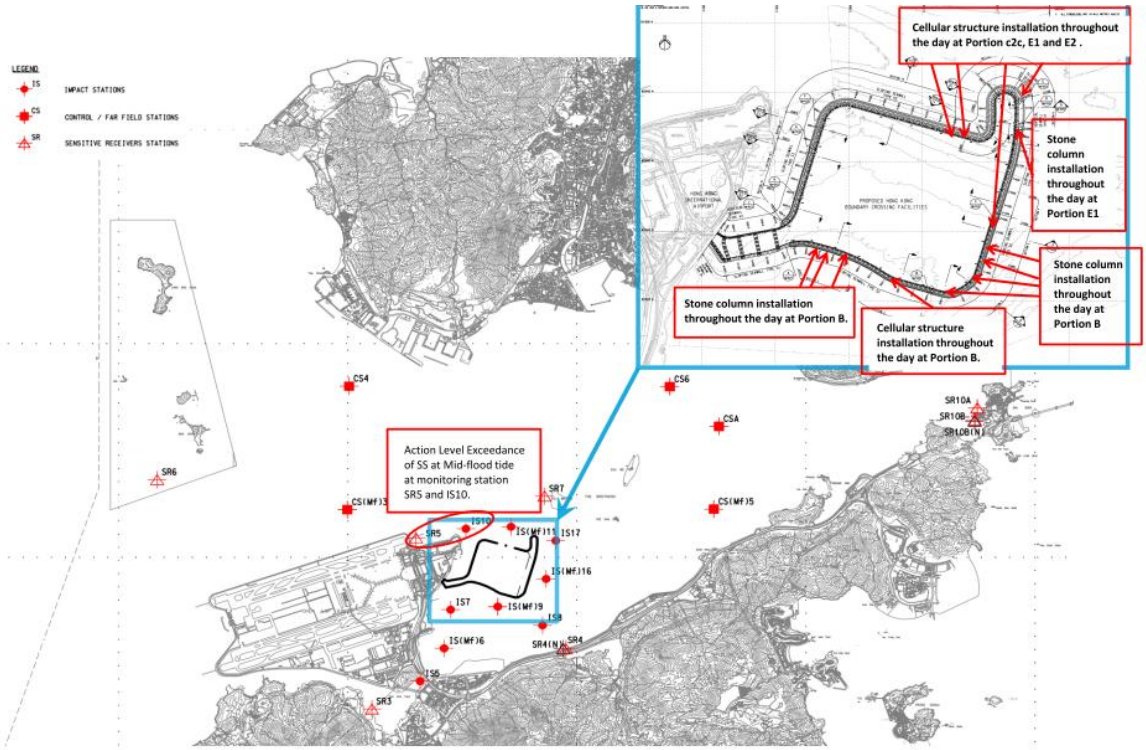
3.3.11.3 The monitoring location of monitoring station SR10B(N) are considered upstream and remote to the active works of this project during flood tide. Therefore it was unlikely that the exceedance recorded at SR10B(N) during flood tide was due to active construction activities of this project.

3.3.11.4 The exceedance was likely due to local effects in the vicinity of SR10B(N).

3.3.11.5 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.

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

3.3.12 Two (2) Limit Level exceedances at measured Suspended Solids (mg/L) were recorded on 25 Oct 2013 at monitoring station IS10 and SR5 at Mid-Flood tide. For Limit Level exceedance at measured Suspended Solids (mg/L), 54.7 mg/L and 36.8 mg/L were recorded at Monitoring Station IS10 and SR5 respectively at Mid-Flood tide.



3.3.12.1 For locations and type of active works carried out on 25 Oct 13, please refer to the above layout map.

3.3.12.2 No active works were carried out portion A, C2a, C1a and C1b. Cellular Structure installation was carried out at Portion C2c, E1, E2 and B on 25 Oct 13 and stone column installation was conducted at Portion B and E1 which is relatively far away from IS10 and SR5.

3.3.12.3 The location and type of active works conducted were almost the same on 23, 25 and 28 Oct 13 at mid flood tide but no exceedance was recorded at IS10 and SR5 on 23 and 28 Oct 13. This indicates that the exceedances at monitoring station IS10 and SR5 were unlikely to be contributed by active works.

3.3.12.4 Impact Stations IS(Mf)11 and IS7 is located closer to the active works of Portion E2 and B respectively than monitoring station IS10 and SR5 on 25 Oct 13, suspended solids values recorded at IS(Mf)11 and IS7 were below the action and limit level which indicates that active works from portion C2c, E1, E2 and B were unlikely to cause SS exceedances at monitoring station IS10 and SR5.

3.3.12.5 When impact water quality monitoring was carried out during mid flood tide at monitoring location IS10 and SR5, appearance of sea water was relatively turbid than it is for other monitoring stations but no silt plume was observed to flow from the inside to the outside of the site boundary. Hence, on-site observations did not support that the elevated SS was due project works.

3.3.12.6 Turbidity level (NTU) results recorded at IS10 and SR5 were 11.6 NTU and 11.8 NTU respectively during flood tide on 25 Oct 13 which was below the Action and Limit Level and this indicates turbidity level was not adversely affected.

3.3.12.7 No turbid water was observed and no silt plume was observed to flow from the inside to the outside of the site boundary when monitoring was conducted at monitoring station IS(Mf)11 and CS(Mf)3 which is the closest monitoring station next to IS10 and SR5 respectively.

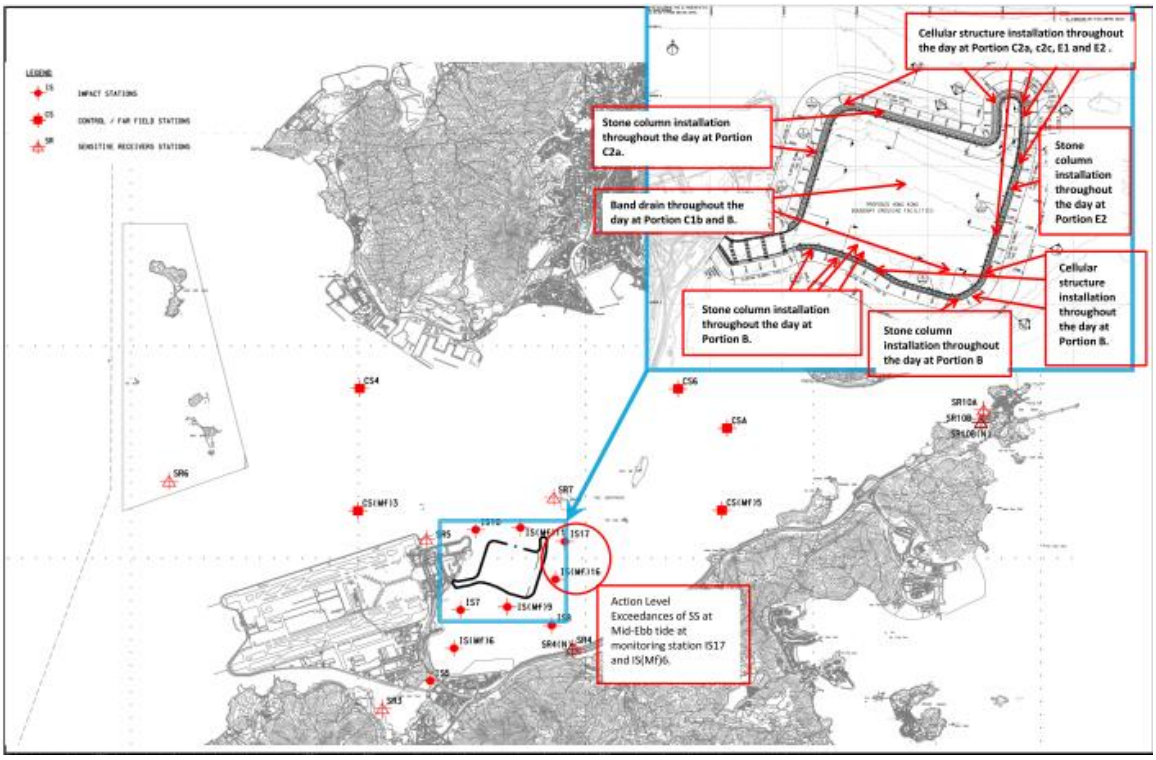
3.3.12.8 The exceedances were likely due to local effects in the vicinity of IS10 and SR5.

3.3.12.9 The exceedances were considered as Non-project related

3.3.12.10 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.

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

3.3.13 Two (2) Action Level exceedances at measured Suspended Solids (mg/L) were recorded on 04 Nov 2013 at monitoring station IS(Mf) 16 and IS17 at Mid-Ebb tide and Mid-Flood tide respectively. For Action Level exceedances at measured Suspended Solids (mg/L), 24.3 mg/L and 31.6 mg/L were recorded at Monitoring Station IS(Mf)16 and IS(Mf)9 respectively.



3.3.13.1 For locations and type of active works carried out on 4 Nov 13, please refer to the above layout map.

3.3.13.2 For action level exceedance of suspended solid recorded at IS(Mf)16 and IS17 during mid ebb tide, active works were carried out at almost the same locations on 1, 4 and 6 Nov 13, but all Suspended Solids results recorded at all monitoring location on 1 and 6 Nov 13 are all below the Action and Limit Level during the same tide on the same day which indicates active works is unlikely to adversely affect the water quality at IS(Mf)16 and IS17

3.3.13.3 When impact water quality monitoring was carried out during mid ebb tide at monitoring location IS(Mf)16 and IS17on 4 Nov 13, no silty plume were observed to flow from the inside to the outside of the site boundary.

3.3.13.4 Turbidity level (NTU) result recorded on 4 Nov 13 at IS(Mf)16 during ebb tide and IS17 during flood tide is 17.2 NTU and 18.4 NTU respectively which were below the Action and Limit Level, this indicates turbidity level was not adversely affected. (Please see attached photo record of the sea condition taken on 4 Nov 13.)

3.3.13.5 Photo record shows that no defect was observed on the perimeter silt curtain nearby IS(Mf)16 and IS17. (Please see attached photo record)

3.3.13.6 When impact water quality monitoring was carried out at IS(Mf)16 during mid ebb tide and at IS(Mf)9 during mid flood tide, no discoloration of sea water was observed and no silty plume were observed to flow from the inside to the outside of the site boundary.

3.3.13.7 Photo record of the sea condition taken on 4 Nov 13

Photo record of site condition nearby IS(Mf)6

Photo record shows site condition nearby IS17

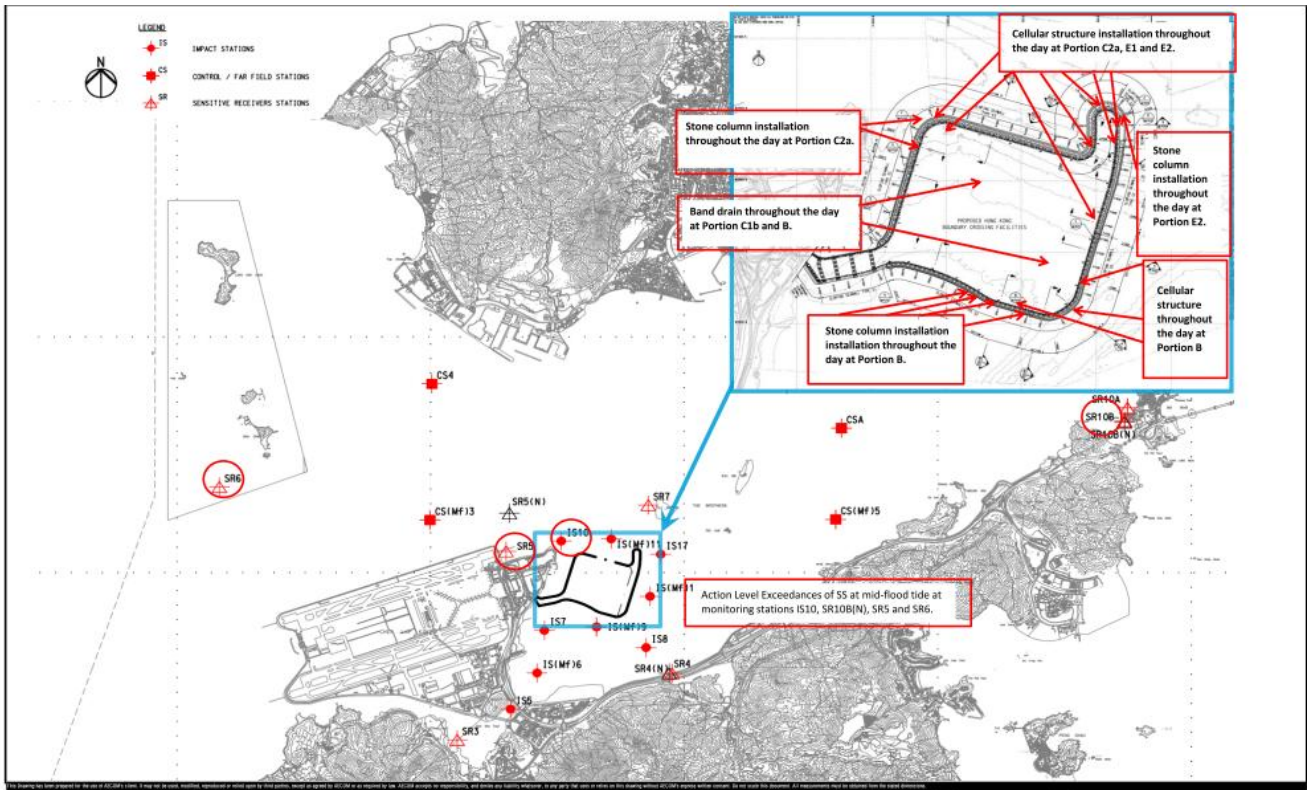
3.3.13.8 The recorded suspended solids values recorded on 4 Nov13 at monitoring station IS(Mf)11, IS(Mf)9 and IS(Mf)8 during ebb tide were below the action and limit level which shows that the water quality nearby IS(Mf)16 and IS17during ebb tide were not adversely affected.

3.3.13.9 The exceedances were likely due to local effects in the vicinity of IS(Mf)16 and IS17.

3.3.13.10 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.

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

3.3.14 Four (4) Action Level exceedances at measured Suspended Solids (mg/L) were recorded on 06 Nov 2013 during mid-flood tide at monitoring station IS10 and SR5. For Action Level exceedances at measured Suspended Solids (mg/L), 30.8 mg/L, 27.0 mg/L, 31.9 mg/L and 25.2 mg/L were recorded at Monitoring Station IS10, SR10B(N) , SR5 and SR6 respectively.



3.3.14.1 Active works like stone column and cellular structure installation were carried out at Portion C2a, E1, E2 and B but no exceedance was recorded at IS(Mf)11 which IS(Mf)11 is considered downstream and closer to active works of Portion E1 and E2. No exceedance was recorded at IS7 which IS7 is considered downstream to active works of Portion B.

3.3.14.2 Exceedances (IS10, SR5 and SR6) recorded at stations which are considered located downstream and closest to active works at Portion C2a during flood tide.

3.3.14.3 IS7 which is closer to the active works at portion B than it is for monitoring station IS10 and SR5 and the suspended solids level of IS7 at mid flood tide were below the action and limit level which indicates that active works from portion B were unlikely to cause SS exceedance at monitoring station IS10 and SR5.

3.3.14.4 Hence, active works like stone column and cellular structure installation carried out at Portion E1, E2 and B were unlikely to cause exceedance.

3.3.14.5 When monitoring was conducted, no turbid water was observed at SR7 and IS(Mf)11, but turbid water was observed at IS10, SR5 an SR6 which is located downstream to to active works at Portion C2a during flood tide.

3.3.14.6 However, with refer to the silt curtain condition on 6 and 8 Nov 13, defects of the perimeter silt curtain was observed at southwest and northwest of the construction site but no exceedance was observed on 8 Nov 13 at IS10, SR5, SR6 and SR10B(N).

3.3.14.7 Almost same type and location of works were conducted by vessels on 4, 6 and 8 Nov 13 but no exceedance was recorded on 4 and 8 Nov 13, indicating works conducted by vessels unlikely to cause the exceedances.

3.3.14.8 Monitoring results show no recurrence of exceedance of SS at IS10, SR5, SR6 and SR10B(N) on 8 Nov 13 indicating the exceedance of SS at IS10, SR5, SR6 and SR10B(N) during flood tide are unlikely due to marine work activities shown on the attached layout.

3.3.14.9 SR10B(N) is considered upstream to active works during flood tide and no exceedance was recorded at CS6, CSA, CS(Mf)5, IS(Mf)16 and IS7 which are closer to the HKBCF. Therefore, the exceedance recorded at SR10B(N) is not likely to be contributed from active work of HKBCF which is located downstream to SR10B(N).

3.3.14.10 As such, the exceedances recorded at IS10, SR5, SR6 and SR10B(N) were considered as non-Project related.

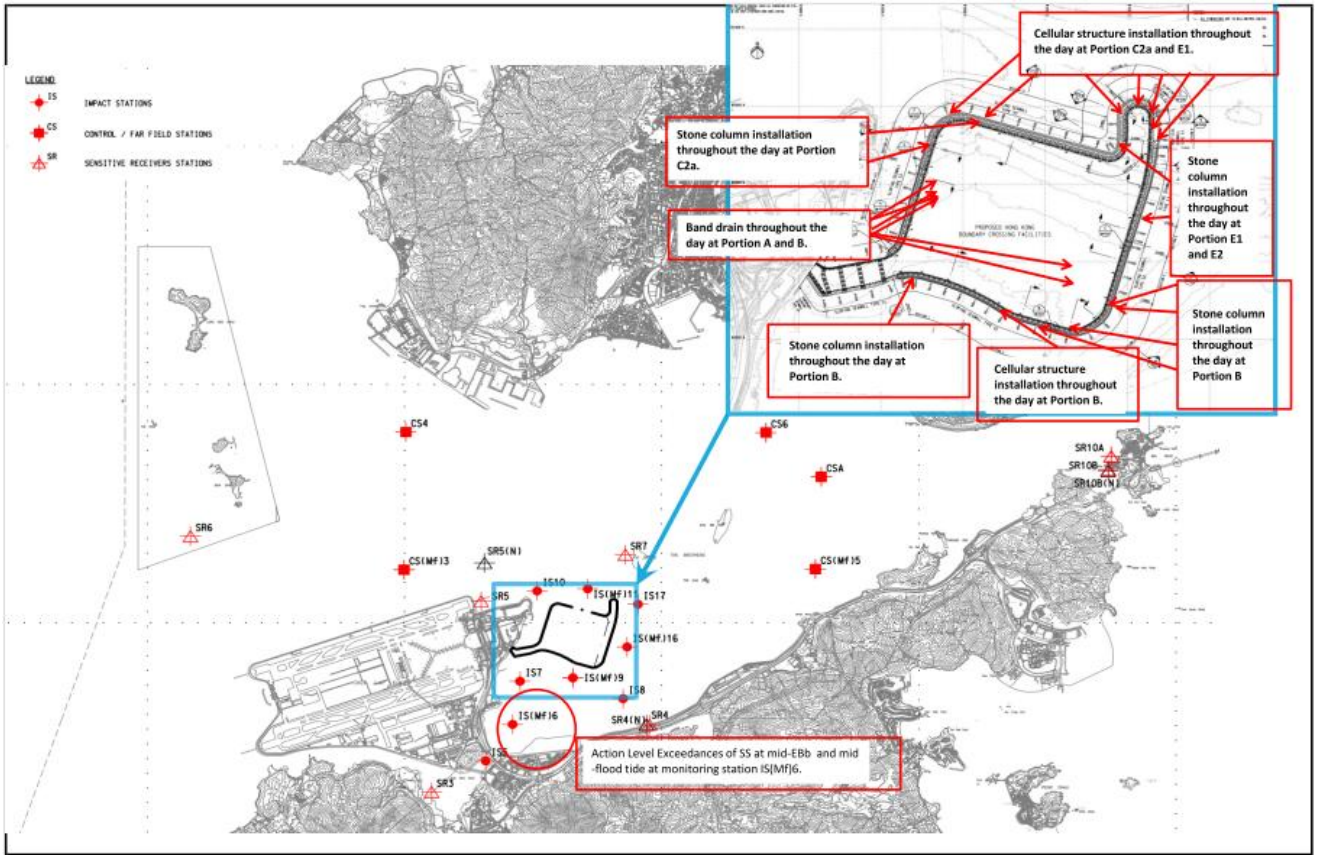
3.3.14.11 Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains and to carry out maintenance work once defects were found.

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

3.3.14.13 Photo record of the sea condition taken on 6 Nov 13

Condition of sea and silt curtain on 6 November 2013 (the northwest side of BCF)

3.3.15 Two (2) Action Level exceedances at measured Suspended Solids (mg/L) where recorded on 11 Nov 13 2013 during mid-flood tide and mid-ebb tide at monitoring station IS(Mf)16. For Action Level exceedance at measured Suspended Solids (mg/L), 27.9mg/L and 26.4mg/L was recorded at Monitoring Station IS(Mf)16



3.3.15.1 Please refer the above layout map for activity carried out on 11 Nov 13.

3.3.15.2 Suspended Solids values recorded at Impact Station IS(Mf)9 and IS7 which are closer to the works than monitoring station IS(Mf)6 are all below the Action and Limit Level during the same tide on the same day. This indicates that active works is unlikely to cause the exceedances at IS(Mf)6.

3.3.15.3 Almost same type and location of works were carried out at the same location on 8, 11 and 13 Nov 13 but Suspended Solids values recorded at IS(Mf)6 on 8 and 13 Nov 13 are all below the Action and Limit Level during the same tide on the same day. This indicates that active works is unlikely to cause the exceedance at IS(Mf)6.

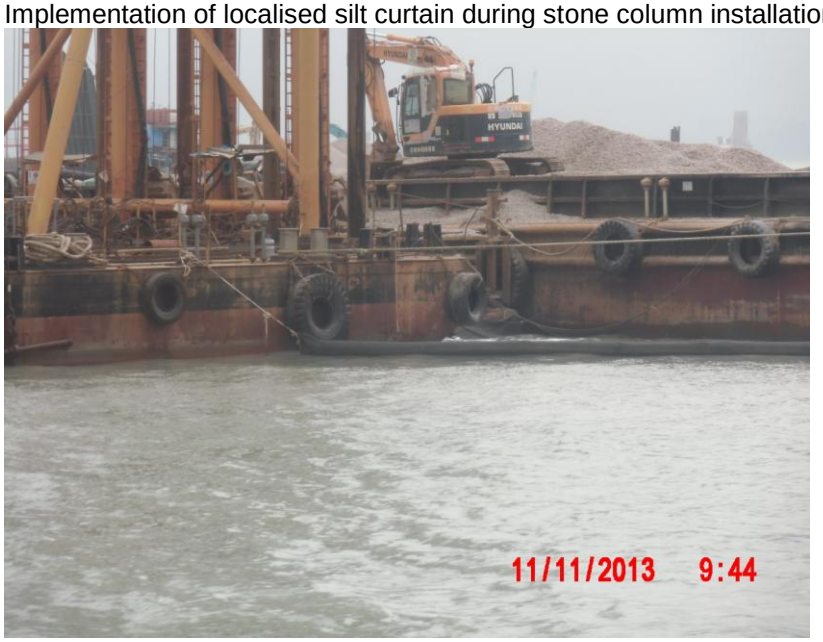
3.3.15.4 Monitoring results show no recurrence of exceedance of SS at IS(Mf)6 on 13 Nov 13 indicating the exceedances of SS at IS(Mf)6 during flood and ebb tide are unlikely due to marine work activities shown on the attached layout map.

3.3.15.5 Localised silt curtain was implemented during stone column installation. (Please refer to the photo record attached)

3.3.15.6 No defects of perimeter silt curtain was observed at the proximity of IS(Mf)6. (Please refer to the photo record attached)

Photo record of the sea condition taken on 11 Nov 13

Implementation of localised silt curtain during stone column installation



Condition of silt curtain at near the monitoring station IS(Mf)6

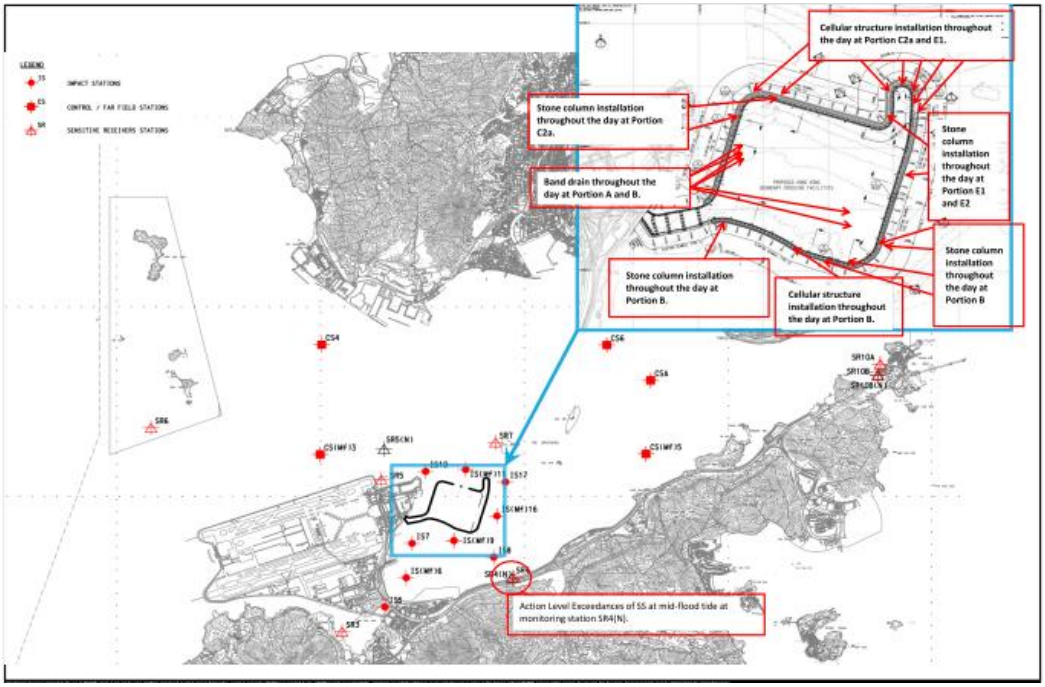
3.3.15.7 As such, the exceedances recorded at IS(Mf)6 during both tide were considered as non-Project related.

3.3.15.8 The exceedance was likely due to local effects in the vicinity of IS(Mf)6.

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

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

3.3.16 One (1) Action Level exceedance at measured Suspended Solids (mg/L) was recorded on 13 Nov 13 during mid-flood tide at monitoring station SR4(N). For Action Level exceedance at measured Suspended Solids (mg/L), 33.8 mg/L was recorded.



3.3.16.1 Please refer the above layout map for activity carried out on 13 Nov13.

3.3.16.2 IS(Mf)9, IS8 and IS(Mf)16 are located closer to the active works than monitoring station SR4(N). Depth Averaged Suspended Solids (SS) values (in mg/L) recorded during the flood tide on the same day at IS(Mf)9, IS8 and IS(Mf)16 were below the Action and Limit Level which indicates project works is unlikely to contribute to the action level exceedance recorded at SR4(N).

3.3.16.3 The monitoring location of monitoring station SR4(N) are considered upstream to the active works of this project during flood tide. Therefore it was unlikely that the exceedance recorded at SR4(N) was due to active construction activities of this project.

3.3.16.4 The exceedance was likely due to local effects in the vicinity of SR4(N).

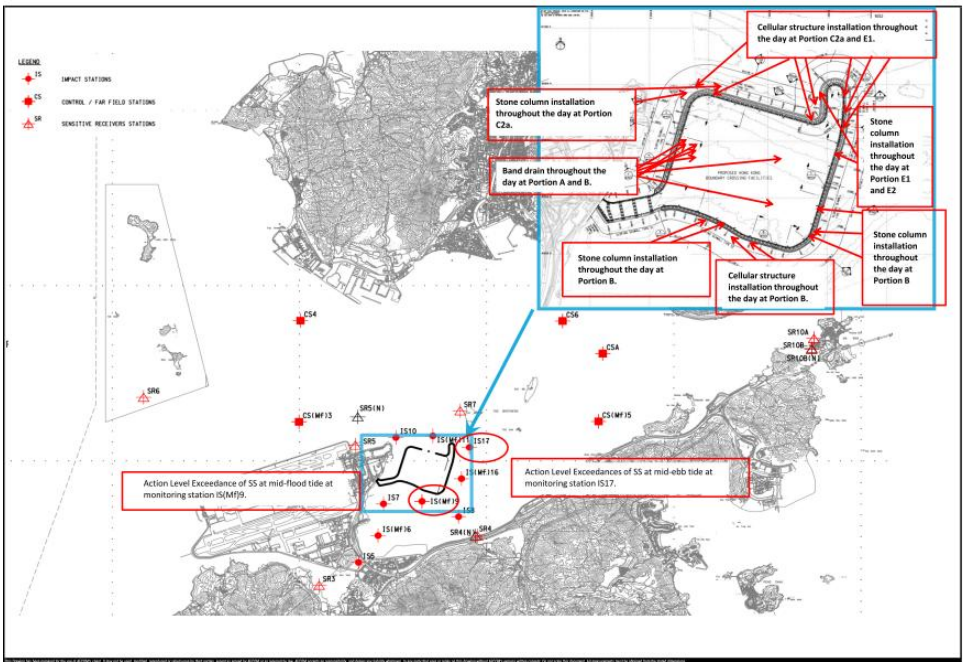
3.3.16.5 Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains and to carry out maintenance work once defects were found.

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

3.3.16.7 Photo record of the sea condition taken on 13 Nov 13

Condition of silt curtain near the monitoring station SR4(N).

3.3.17 Two (2) action level exceedance of SS was recorded on 15 Nov 13 at monitoring station IS17 during ebb tide and IS(Mf)9 during flood tide. SS level of 26 mg/L and 26.3 mg/L were recorded for station IS17 during ebb tide and IS(Mf)9 during flood tide respectively.



3.3.17.1 Please refer the below layout map for activity carried out on 15 Nov 13.

3.3.17.2 Turbidity level (NTU) results recorded on 15 Nov 13 at IS17 during ebb tide and IS(Mf)9 during flood tide is 23.4 NTU and 20.4 NTU respectively which were below the Action and Limit Level, this indicates turbidity level was not adversely affected. (Please see attached photo record of the sea condition taken on 15 Nov 13.)

3.3.17.3 Almost the same type of works at the same locations were carried out at the same location on 13, 15 and 18 Nov 13 but Suspended Solids values recorded at IS17 and IS(Mf)9 on 13 and 18 Nov 13 are all below the Action and Limit Level during the same tide on the same day which indicates active works is unlikely to adversely affect the water quality at IS17 and IS(Mf)9.

3.3.17.4 The recorded suspended solids values recorded on 15 Nov 13 at monitoring station IS(Mf)11, SR7, IS(Mf)16 during ebb tide were below the action and limit level which shows that the water quality nearby IS17 during the monitoring period were not adversely affected.

3.3.17.5 The recorded suspended solids values recorded on 15 Nov 13 at monitoring station IS(Mf)16, IS8 and IS7 during mid flood tide were below the action and limit level which shows that the water quality nearby IS(Mf)9 during the monitoring period were not adversely affected.

3.3.17.6 Refer to the attached layout map, active works were noted directly upstream to IS(Mf)9 during flood tide and IS17 during ebb tide, but no defects at south aligment (Nearby IS(Mf)9 and the northwest aligment of the perimeter silt curtain (nearby SI17) when monitoring was conducted on 15 Nov 13.

3.3.17.7 The exceedances were likely due to local effects in the vicinity of IS17 and IS(Mf)9.

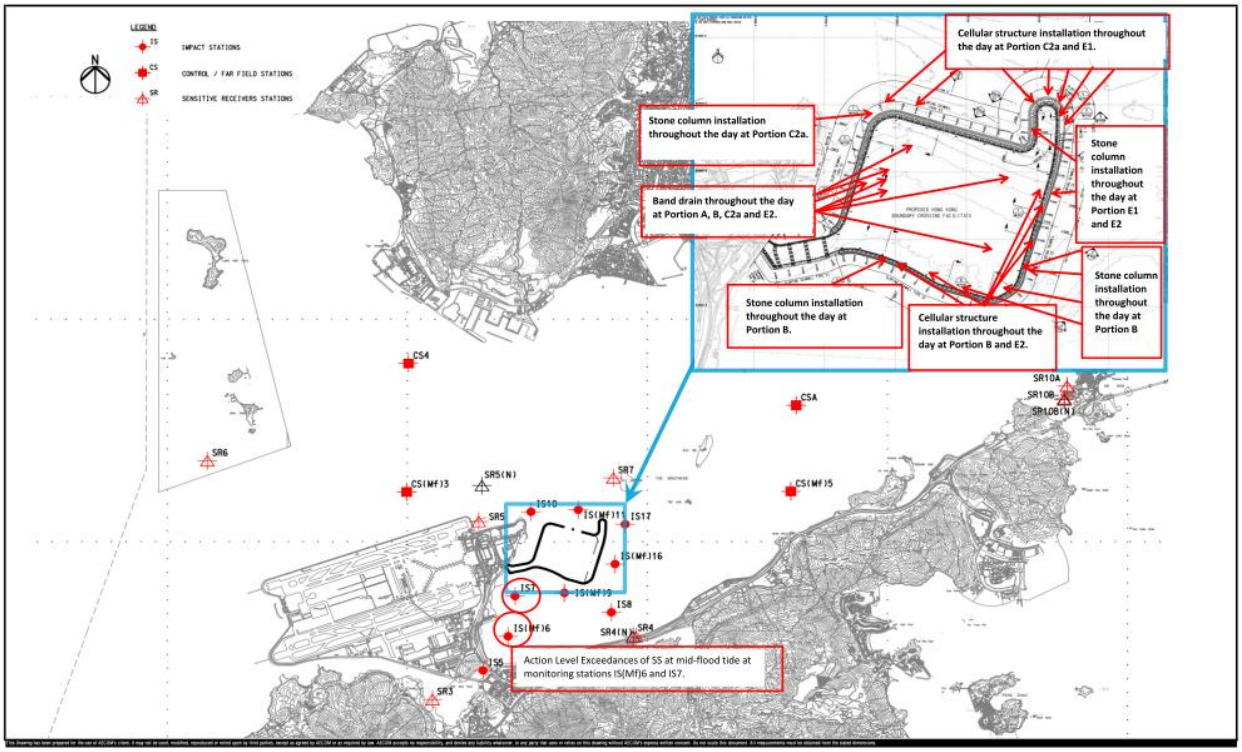
3.3.17.8 The exceedances were considered as Non-project related

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

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

3.3.17.11 Photo record of the sea condition taken on 15 Nov 13

3.3.18 Two (2) Action level exceedance of SS was recorded on 20 Nov 13 at monitoring station IS(Mf)6 and IS7 during mid flood tide. SS level of 31.5mg/L and 23.7mg/L was recorded for IS(Mf)6 and IS7 respectively.



3.3.18.1 Please refer attached Layout Maps for work activity carried out on 20 Nov 13.

3.3.18.2 Turbidity level (NTU) results recorded on 20 Nov 13 at IS(Mf)6 and IS7 during flood tide is 24.5 NTU and 8.7 NTU respectively which were below the Action and Limit Level, this indicates turbidity level was not adversely affected. (Please see attached photo record of the sea condition taken on 20 Nov 13.)

3.3.18.3 IS(Mf)9 is located closer to the active works than monitoring stations IS(Mf)6 and IS7. Depth Averaged Suspended Solids (SS) values (in mg/L) recorded during the flood tide on the same day at IS(Mf)9 was below the Action and Limit Level which indicates that the water quality nearby IS(Mf)6 and IS7 during the monitoring period were not adversely affected.

3.3.18.4 Almost the same type of works at the same locations were carried out at the same location on 18 and 22 Nov 13 but Suspended Solids values recorded at IS(Mf)6 and IS7 on 18 and 22 Nov 13 are all below the Action and Limit Level during the same tide on the same day which indicates active works is unlikely to adversely affect the water quality at IS(Mf)6 and IS7.

3.3.18.5 Refer to the attached layout map, active works were noted directly upstream to IS(Mf)6 and IS7 during flood tide, but no defects at the northwest alignment of the perimeter silt curtain (nearby SI(Mf)11) when monitoring was conducted on 20 Nov 13.

3.3.18.6 No defects of perimeter silt curtain was observed at the proximity of IS(Mf)6 and IS7. (Please refer to the photo record attached)

3.3.18.7 Condition of silt curtain near the monitoring station IS(Mf)6 and IS7.

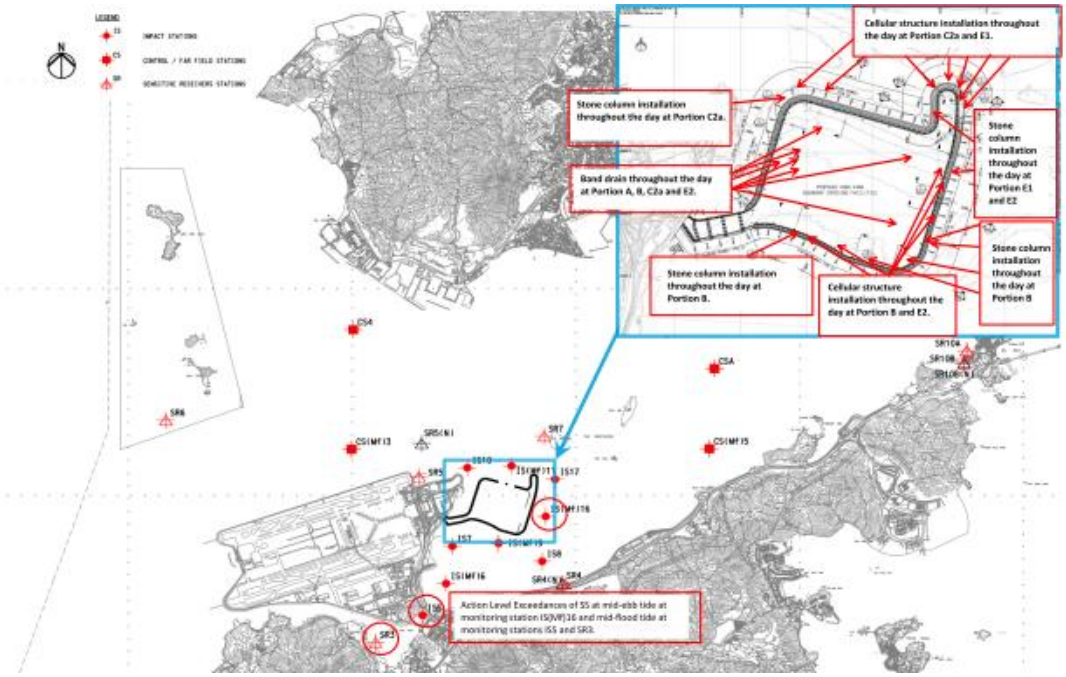
3.3.18.8 The exceedances were likely due to local effects in the vicinity of IS(Mf)6 and IS7.

3.3.18.9 The exceedances were considered as Non-project related

3.3.18.10 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.

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

3.3.19 Three (3) Action level exceedance of SS was recorded on 22 Nov 13 at monitoring station IS(Mf)6 during mid-ebb tide, IS5 and SR3 during mid-flood tide. SS level of 30mg/L at monitoring station IS(Mf)6 during mid-ebb tide was recorded and 24.6mg/L and 23.7mg/L were recorded for IS5 and SR3 respectively during mid flood tide



3.3.19.1 Please refer attached Layout Maps for work activity carried out on 22 Nov 13.

During Mid-ebb tide:

3.3.19.2 Turbidity level (NTU) results recorded on 22 Nov 13 at IS(Mf)16 during ebb tide is 22.5 NTU which were below the Action and Limit Level, this indicates turbidity level was not adversely affected. (Please see attached photo record of the sea condition taken on 22 Nov 13.)

3.3.19.3 IS17 and IS(Mf)11 which are located closer to the active works than monitoring stations IS(Mf)16. Depth Averaged Suspended Solids (SS) values (in mg/L) recorded during the ebb tide on the same day at IS17 and IS(Mf)11 were below the Action and Limit Level which indicates that the water quality nearby IS(Mf)16 during the monitoring period were not adversely affected.

3.3.19.4 Almost the same type of works at the same locations were carried out at the same location on 18, 20 and 22 Nov 13 but Suspended Solids values recorded at IS(Mf)16 on 18, 20 and 22 Nov 13 are all below the Action and Limit Level during the same tide on the same day which indicates active works is unlikely to adversely affect the water quality at IS(Mf)16.

3.3.19.5 Localised silt curtain was implemented during stone column installation.

3.3.19.6 No defects of perimeter silt curtain was observed at the proximity of IS(Mf)16. (Please refer to the photo record attached)


2013/11/22


2013/11/22

During Mid-flood tide:

3.3.19.7 Turbidity level (NTU) results recorded on 22 Nov 13 at IS5 and SR3 during flood tide is 15.7 NTU and 18.7 NTU respectively which were below the Action and Limit Level, this indicates turbidity level was not adversely affected. (Please see attached photo record of the sea condition taken on 22 Nov 13.)

3.3.19.8 IS(Mf)9 and IS7 are located closer to the active works than monitoring stations IS5 and SR3. Depth Averaged Suspended Solids (SS) values (in mg/L) recorded during the flood tide on the same day at IS(Mf)9 and IS7 were below the Action and Limit Level which indicates project works is unlikely to contribute to the action level exceedance recorded at IS5 and SR3.

3.3.19.9 The monitoring location of monitoring stations IS5 and SR3 are considered upstream to the active works of this project during flood tide. Therefore it was unlikely that the exceedances recorded at IS5 and SR3 were due to active construction activities of this project.

3.3.19.10 The exceedances were likely due to local effects in the vicinity of IS(Mf)16, IS5 and SR3.

3.3.19.11 The exceedances were considered as Non-project related

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

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

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

3.4 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 Sept 2013- Nov 2013

Number of Impact Surveys Completed^	6
Survey Distance Travelled under Favourable On- Effort Condition	665.9km
Number of Sightings	42 sightings (28 sightings are ”on effort” (which are all under favourable condition), 14 “sightings are opportunistic”)
Number of dolphin individual sighted	133 individuals (the best estimated group size)
Dolphin Encounter Rate#	NEL: 0 NWL:6.3
Dolphin Group Size	Average of 3.2 Varied from 1-12 individuals
Most Often frequent dolphin sighting area	Sha Chau and Lung Kwu Chau Marine Park.

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

3.4.5 Two (2) Action Level exceedances of dolphin monitoring were recorded in the reporting quarter. The investigation results showed that 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. The investigation results 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 below shows the Summary of STG and ANI encounter rates in Sept 2013- Nov 2013**.**

Table 3.7 Summary of STG and ANI encounter rates in Sept 2013- Nov 2013

	NEL	NWL	Level Exceeded
STG*	0.00	6.7	Action
ANI**	0.00	24.7	Action

*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.

3.4.7 Single parameter analyses are unable to detect impact as the influence of additional and co-correlated factors are not accounted for. As such, a multi-parameter model was proposed and reviewed by management authorities. This analysis is currently underway and shall be reported in full in a separate report immediately in its completion.

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 Stockpile of sand was observed entire surface wet at WA2. The Contractor was reminded that stockpile of aggregate or dusty materials shall be sprayed with water so as to maintain the entire surface wet; or covered entirely by impervious sheeting or placed in sheltered areas to mitigate potential fugitive dust emission. (Reminder)

3.5.4 Side curtain attached to the tipping point of a conveyor belt on a filling barge was provided to filling barge but was observed not fully enclosed. The Contractor was reminded to provide a fully enclosed side curtain for filling activities. (Reminder)

3.5.5 Sand surface was observed during inspection at works area at Portion A. The Contractor provided dust control to the areas with sand surface. The Contractor was reminded to continue the provision of dust control measures to the areas with sand surface. (Reminder)

3.5.6 Dark smoke was observed emitted on barges when sand material was being transferred to another barge. The Contractor was reminded to rectify the situation such as to maintain their equipments in good condition to prevent emission of dark smoke. The Contractor maintained their equipments in good condition to prevent emission of dark smoke. (Closed)

3.5.7 Bags of cement was observed not entirely covered by impervious sheeting, the Contractor was reminded to keep the bags of cement covered entirely by impervious sheeting. The Contractor rectified the situation and kept the bags of cement covered entirely by impervious sheeting. (Closed)

Noise

3.5.8 Some plants mounted on construction vessels were observed acoustically-decoupled, but a generator was still observed not totally acoustically-decoupled on barge Shang Ho Bo 601. The Contractor was advised to continue to provision of enhancement works i.e. to provide sufficient acoustic decoupling measure(s) such as acoustic mat to noisy equipments. The Contractor was reminded that insufficient/inadequate mitigation measures must be swiftly rectified. (Reminder)

3.5.9 A Generator was observed without sufficient decoupling measures on barge Fai Yu 3228. The Contractor provided sufficient acoustic decoupling measures to generator on Fai Yu 3228. (Closed)

3.5.10 Noise Emission Label (NEL) of an air compressor was observed missing. The Contractor was reminded to properly display the NEL on all Compressors. The Contractor properly display the NEL the Compressors observed on Kiu Chi. (Closed)

Chinese White Dolphin

3.5.11 No adverse observation was identified in the reporting month.

Water Quality

3.5.12 Oil drum was observed improperly stored on barge SHB401, on rock bund, works area at Portion A, on an area outside Contractor's site office, the Contractor was reminded to provide mitigation measures such as bunding or drip tray to all oil drums. The Contractor removed the oil drums from area without bunding or drip tray. (Closed)

3.5.13 Open holes were observed within the drum of the bunding on barge SHB401, on Barge Fai Yu 3228, on barge AP4, on barge Evershine 668, on barge Yat Fai, at works area of portion A and on temporary rock bund. The Contractor was reminded to provide effective mitigation measures such as to seal the holes properly to prevent potential leakage and runoff. The Contractor provided effective mitigation measures such as to fix the defects properly to prevent potential leakage and runoff. (Closed)

3.5.14 It was observed that the frame of a trip tray on barge Shang Ho Bo 601 was insufficient. The Contractor was reminded to provide effective mitigation measures such as drip tray/bunding with sufficient height to contain waste drums. The Contractor provided drip tray/bunding with sufficient space to contain waste drums. (Closed)

3.5.15 It was observed that the frame of a trip tray on barge Fai Yu 3228 was damaged. The Contractor was reminded to provide effective mitigation measures such as drip tray with sufficient height to contain equipments. (Closed)

3.5.16 Machine and generator were observed without drip tray/tarpaulin sheet underneath at rock bund and works area at Portion A and on steel cell. The Contractor was reminded to provide mitigation measures to prevent potential surface runoff. The Contractor rectified the situation by placing tarpaulin sheet underneath the machine and sand bag was used to surround the machine. (Closed)

3.5.17 A new generator was observed without drip tray on cellular structure. The Contractor was reminded to provide mitigation measures such as drip tray to this generator before operation of this generator. (Reminder)

3.5.18 Temporary mitigation measure was provided to idle generation on barge Fai Yu 3228 but the Contractor was reminded to provide mitigation measures such as drip tray or bunding to prevent potential oil leakage and surface runoff. The generator was provided with built-in drip tray. (Closed)

3.5.19 Silt plum was observed flowed from the inside of the localized silt curtain on barge Sun Moon Kee. The Contractor rectified the defects of the localized silt curtain. (Closed)

3.5.20 A fuel tank which is not in use was observed without drip tray or bunding. The Contractor was reminded to provide mitigation measures such as drip tray or bunding to fuel tank before use. (Reminder)

3.5.21 Oil stain was observed on barge Yat Fat and on barge Kiu Chiu. The Contractor was reminded to clear the oil stain using oil absorbent material and dispose the absorbent as chemical waste. The Contractor cleared the oil stain observed on barge Yat Fat. (Closed)

3.5.22 Barges were observed without sufficient enclosed side curtain. The Contractor was reminded to provide barges for delivering sand material with sufficient enclosed side curtain. The Contractor was reminded to provide barges for delivering sand material with enclosed side curtain. (Closed)

3.5.23 Turbid water was observed at the southwestern silt curtain entrance area. Refer to the photo taken and site observations, sources of impact likely due to the turbine activities and/or movement of vessel at shallow water (at near the entrance at southwestern of the Construction site and/or when vessel's propeller was turn on at shallow water). The dispersion of turbid water from the inside of the perimeter silt curtain to the outside of the perimeter silt curtain is potentially due to defects of perimeter silt curtain at certain sections and/or insufficient overlapping at entrance/exit of the perimeter silt curtain. The Contractor was advised to regularly evaluate the integrity of the perimeter silt curtain by reviewing the results obtained from daily checking or/and monthly diver inspections specified by the Silt Curtain Deployment Plan. The Contractor was advised to provide sufficient mitigation measures and swiftly carry out maintenance once defects of the perimeter silt curtain are found during the above mentioned daily checking and/or monthly diver inspection. The Contractor was provided mitigation measures and carried out maintenance above mentioned defects of the perimeter silt curtain are found. (Closed)

Chemical and Waste Management

Waste

3.5.24 Bags of waste were observed accumulated on barge Four Sea 8, barge Hing Fai, barge AP4 and various locations on a works area at Portion A. The Contractor was reminded to clear the waste regularly to prevent accumulation. (Reminder)

3.5.25 Litter and general refuse was observed accumulated on sea the Contractor was reminded to avoid/clear any foam, oil, grease, chemicals, litter, food or other objectionable matter due to the Project works presented in the water within and adjacent to the works site. The Contractor avoided any foam, oil, grease, chemicals, litter, food or other objectionable matter due to the Project works presented in the water within and adjacent to the works site. The Contractor was reminded to collect and clear the waste on sea regularly. (Closed)

3.5.26 General refuse were found on various location of the works area at Portion A. The Contractor was reminded to clear the general refuse regularly. The Contractor was reminded to maintain the site in a clean and tidy condition i.e. to properly store the general refuse at designated waste storage area(s). The Contractor cleared the general maintain the site in a clean and tidy condition. (Closed)

Landscape and Visual Impact

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

Others

3.5.28 The Contractor was reminded to properly display relevant Environmental Permit at an appropriate location i.e. near entrance on barge Kam Shun 368, so that it may be easily noticed. (Reminder)

3.5.29 Water was observed accumulate inside car tyre on barge Yat Fat. The Contractor was reminded to keep the site clean and tidy and clear the water accumulated inside car to prevent mosquito breeding. The Contractor rectified the situation by clearing the car tyre on barge Yat Fat. (Closed)

3.5.30 The Contractor had rectified most of the observations as identified during environmental site inspection in the reporting Quarter. 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.

3.5.31 The Contractor had rectified most of the observations as identified during environmental site inspection in the reporting Quarter. 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, 2,162,636.3 m^3 of fill were imported for the Project use in the reporting period. 1.792 tonnes of paper/ carboard packaging and 1.4 tonnes of metal were generated, 1.2 tonnes of chemical waste and 78 m^3 of general refuse were generated and disposed of in the reporting period. Monthly summary of waste flow table is detailed in Appendix M.

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. Five (5) 24-hour TSP results recorded at AMS3A exceeded the Action Level and one (1) 24-hour TSP results recorded at AMS3A exceeded the Limit Level in the reporting Quarter. Investigation results show that the exceedances were 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 Twenty eight (28) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting Quarter. (2) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. Investigation results show that the exceedances were not related to Project.

6.1.4 Two (2) Action Level exceedances were recorded in the reporting quarter. The investigation results showed that 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.

6.1.5 Event and Action Plan for Impact Dolphin Monitoring was triggered. For detail of investigation, please refer to appendix L.

6.1.6 Cumulative statistics on exceedances is provided in Appendix J.

7 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

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

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

7.1.2 One (1) complaint was logged by the Contractor regarding the leakage from work barges causing water pollution near Tuen Mun Richland Garden received on 26 Sept 13.

7.1.2.1 The complaint reported in the EM&A report (Sept 13) regarding the leakage from work barges causing water pollution near Tuen Mun Richland Garden was followed up and replied by Highway Department to Oriental Daily Newspaper and it is noted that all project related vessels (including sand barges) are designated with a regular marine travel route to the site, but the regular travel route plan of this project does not specify the travel route passing through the Tuen Mun Butterfly Beach area. Information shown that all sand barges will not conduct sand filling activities at area outside HKBCF site boundary and all vessels have regular maintenance to ensure that all Sand Barge functioning well.

7.1.2.2 With refer to the available information such as photo record of the incident cannot indicate that the leakage from work barges was caused by the vessel of this Contract and the complaint could not be concluded as project related.

7.1.2.3 The Contractor was advised to ensure the regular travel routes for all project related vessels (including sand barges) shall be strictly followed, all sand barges do not conduct sand filling activities at area outside HKBCF site boundary and all vessels have regular maintenance to ensure that all Sand Barge functioning well.

7.1.3 As informed by the Contractor on 5 Nov 13, 1 (one) a noise complaint received on 14 Sept 13 was referred to the Contractor of HKBCF on 1 Nov 13. The captioned complaint involves noise generated by a tug boat operating near a pier at Tung Chung around 05:55am-06:45am on 14 Sept 13.

7.1.3.1 In respect of the concern incident, the Contractor of HKBCF confirmed that the tug boat showed in photographs provided does not belong to this project. Site daily records were provided by the Contractor and the site daily records show that no tug boat was in operation before 09:00 on 14 Sept 13. As a result, the noise complaint was considered as non-project related

7.1.3.2 The Contractor was advised to notice all captains of the boats of this Contract to be aware of the captioned noise incident and to avoid the occurrence of the captioned situation.

7.1.4 One (1) complaint received from Penta-Ocean – Gitanes Joint Venture (CV/2012/03) mentioned that the formation works of the Contaminated Mud Pit CMP1 to the South of the Brothers (CMP1 of SB) which has been completed in mid-August 2013 and the pit has been commissioned for receiving contaminated marine mud from other projects starting from 16 August 2013. However, it was recently observed that some of the project vessels of HY/2010/02 had berthed within the said pit and those anchorages would likely cause disruption to the underlying contaminated mud and thus induce unfavourable contamination impact to the surrounding marine environment. In this regard, they reminded the contractor to avoid berthing of their vessels within the boundary of CMP1 of SB thereafter for the sake of environmental concern.

7.1.4.1 With refer to the given photo, there are no sufficient details or features could be found on the anchored vessels that confirmed they are project vessels (lack of names and vessel number); it cannot be conclude that the concerned vessels shown in the photos belong to this Contract. The complaint is therefore considered not likely to be related to the construction works.

7.1.4.2 The Contractor was advised to notice all captains of the boats of this Contract to be aware of the captioned incident and to avoid the anchoring of vessels within the concerned area. Further to the captioned complaint on 22/11/2013, The Contractor had followed up with the case about their vessels berthing within the boundary of CMP1 of SB thereafter, causing disruption to the underlying

contaminated mud and induces contamination impact to the surrounding marine environment. In respect of the concern situation, all captains of the vessels were reminded to avoid anchor in the captioned area immediately.

7.1.5 One (1) follow up enquiry of the same issue mentioned in a complaint reported in the EM&A report (Sept 13) was logged by the Contractor on 9 Oct 2013. The enquirer expressed concern of the leakage from work barges causing water pollution at sea near Tuen Mun Richland Garden and the impact of fishery activities.

7.1.5.1 The complaint reported in the EM&A report (Sept 13) regarding the leakage from work barges causing water pollution near Tuen Mun Richland Garden was followed up and information shown that all project related vessels (including sand barges) are designated with a regular marine travel route to the site, but the regular travel route plan of this project does not specify the travel route passing through the Tuen Mun Butterfly Beach area.

7.1.5.2 Information shown that all sand barges will not conduct sand filling activities at area outside HKBCF site boundary and all vessels have regular maintenance to ensure that all Sand Barge functioning well.

7.1.5.3 Although with refer to the available information such as photo record of the incident cannot indicate that the leakage from work barges was caused by the vessel of this Contract and the complaint could not be concluded as project related.

7.1.5.4 The Contractor was advised to ensure the regular travel routes for all project related vessels (including sand barges) shall be strictly followed, all sand barges do not conduct sand filling activities at area outside HKBCF site boundary and all vessels have regular maintenance to ensure that all Sand Barge functioning well.

7.1.6 No notification of summons and successful prosecution was received in the reporting period.

7.1.7 No environmental notification of Summons and Successful Prosecutions was received in the reporting quarter.

7.1.8 Statistics on complaints, notifications of summons and successful prosecutions are summarized in Appendix J.

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. Five (5) 24-hour TSP results recorded at AMS3A exceeded the Action Level and one (1) 24-hour TSP results recorded at AMS3A exceeded the Limit Level in the reporting quarter. Investigation results show that the exceedances were 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 Twenty eight (28) Action Level Exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter. (2) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L) in the reporting quarter.

8.3.5 Two (2) Action Level exceedances of dolphin monitoring were recorded in the reporting quarter. The investigation results showed that 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.

8.3.6 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.

8.3.7 One (1) complaint was logged by the Contractor regarding the leakage from work barges causing water pollution near Tuen Mun Richland Garden received on 26 Sept 13. With refer to the available information such as photo record of the incident cannot indicate that the leakage from work barges was caused by the vessel of this Contract and the complaint could not be concluded as project related.

8.3.8 As informed by the Contractor on 5 Nov 13, one (1) noise complaint received on 14 Sept 13 was referred to the Contractor of HKBCF on 1 Nov 13. After investigation, the noise complaint was considered as non-project related.

8.3.9 One (1) complaint received from Penta-Ocean – Gitanes Joint Venture (CV/2012/03) mentioned that the formation works of the Contaminated Mud Pit CMP1 to the South of the Brothers (CMP1 of SB) which has been completed in mid-August 2013 and the pit has been commissioned for receiving contaminated marine mud from other projects starting from 16 August 2013. However, it was recently observed that some of the project vessels of HY/2010/02 had berthed within the said pit and those anchorages would likely cause disruption to the underlying contaminated mud and thus induce unfavourable contamination impact to the surrounding marine environment. In this regard, they reminded the contractor to avoid berthing of their vessels within the boundary of CMP1 of SB thereafter for the sake of environmental concern. After investigation, the complaint is considered not likely to be related to the construction works.

8.3.10 One (1) follow up enquiry of the same issue mentioned in a complaint reported in the EM&A report (Sept 13) was logged by the Contractor on 9 Oct 2013. The enquirer expressed concern of the leakage from work barges causing water pollution at sea near Tuen Mun Richland Garden and the impact of fishery activities. Although with refer to the available information such as photo record of the incident cannot indicate that the leakage from work barges was caused by the vessel of this Contract and the complaint could not be concluded as project related.

8.3.11 No notification of summons and successful prosecution was received in the reporting period.

8.3.12 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.

8.3.13 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.

8.3.14 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.

812000 E 813000 E 814000 E 815000 E 816000 E 817000 E 818000 E 819000 E 820000 E 821000 E 822000 E 823000 E

825000 N 824000 N 823000 N 822000 N 821000 N 820000 N 819000 N 818000 N 817000 N 816000 N 815000 N

N

THE SITE

PROPOSED HONG KONG BOUNDARY CROSSING FACILITIES

HONG KONG INTERNATIONAL AIRPORT

SIU HO WAN WIND PROFILER

SIU HO WAN ANEMOMETER STATION

WORKS AREA WA4

WORKS AREA WA3

WORKS AREA WA2

TUNG CHUNG

THE BROTHERS

TSZ KAN CHAU

SIU MO TO

TAI MO TO

TO KAU WAN

CHEUNG SOK

LUK KENG BAY

YAM TSAI BAY

SHAM SHUI

SIU HO WAN

SAM PAK AU

LAI PIK SHAN

SZE WAN AU

TAI SHAN

PENNY'S BAY

DISCOVERY BAY (TAI PAK WAN)

YI PAK WAN

TUNG CHUNG BAY

POR KAI SHAN

TUNG CHUNG NEW TOWN EXTENSION

TUNG CHUNG NORTH EXTENSION COUNTRY PARK

TAI HO WAN

TUNG CHUNG CROSS ISLAND HIGHWAY

TUNG CHUNG EAST

TUNG CHUNG WEST

PEARL ISLAND

GOLDEN BEACH

DRAGON BEACH

PENG CHAU

TUNG WAN

NGAN CHAU

HUNG FA NGAN

SILVER MINE BAY BEACH

HONG KONG DISNEYLAND

TUNG CHUNG

N

HONG KONG INTERNATIONAL AIRPORT

HKBCF

HONG KONG DISNEYLAND

TUNG CHUNG

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

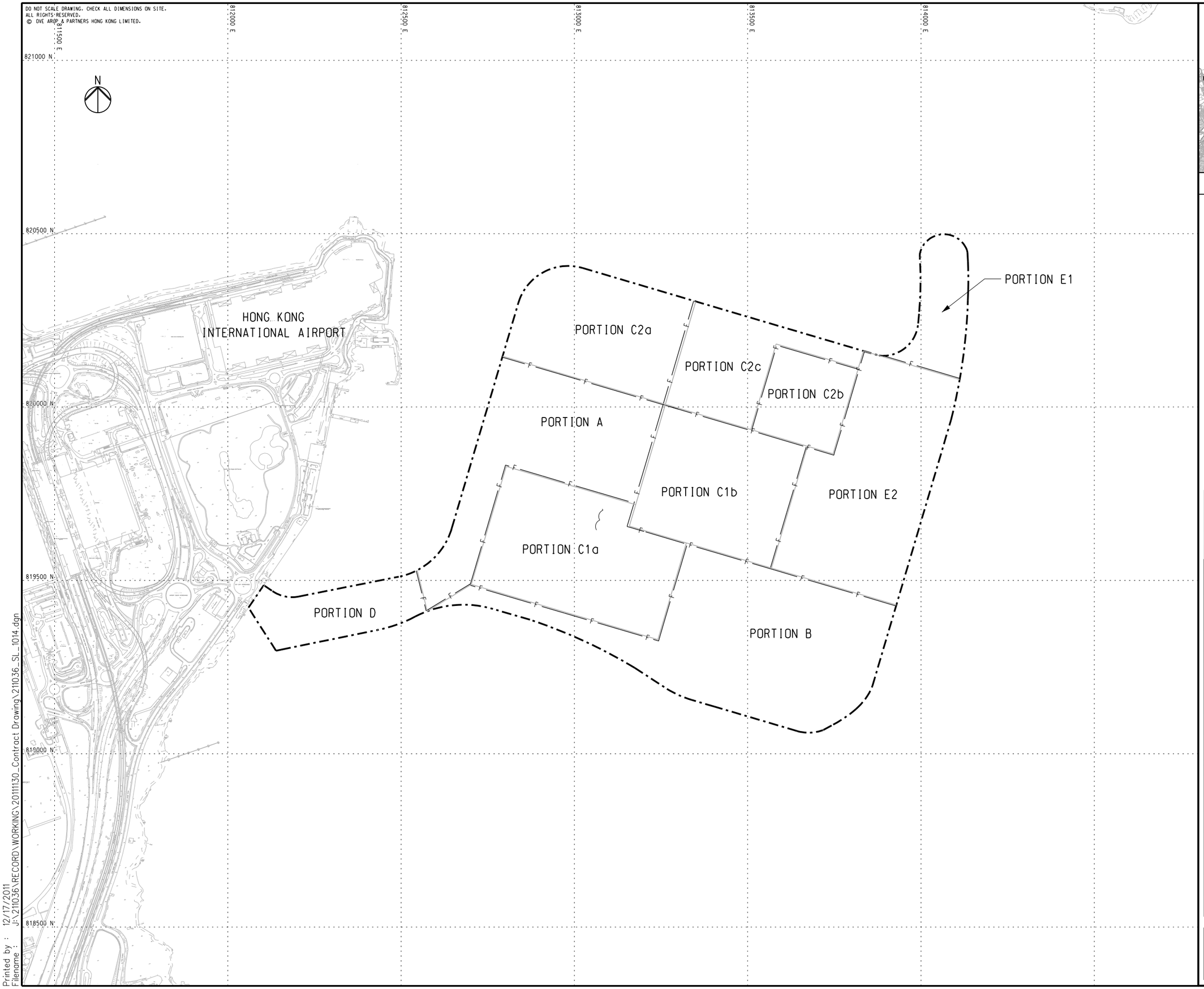
Drawing title

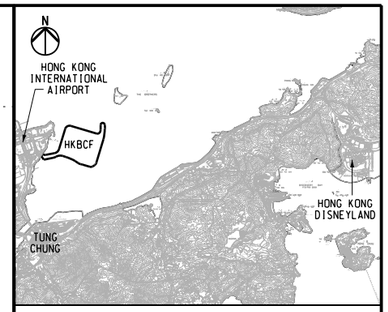
KEY PLAN

Drawing no.		Rev.
211036/SL/1001		-
Drawn: RL	Date: 11/09	Checked: KKY	Approved: 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

Printed by : 12/17/2011
Filename : J:\211036\RECORD\WORKING\20111130_Contract Drawing\211036_SL_1001.dgn





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

ISO A3 297mm x 420mm

Checked:

Project Management Initials:

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810000 E
811000 E
812000 E
813000 E
814000 E
815000 E

820000 N
819000 N
818000 N
817000 N
816000 N

PROPOSED HONG KONG BOUNDARY CROSSING FACILITIES

AMS7

AMS6

AMS3A
NMS3A

AMS2
NMS2

CHEK LAP KOK

HONG KONG INTERNATIONAL AIRPORT

SCENIC HILL

Pak Sha Tsui

TUNG CHUNG

LEGEND

AMS1 AIR MONITORING STATIONS

NMS1 NOISE MONITORING STATIONS

WIND STATION

AECOM

Figure 2

IMPACT AIR QUALITY AND NOISE
MONITORING STATIONS AND WIND STATION

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

Project No.: 60249820 Date: MAY 2012

Plot File by: Lammd 03/05/2012
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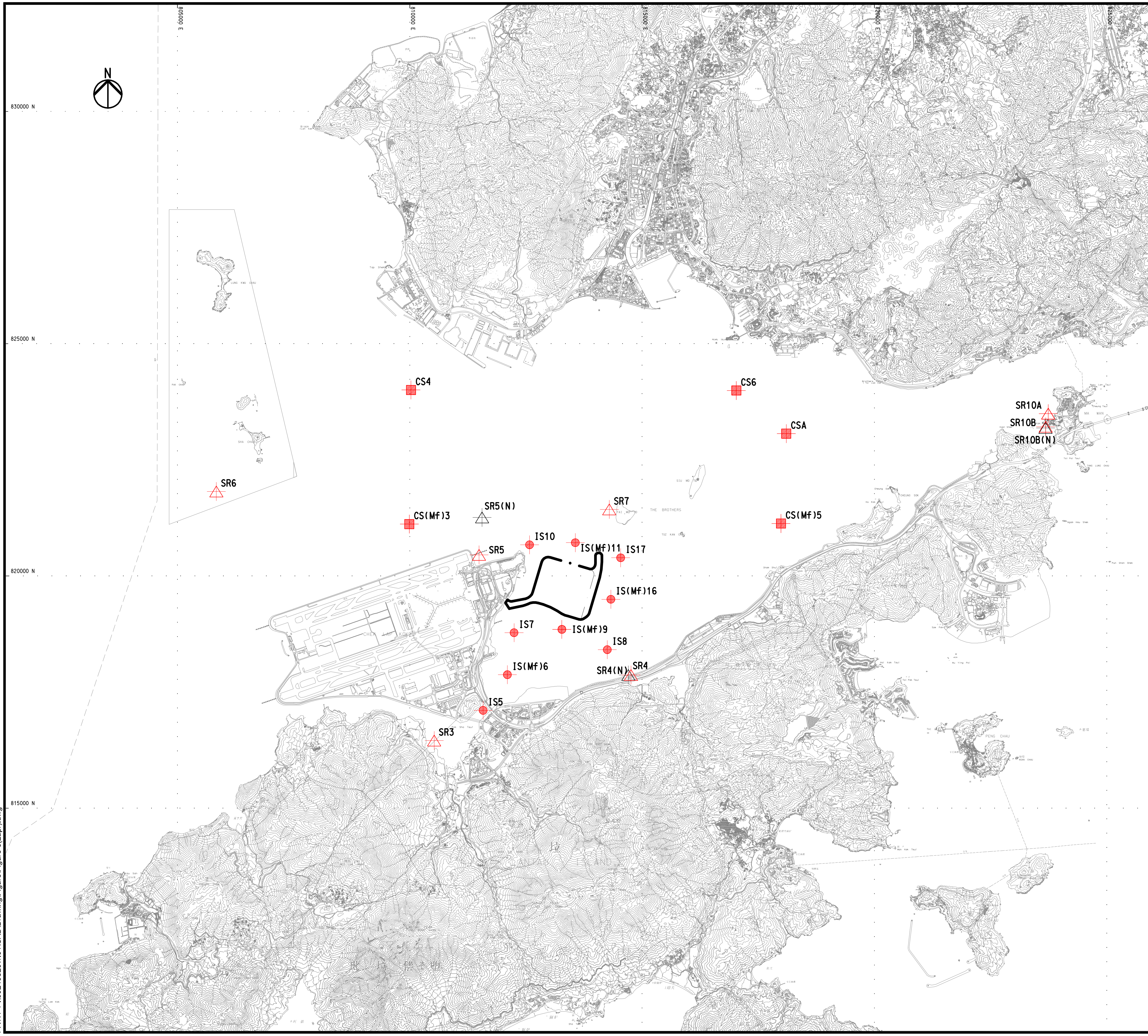


LEGEND

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

SETTING OUT SCHEDULE

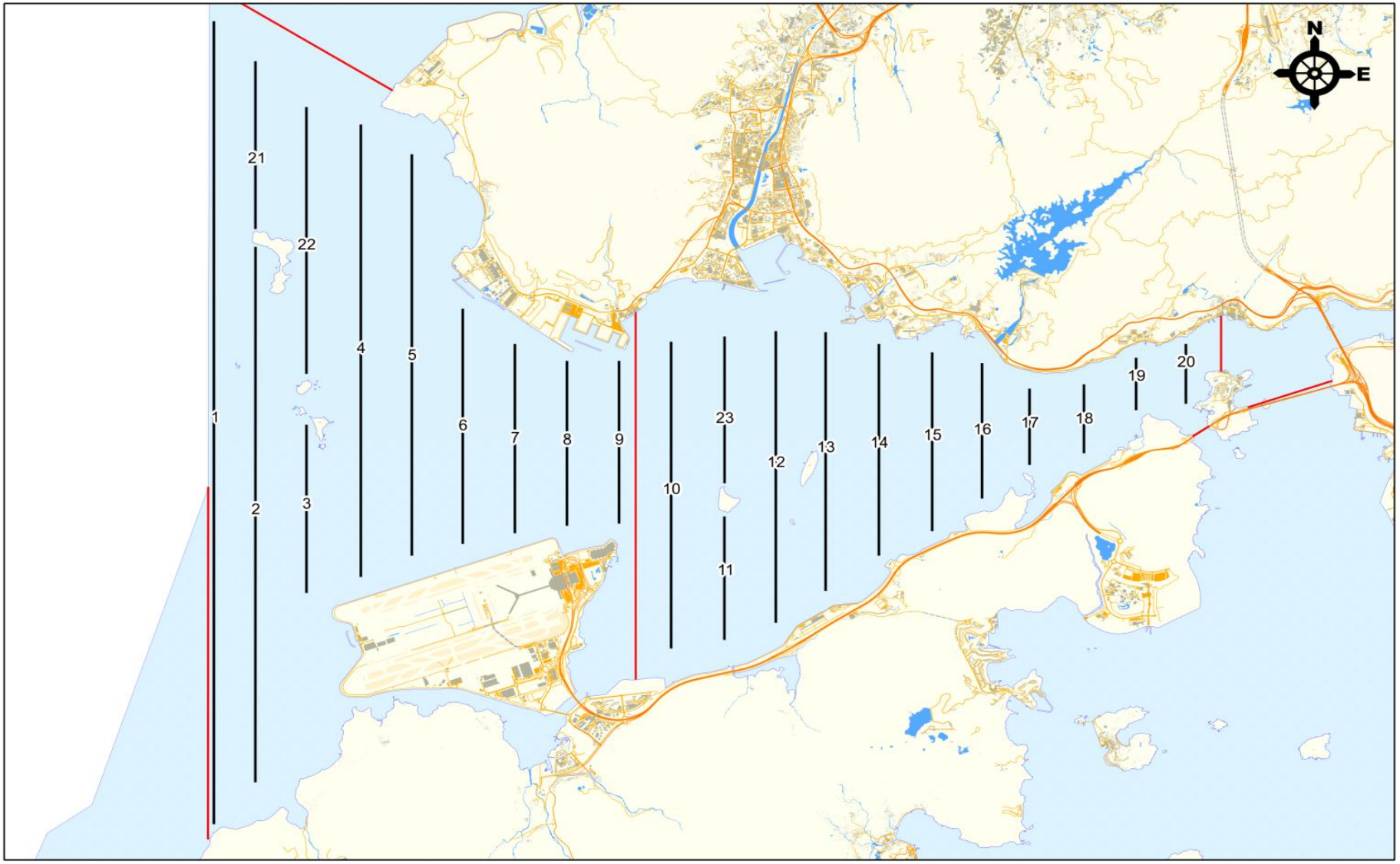
MONITORING STATIONS	CO-ORDINATES	
	EASTING	NORTHING
IS5	811579	817106
IS(Mf)6	812101	817873
IS7	812244	818777
IS8	814251	818412
IS(Mf)9	813273	818850
IS10	812577	820670
IS(Mf)11	813562	820716
IS(Mf)16	814328	819497
IS17	814539	820391
SR3	810525	816456
SR4(N)	814705	817859
SR5	811489	820455
SR5(N)	811555	821258
SR6	805837	821818
SR7	814293	821431
SR10A	823741	823495
SR10B(N)	823683	823187
CS(Mf)3	809989	821117
CS(Mf)5	817990	821129
CS4	810025	824004
CS6	817028	823992
CSA	818103	823064

HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS
Project No.: 60249820 Date: APR 2012

IMPACT WATER QUALITY MONITORING STATIONS

AECOM

Figure 3



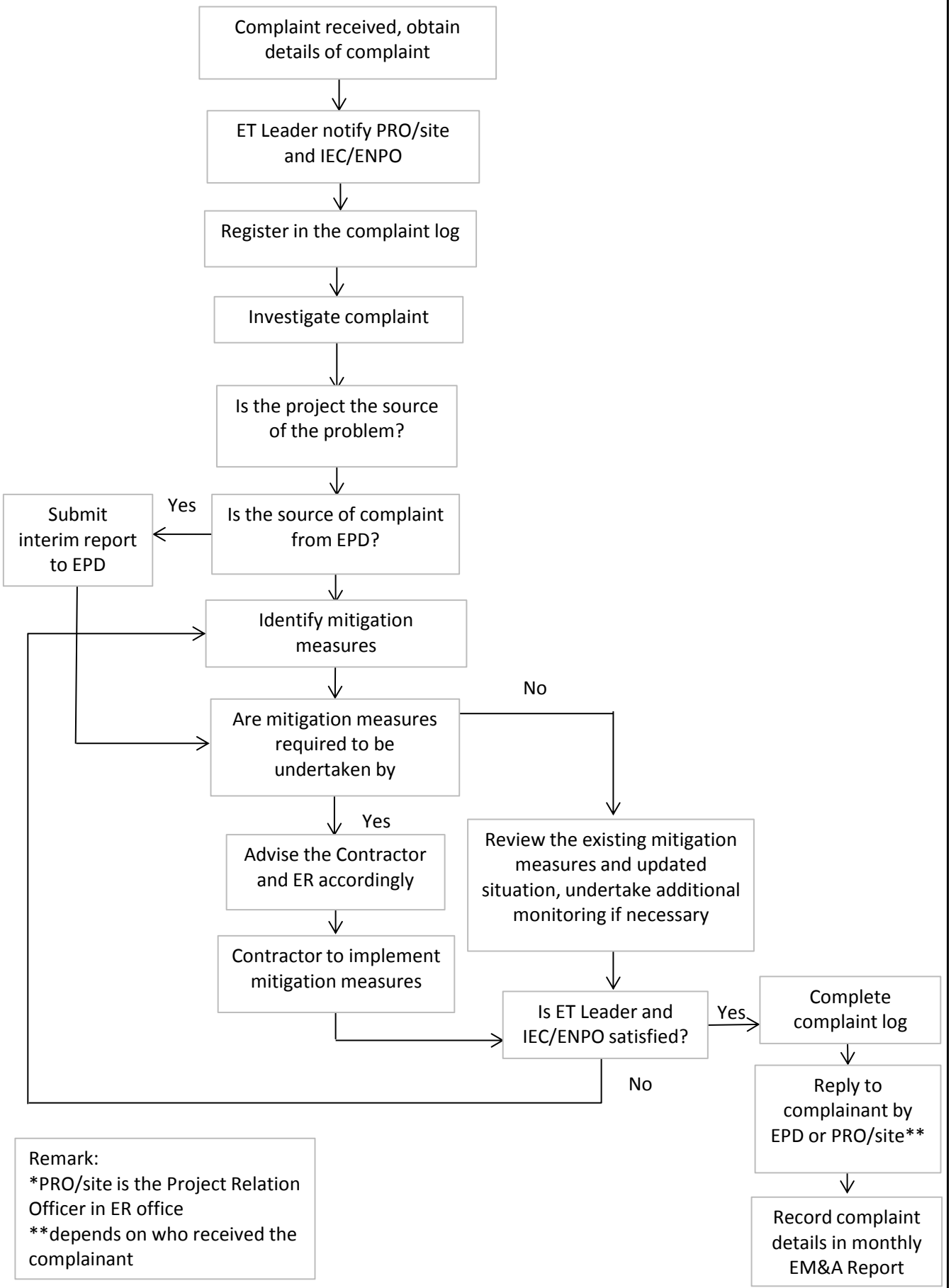
***Remark: Transect 10 is now 3.6km in length due to the HKBCF construction site. The total transect length for both NEL and NWL combined is 111km.**

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



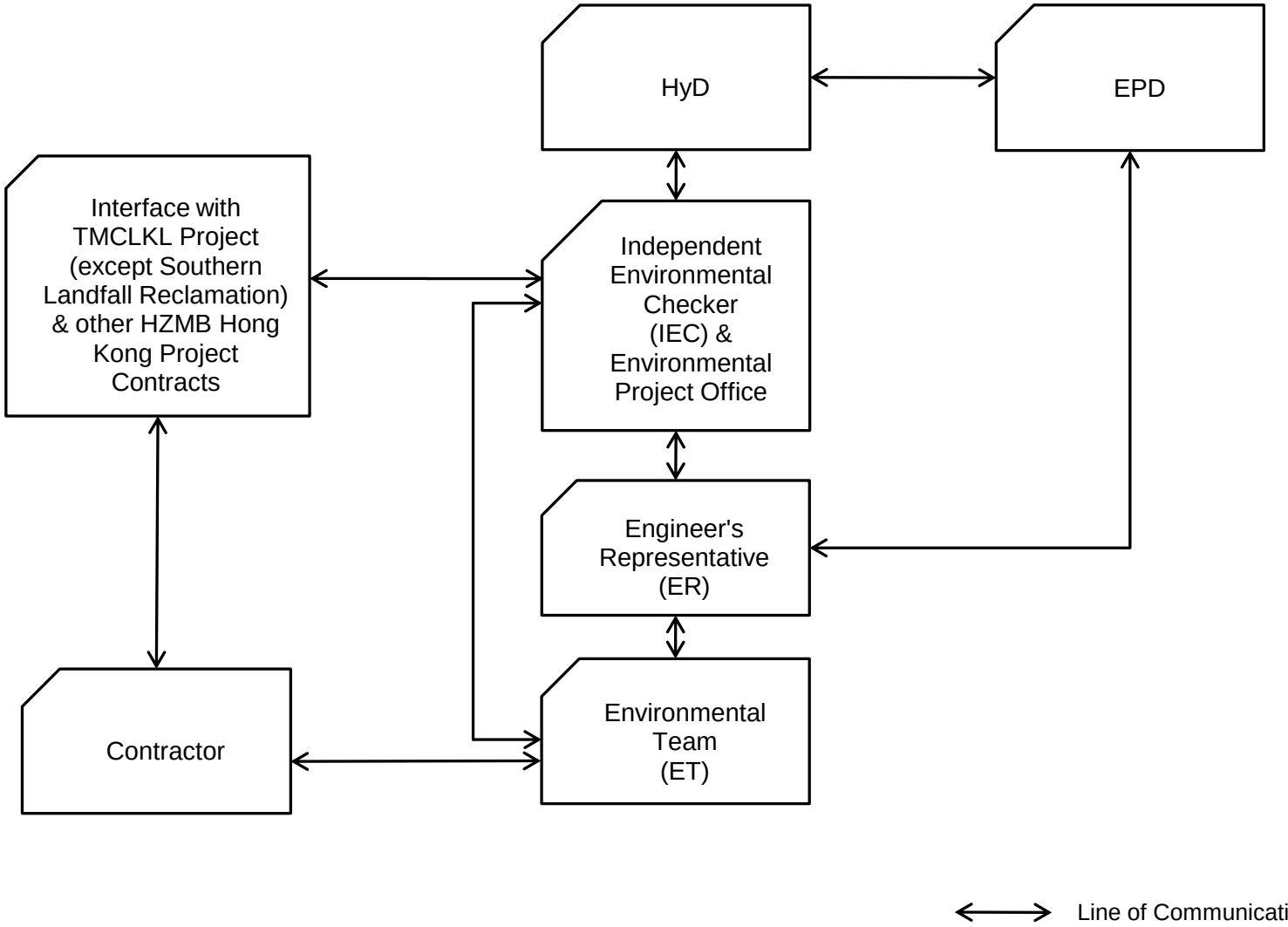
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

AECOM

Environmental Complaint Handling Procedure

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

Figure 5



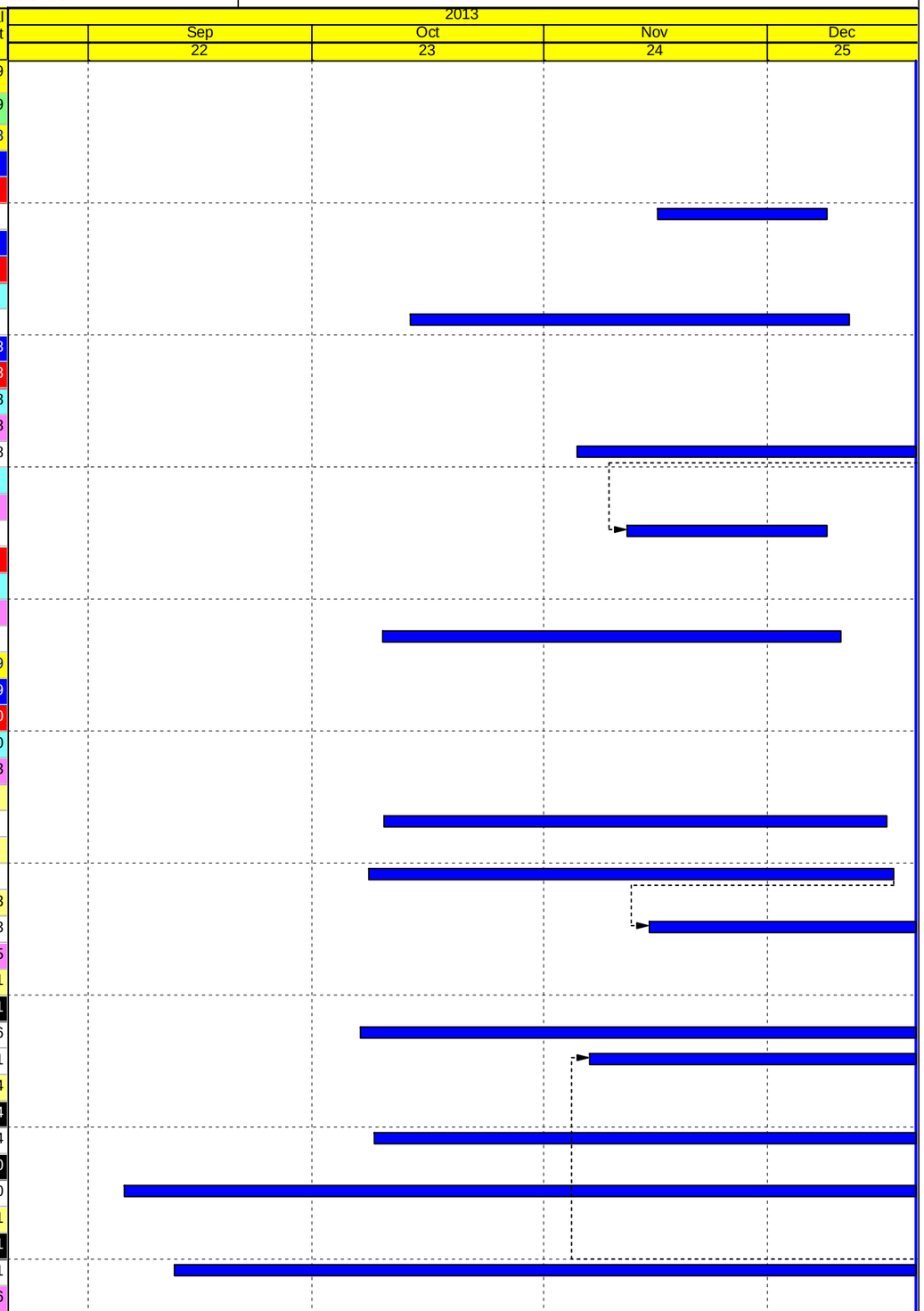
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
--RECLAMATION WORKS
Project No.: 60249820 Date: April 2013

Project Organisation for Environmental Works

AECOM

Appendix A

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
25th Monthly Progress Report Status as on 21 Dec 2013		142	05-Sep-13 A	14-Jan-14	1209
Work Zone, as defined in PS Clause 1.03(6)		142	05-Sep-13 A	14-Jan-14	1209
Portion A		58	10-Oct-13 A	26-Dec-13	1228
Optimizing Rubble Mound Seawalls		8	16-Nov-13 A	09-Dec-13 A	
Seawall Portion A at C118 - C121, 170m		8	16-Nov-13 A	09-Dec-13 A	
RFA1-008	PA at C121 - C118 Rockfill (Cat1) for platform upto +2.5mPD 15,810m3	8	16-Nov-13 A	09-Dec-13 A	
Reclamation		40	14-Oct-13 A	12-Dec-13 A	
Portion A Sand Blanket		40	14-Oct-13 A	12-Dec-13 A	
Land Portion A		40	14-Oct-13 A	12-Dec-13 A	
SABRA0	Sand Blankets 163,971m3 PA Edge Area C130 to C134 4,000m3/day	40	14-Oct-13 A	12-Dec-13 A	
Portion A		58	10-Oct-13 A	26-Dec-13	1228
Reclamation		30	05-Nov-13 A	26-Dec-13	1138
Portion A Marine Fill upto +2.5mPD		11	05-Nov-13 A	26-Dec-13	1138
Land Portion A		11	05-Nov-13 A	26-Dec-13	1138
MFA0-0	Marine Fill Type A Sand 100% at PA Main Area 330,000m3 30,000m3/day PCB West	11	05-Nov-13 A	26-Dec-13	1138
Portion A Land Band Drain		24	12-Nov-13 A	09-Dec-13 A	
Land Portion A		24	12-Nov-13 A	09-Dec-13 A	
VBDA0-	Vertical Band Drains 35,000nrs by land plant at PA PCB West 1,500nrs/day	24	12-Nov-13 A	09-Dec-13 A	
Portion A Instrumentation		30	10-Oct-13 A	11-Dec-13 A	
Portion A Instrumentation - SD		30	10-Oct-13 A	11-Dec-13 A	
SD-24 C123		30	10-Oct-13 A	11-Dec-13 A	
CTSD-2	Installation of SD-24 (C123) PA	30	10-Oct-13 A	11-Dec-13 A	
Portion B, C & E		142	05-Sep-13 A	14-Jan-14	1209
Portion B, C & E		142	05-Sep-13 A	14-Jan-14	1209
Seawall		132	05-Sep-13 A	14-Jan-14	1120
Ground Treatment		132	05-Sep-13 A	14-Jan-14	1120
Stone Columns for Rubble Mound Seawall by Marine Plant		72	08-Oct-13 A	23-Dec-13	-13
Portion B K16 - K20 5cells 1,950Nos FTB20		66	10-Oct-13 A	17-Dec-13 A	
SC0B-	PB Stone Columns K016 - K020 4cells 1,246nrs/1,950nrs (19nrs/day) FTB20	66	10-Oct-13 A	17-Dec-13 A	
Portion B K21 - K23 3Cells 1,144Nos. AP1		26	08-Oct-13 A	18-Dec-13 A	
SC0B-	PB Stone Columns outermost K021 - K023 3cells 496nrs/1144nrs (19nrs/day) from 16A	26	08-Oct-13 A	18-Dec-13 A	
Portion B K24 - K27 4Cells 1,568Nos. AP2 & FTB19		38	15-Nov-13 A	23-Dec-13	-13
SC0B-	PB Stone Columns outermost K024 - K027 5Cells 718nrs/1568nrs (19nrs/day) from 16A	38	15-Nov-13 A	23-Dec-13	-13
Stone Columns Outside cellular Structures by Marine Plant		132	05-Sep-13 A	09-Jan-14	1125
Seawall Portion B at K028 - K044 17cells 3478nrs		103	07-Oct-13 A	09-Jan-14	-41
Beside of front cellular walls K028-K044 1,739nrs		103	07-Oct-13 A	09-Jan-14	-41
SC0I	PB Stone Columns beside K028 - K044 17cells 259nrs (10nrs/day) FTB-AP1	26	07-Oct-13 A	24-Dec-13	-26
SC0I	PB Stone Columns beside K028 - K044 17cells 740nrs (10nrs/day) FTB-AP2	74	07-Nov-13 A	09-Jan-14	-41
Seawall Portion B at K045 - K051 7cells 1432nrs		67	05-Sep-13 A	24-Dec-13	24
Beside of front cellular walls K045-K051 716nrs		36	09-Oct-13 A	24-Dec-13	24
SC0I	PB Stone Columns beside K045 - K051 7cells 358nrs (10nrs/day) FTB-AP3	36	09-Oct-13 A	24-Dec-13	24
Outermost of front cellular walls K045-K051 716nrs		29	05-Sep-13 A	21-Dec-13	-80
SC0I	PB Stone Columns outermost K045 - K051 7cells 475nrs (19nrs/day) FTB19	29	05-Sep-13 A	21-Dec-13	-80
Seawall Portion E2 at K052 - C062 11cells 2,252nrs		24	12-Sep-13 A	24-Dec-13	1141
Beside of front cellular walls K052-C062 1,126nrs		24	12-Sep-13 A	24-Dec-13	1141
SC0I	PE2 Stone Columns beside K052 - K062 11cells 220nrs (10nrs/day) FTB-AP2	24	12-Sep-13 A	24-Dec-13	1141
Stone Columns Inside cells by Land Plant 2,640nrs		65	27-Sep-13 A	14-Jan-14	-46



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

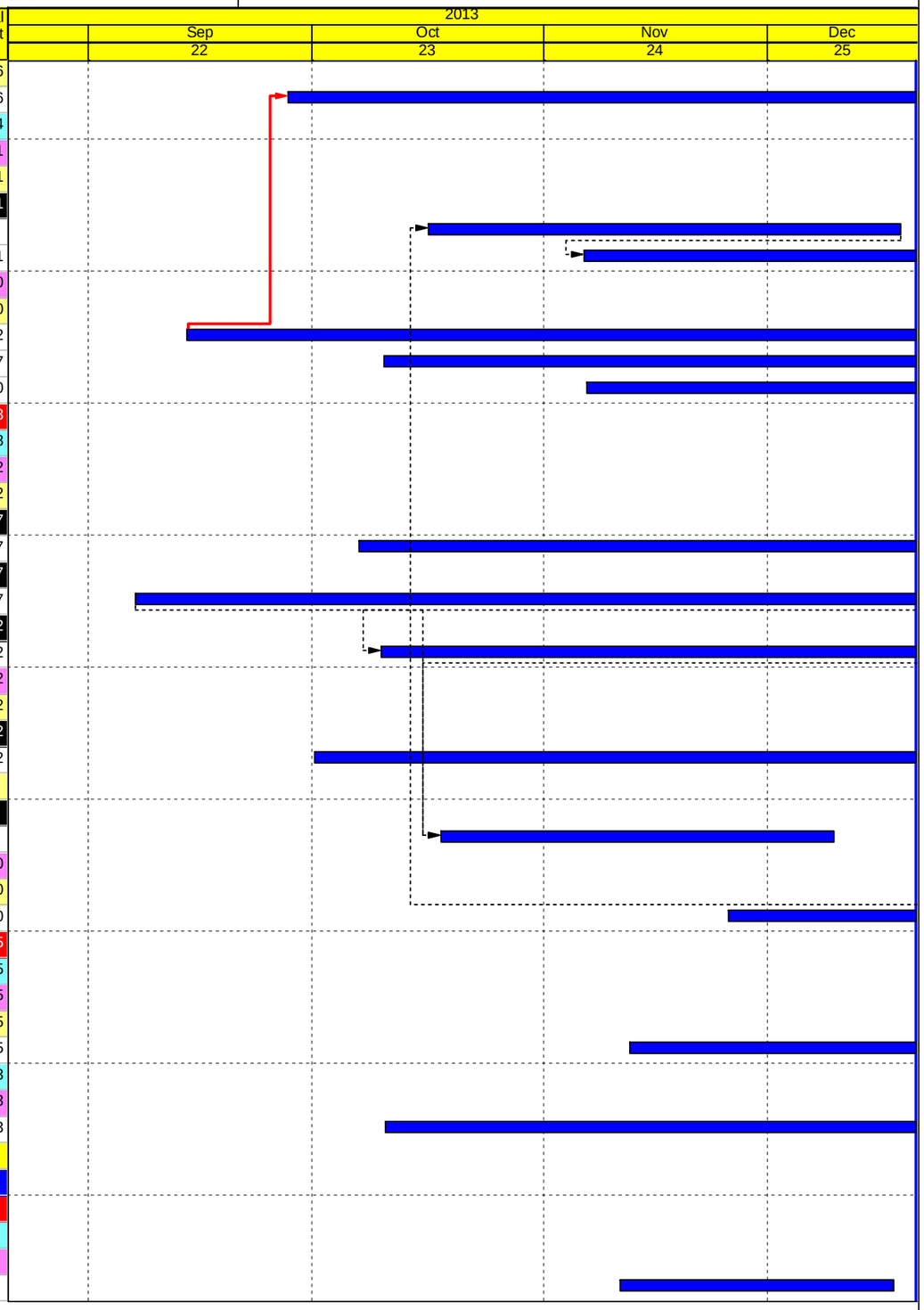
Contract No. HY/2010/02 Hong Kong - Zhuhai - Macao Bridge

Hong Kong Boundary Corssing Facilities - Reclamation Works

EMandA Quaterly Report Programme

Data Date :21-Dec-13

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float
	Seawall Portion B at K028 - K051 24cells 1,920nrs	65	27-Sep-13 A	14-Jan-14	-46
SCIB0	PB Stone Columns inside cells & 2rows K028 - K040 13cells 1,040nrs (8nrs/day/plant x 2	65	27-Sep-13 A	14-Jan-14	-46
	Cellular Structures	83	14-Sep-13 A	28-Dec-13	-44
	Cellular Main Cells 89cells	53	16-Oct-13 A	24-Dec-13	-41
	Full Guide Frames Method 89cells	53	16-Oct-13 A	24-Dec-13	-41
	Portion C & E C112 to C063 50cells	53	16-Oct-13 A	24-Dec-13	-41
CSE1	PE1 Cellular Structure C080, C082, C086, C089, C085, C063, C77 & C064 8cells Type_	33	16-Oct-13 A	19-Dec-13 A	
CSE1	PE1 Cellular Structure C076, C073, C070, C067, C075 & C072 6cells Type_C 26050m3	33	06-Nov-13 A	24-Dec-13	-41
	Connecting Arcs	80	14-Sep-13 A	28-Dec-13	-60
	Portion B between K028 to K051 24arcs	80	14-Sep-13 A	28-Dec-13	-60
CA00E	PB Final Backfill Cellular Cells K028 - K040 Type C	22	14-Sep-13 A	21-Dec-13	-112
CA00E	PB Connecting Arc structure K041 - K051 11pair arcs Type_C 23,144m3 3day/pair	33	10-Oct-13 A	25-Dec-13	-87
CA00E	PB Final Backfill cellular cells K041 - K051 Type C	30	06-Nov-13 A	28-Dec-13	-60
	Reclamation	112	07-Sep-13 A	26-Dec-13	1228
	Ground Treatment	112	07-Sep-13 A	26-Dec-13	1228
	Geotextile	46	07-Sep-13 A	26-Dec-13	72
	Existing Seabed above -5mPD	46	07-Sep-13 A	26-Dec-13	72
	Land Portion B	12	07-Oct-13 A	24-Dec-13	-67
GERI	PB Geotextile for sand blanket at K028 - K040	12	07-Oct-13 A	24-Dec-13	-67
	Land Portion C1a	20	07-Sep-13 A	23-Dec-13	-77
GER(	PC1a Geotextile for sand blanket	20	07-Sep-13 A	23-Dec-13*	-77
	Land Portion C1b	15	10-Oct-13 A	26-Dec-13	72
GER(	PC1b Geotextile for sand blanket East	15	10-Oct-13 A	26-Dec-13	72
	Sand Blankets	52	01-Oct-13 A	23-Dec-13	1142
	Existing Seabed below -5mPD	36	01-Oct-13 A	23-Dec-13	1142
	Land Portion C2a	36	01-Oct-13 A	23-Dec-13	1142
SABF	Sand Blankets at PC2a 36,000m3 1,000m3/day West	36	01-Oct-13 A	23-Dec-13	1142
	Existing Seabed Above -5mPD	36	18-Oct-13 A	10-Dec-13 A	
	Land Portion C1b	36	18-Oct-13 A	10-Dec-13 A	
SABF	Sand Blankets at PC1b 75,500m3 2,000m3/day East	36	18-Oct-13 A	10-Dec-13 A	
	Vertical Band Drains by Marine Plant	30	25-Nov-13 A	26-Dec-13	-100
	Land Portion E1	30	25-Nov-13 A	26-Dec-13	-100
VBDE:	Vertical Band Drains 35,987nrs by marine plant at PE1 (1,500nrs/day)	30	25-Nov-13 A	26-Dec-13	-100
	Geotechnical Instrumentation Works	37	10-Oct-13 A	21-Dec-13	85
	Geotechnical Instrumentation Works for Seawalls	10	12-Nov-13 A	21-Dec-13	85
	Cluster Type SA 2nrs Piezometer, Extensometer and Settlement Marker Cluster inside Cells	10	12-Nov-13 A	21-Dec-13	85
	SA-2 C113 Portion C2a	10	12-Nov-13 A	21-Dec-13	85
CTSA:	Installation of SA-2 C113 (within 10days after filling C113) PC2a	10	12-Nov-13 A	21-Dec-13	85
	Geotechnical Instrumentation Works for Reclamation RA & RB	7	10-Oct-13 A	21-Dec-13	-93
	RA	7	10-Oct-13 A	21-Dec-13	-93
CTRA-(	Installation of RA 5sets at PA	7	10-Oct-13 A	21-Dec-13*	-93
	Portion D	14	11-Nov-13 A	18-Dec-13 A	
	Site Construction	14	11-Nov-13 A	18-Dec-13 A	
	Seawall Construction	14	11-Nov-13 A	18-Dec-13 A	
	20130628	14	11-Nov-13 A	18-Dec-13 A	
	Temporary Seawall CH5+735 - CH5+825 (90m)	14	11-Nov-13 A	18-Dec-13 A	
PDTS-:	S1 Temporary Seawall Stone Aggregate 42,400m3	14	11-Nov-13 A	18-Dec-13 A	



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

25th Monthly Progress Report Status as on 21 Dec 2013

China Harbour Engineering Co., Ltd

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	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period; • 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		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		on the top and the 3 sides; • Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • 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		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.		
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;	All construction sites	N/A

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		• 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 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	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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 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	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
			EIA report at all construction sites	
S6.4.14 of HKBCFEIA	N5	Sequencing operation of construction plants where practicable.	All construction sites where practicable	V
S5.1 of TMCLKLEIA	N6	Implement a noise monitoring under EM&A programme.	Selected representative noise monitoring station	V
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;	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		• 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; • 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	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	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
TMCLKLEIA		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 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	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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 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	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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 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.		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
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: • 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	During filling	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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 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		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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 TMCLKLEIA	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: • 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	All land-based construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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 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		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		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; • 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	W3	Implement a water quality monitoring programme	At identified monitoring location	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
and S6.10 of TMCLKLEIA				
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 • Good site practices • Strict enforcement of no marine dumping • Site runoff control • Spill response plan	Seawall, reclamation area	V
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

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
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 HKBCFEIA and S8.14 of TMCLKLEIA	E6	• Control vessel speed • Skipper training • Predefined and regular routes for working vessels; avoid Brothers Islands	Marine traffic	V
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	Seawall, reclamation area	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		• Strict enforcement of no marine dumping • Spill response plan		
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 rock materials and planting strip area accommodating screen buffer to enhance "natural-look" of new coastline.	All construction site areas	N/A
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				

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
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):

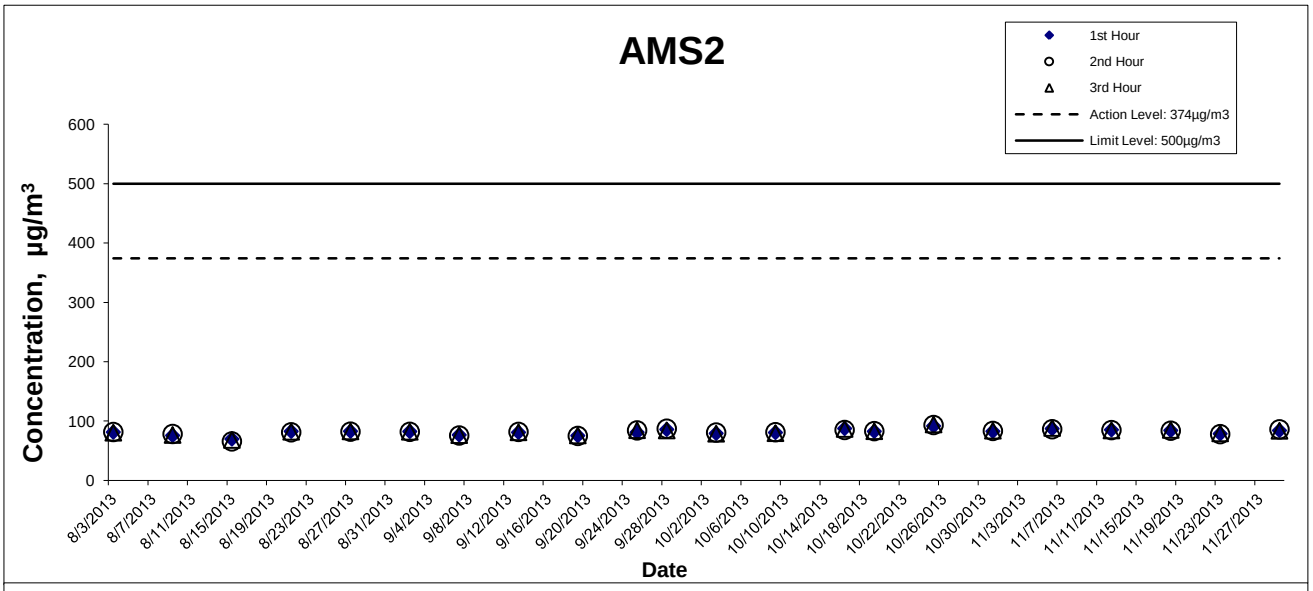
	North Lantau Social Cluster	
	NEL	**NWL**
Action Level	(STG < 70% of baseline) & (ANI < 70% of baseline)	(STG < 70% of baseline) & (ANI < 70% of baseline)
Limit Level	[(STG < 40% of baseline) & (ANI < 40% of baseline)] AND [(STG < 40% of baseline) & (ANI < 40% of baseline)]	

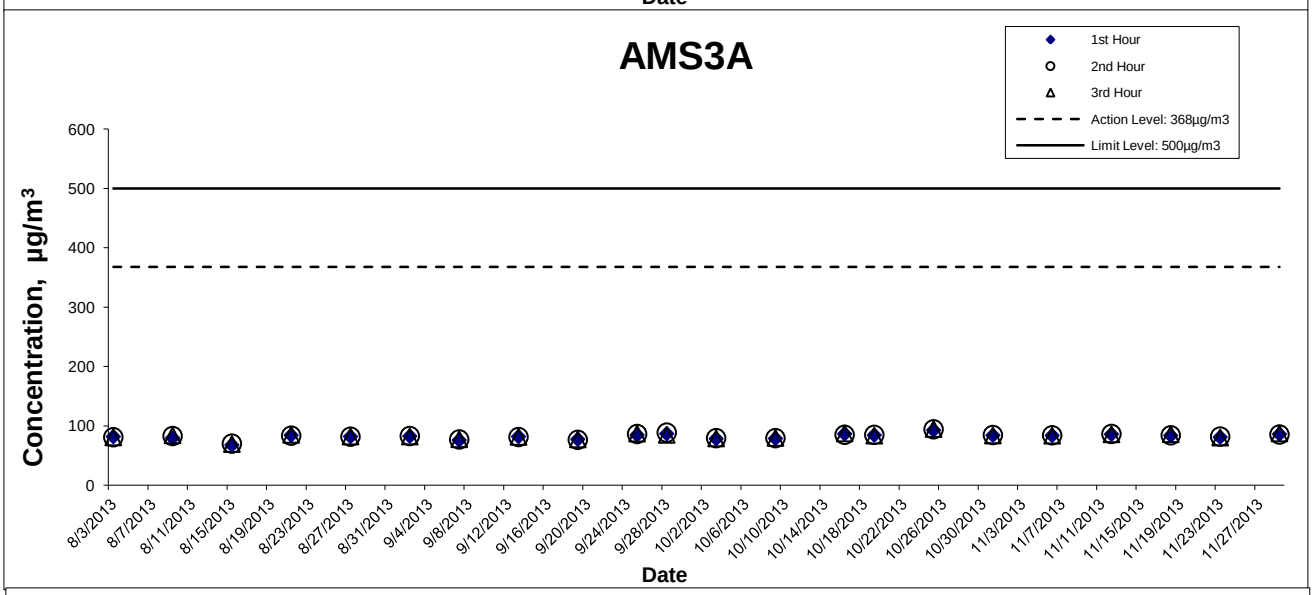
For North Lantau Social Cluster, action level will be trigger if either NEL **or** NWL fall below the criteria; limit level will be triggered if both NEL **and** NWL fall below the criteria.

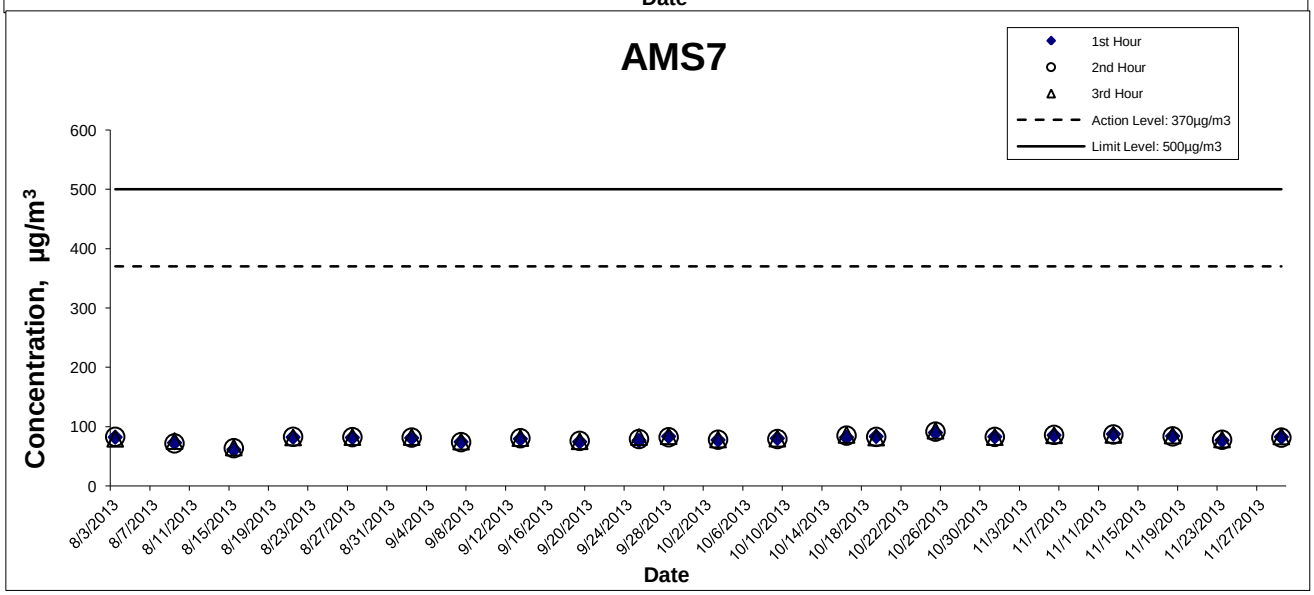
Table 5(b) Derived Value of Action Level (AL) and Limit Level (LL) for Chinese White Dolphin Monitoring

	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 Sept to Nov 2013, please refer to the Monthly EM&A Reports for Sept, Oct and Nov 2013 and their Appendix G respectively.







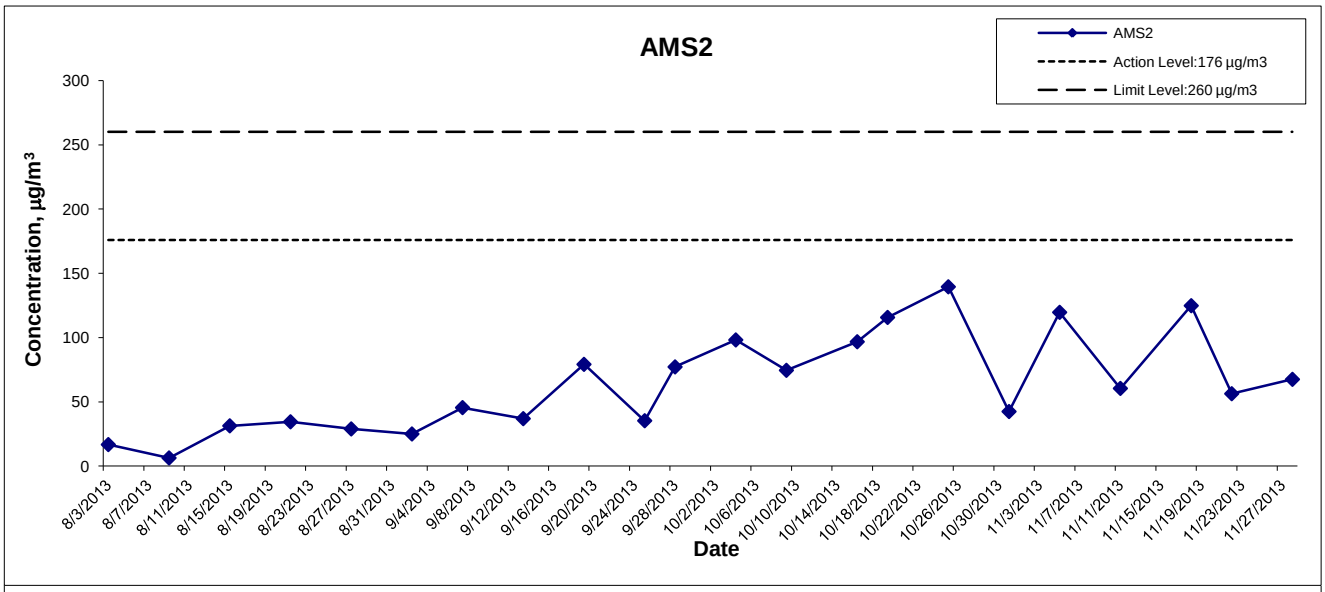
HONG KONG - ZHUHAI - MACAO BRIDGE
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

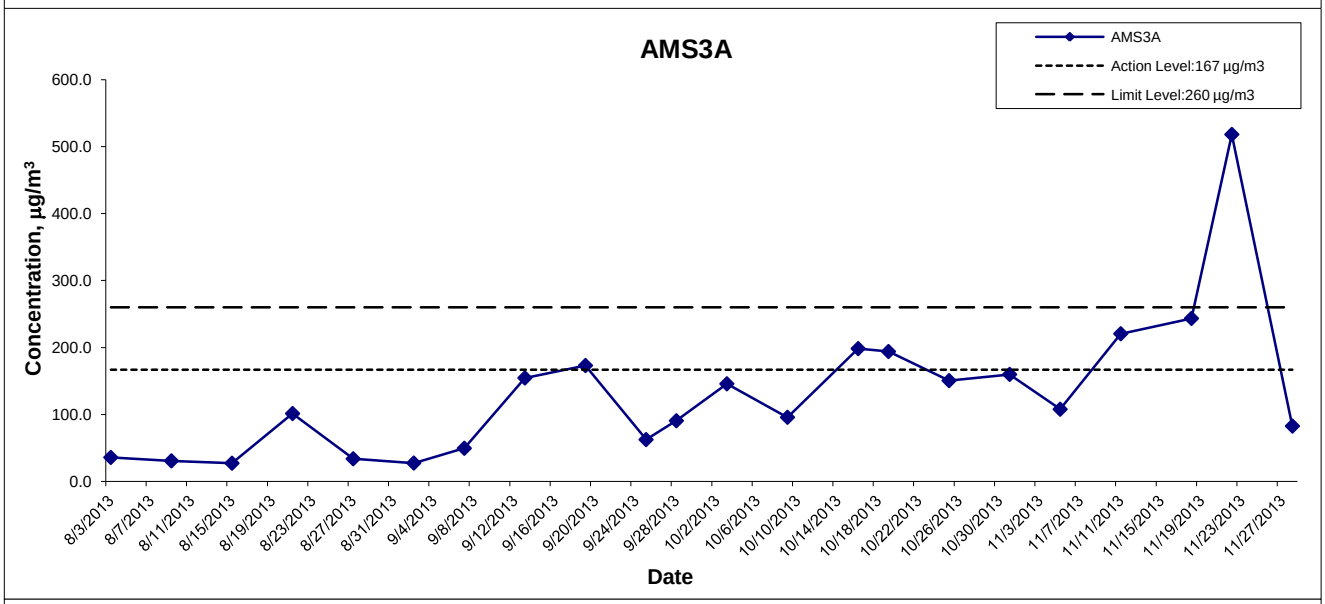
AECOM

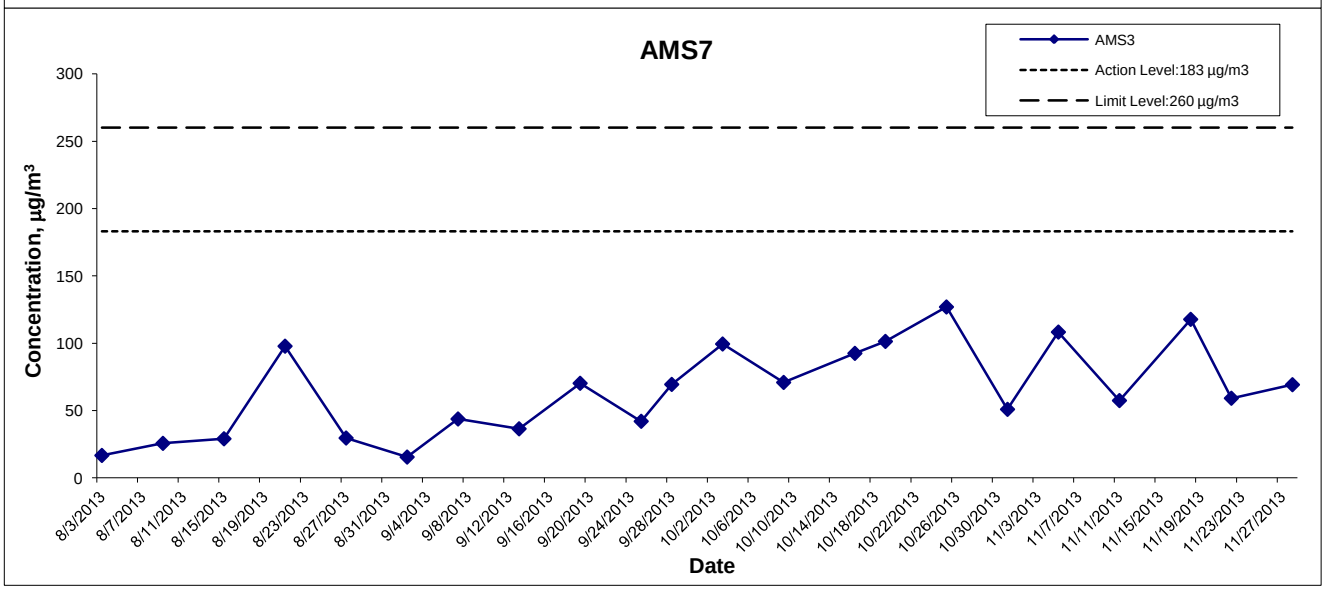
Graphical Presentation of Impact 1-hour TSP Monitoring Results

Project No.: 60249820 **Date: Dec 2013**

Appendix E







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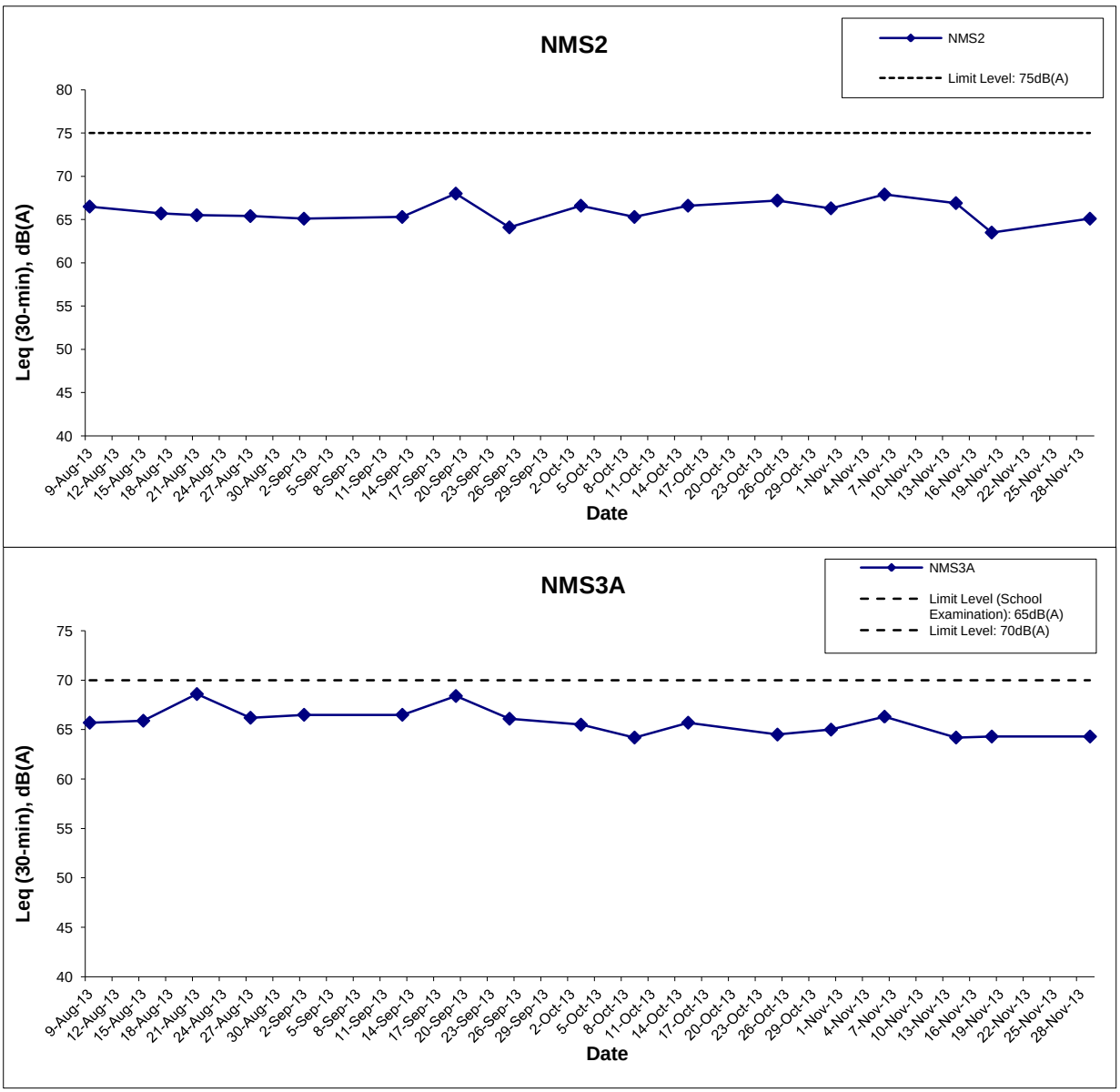
HONG KONG BOUNDARY CROSSING FACILITIES
- RECLAMATION WORKS

AECOM

Graphical Presentation of Impact 24-hour TSP Monitoring Results

Project No.: 60249820 **Date: December 2013** **Appendix E**

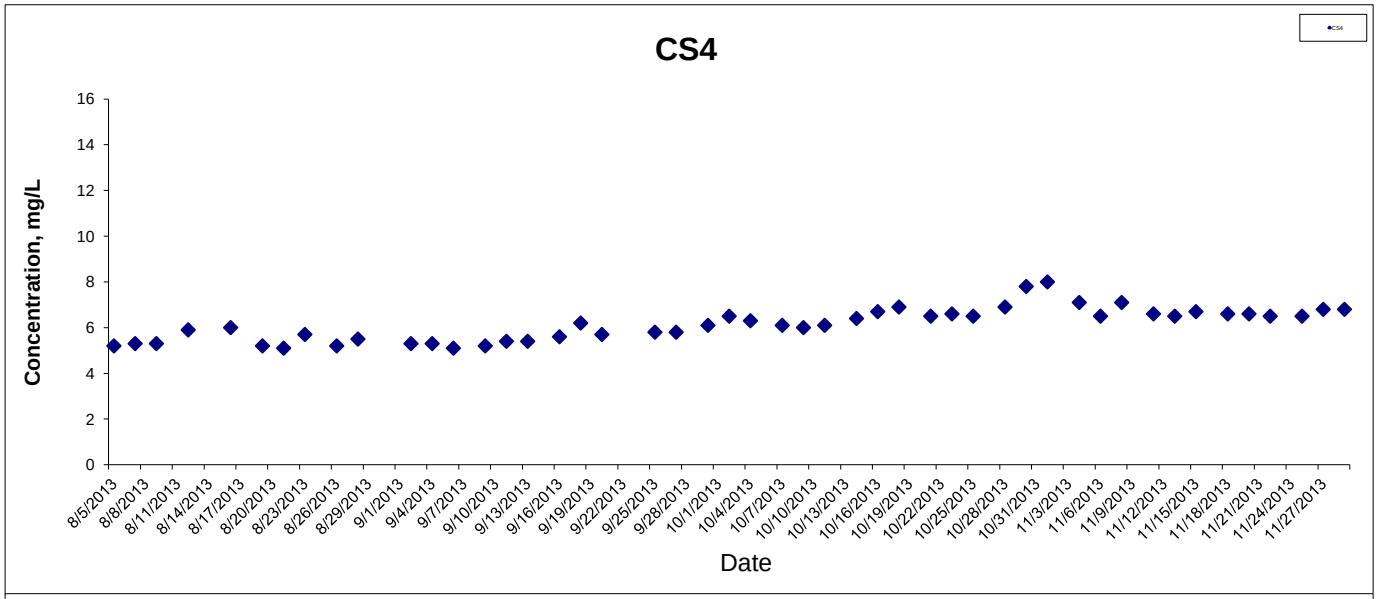
For details of the major activites carried out, weather conditions and other significant factors that might affect the monitoring results during monitoring periods from Sept to Nov 2013, please refer to the Monthly EM&A Reports for Sept, Oct and Nov 2013 and their Appendix I respectively.

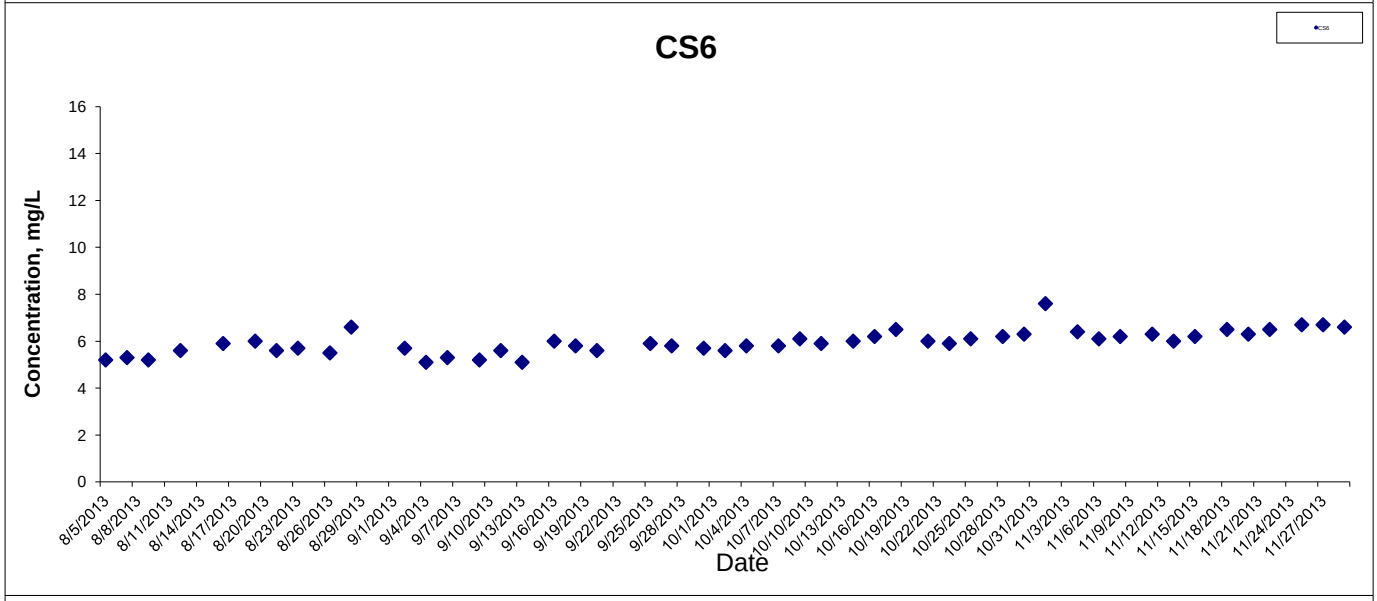


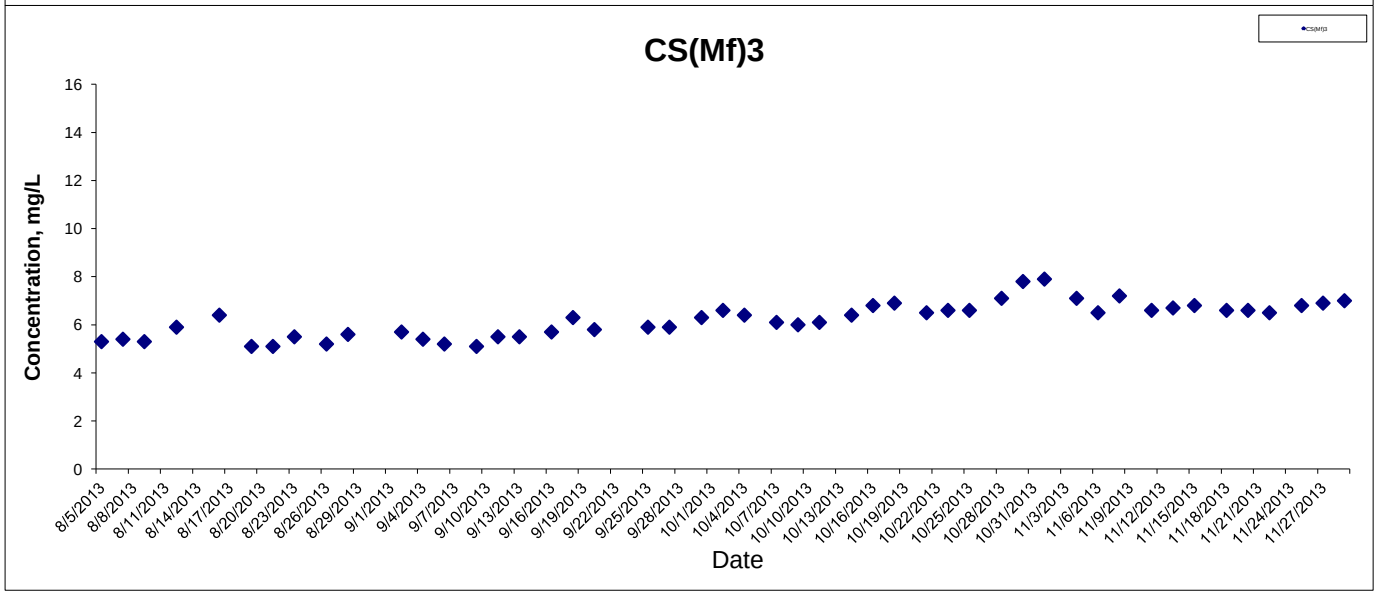
Remarks: Effective from July 2012, the Limit Level at NMS3A was revised to 70dB(A). Daytime noise Limit Level of 70 dB(A) applies to education institutions, while 65dB(A) applies during school examination period.

For details of the major activites carried out, weather conditions and other significant factors that might affect the monitoring results during monitoring periods from Sept to Nov 2013, please refer to the Monthly EM&A Reports for Sept, Oct and Nov 2013 and their Appendix J respectively.

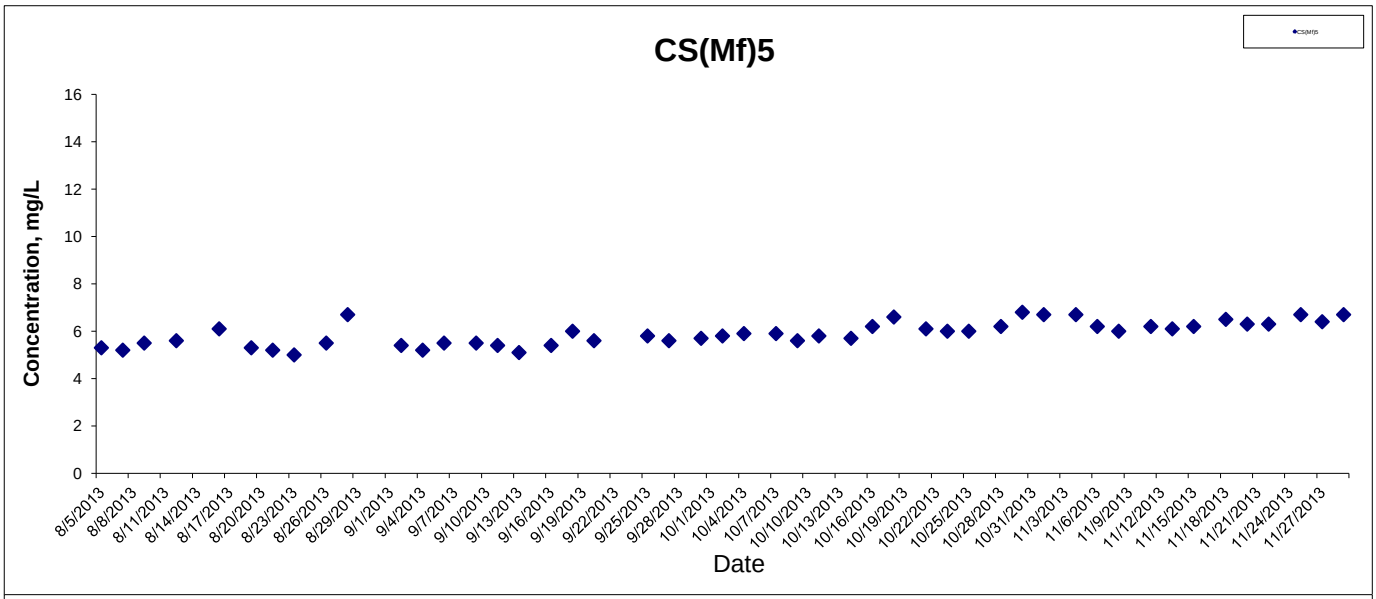
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

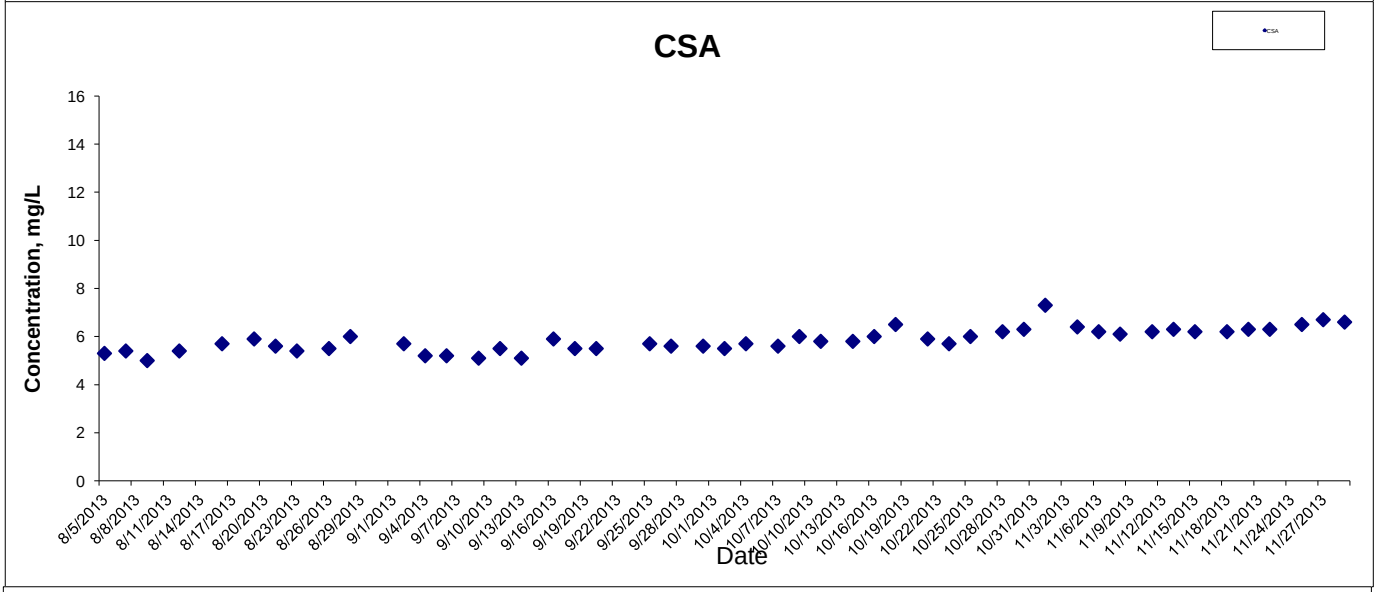


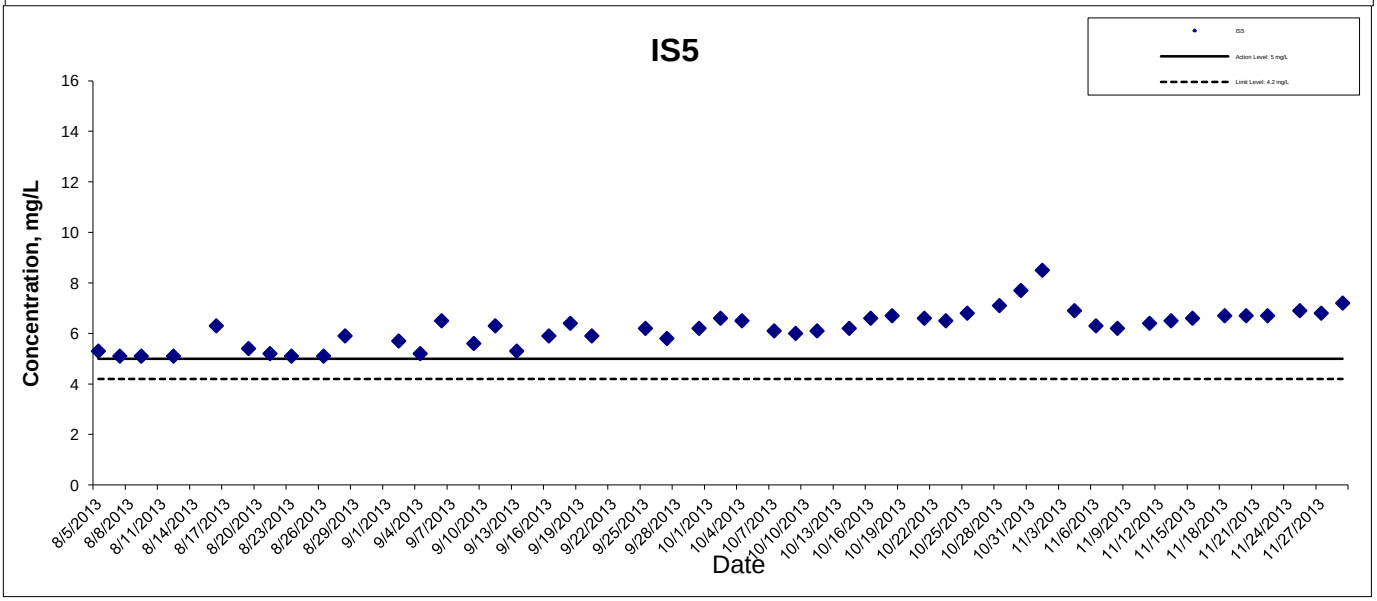




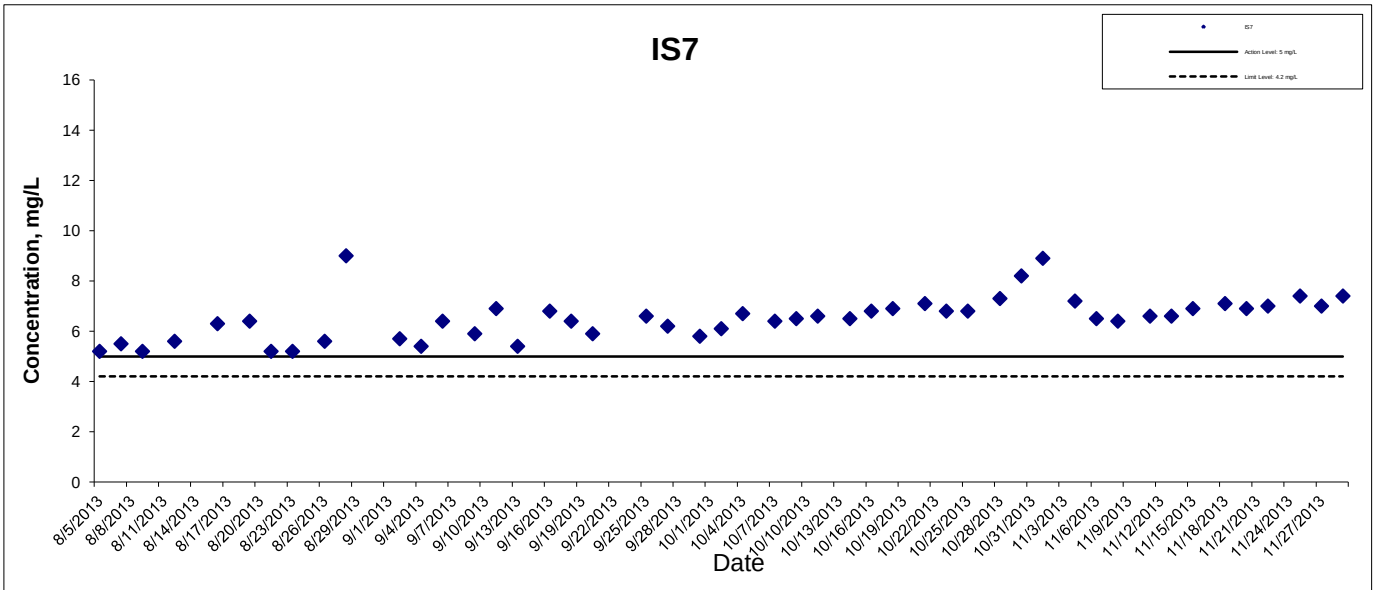
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

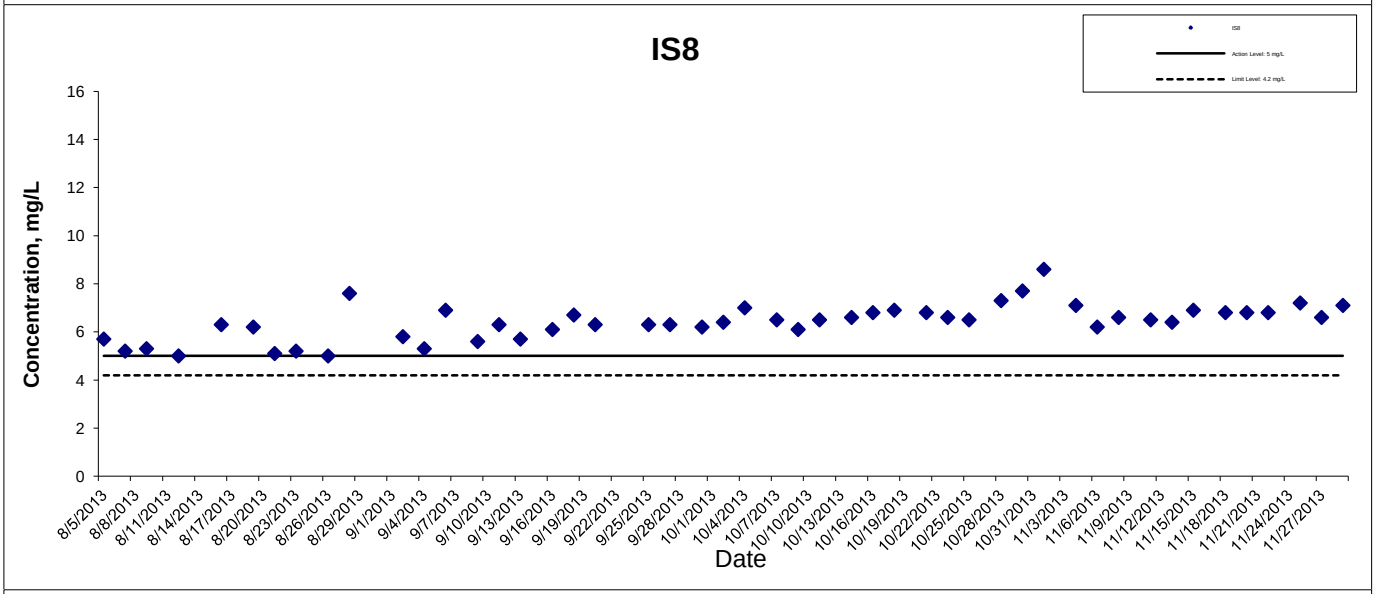


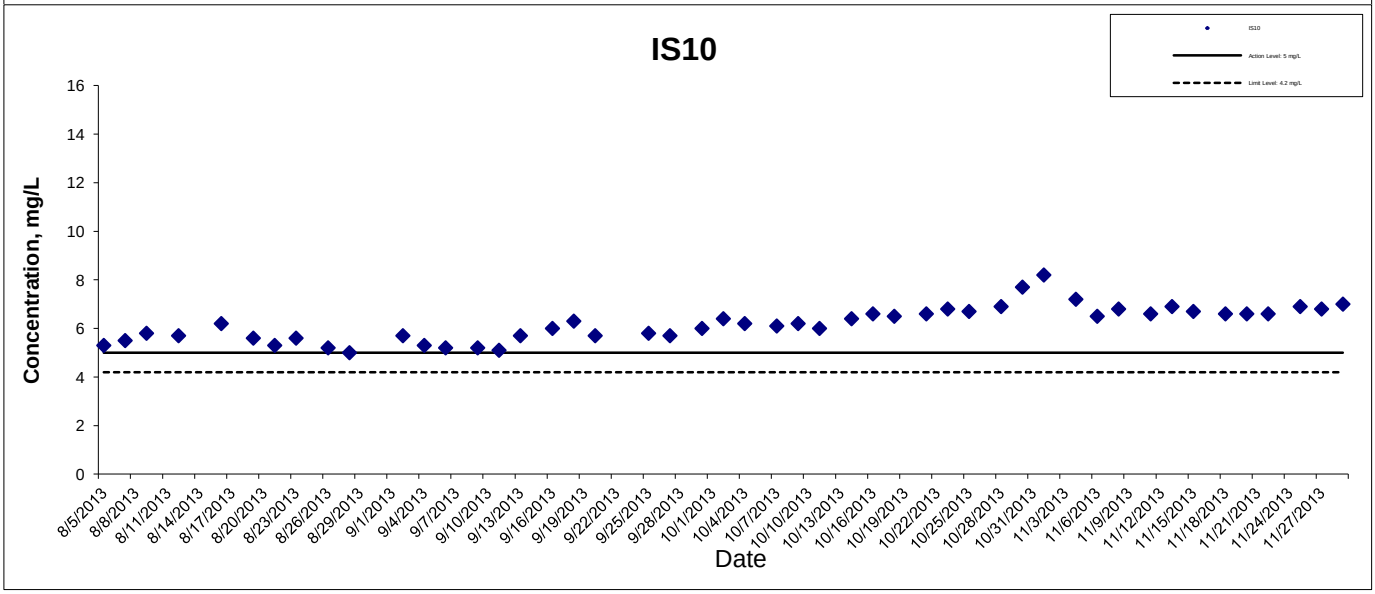




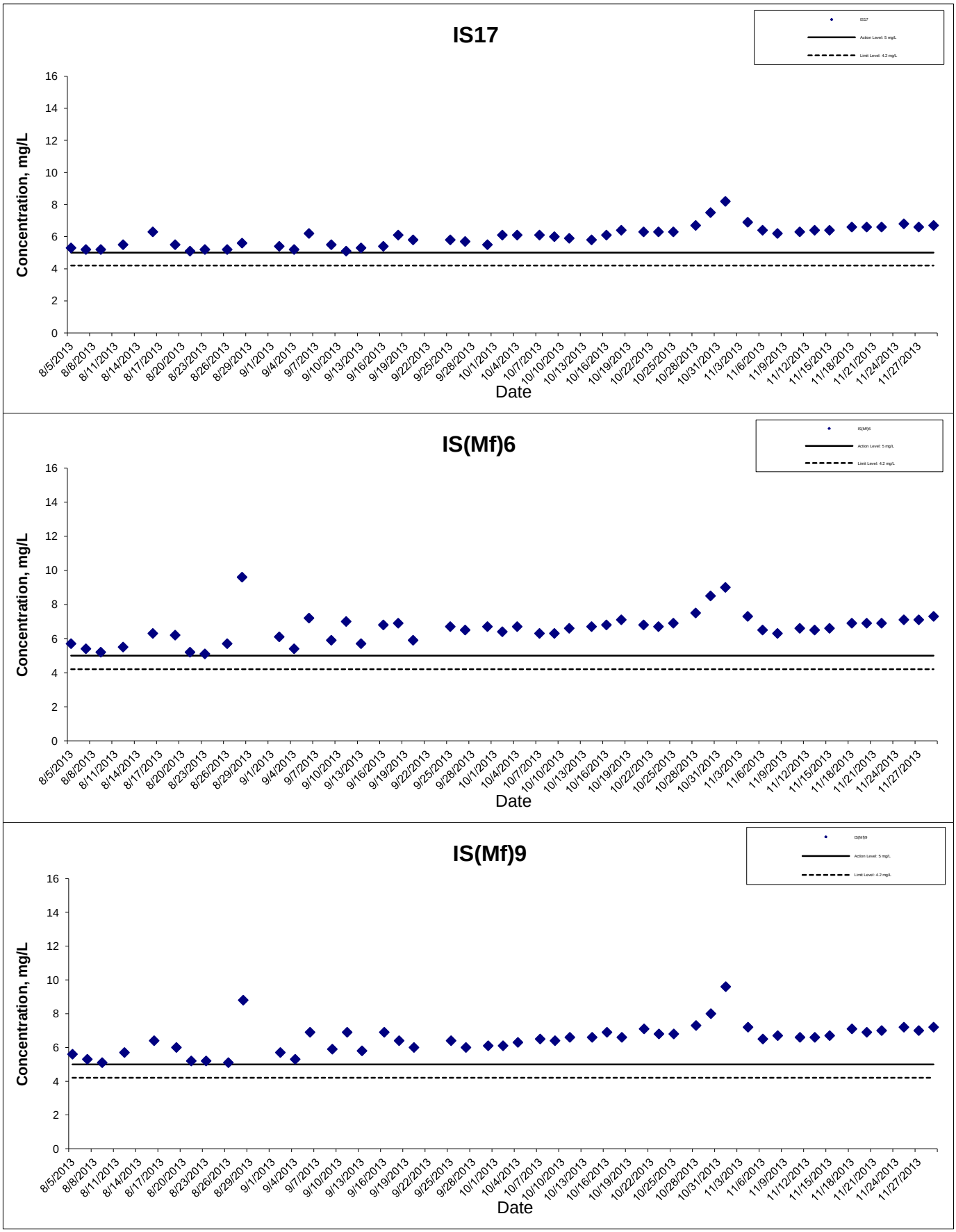
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide







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



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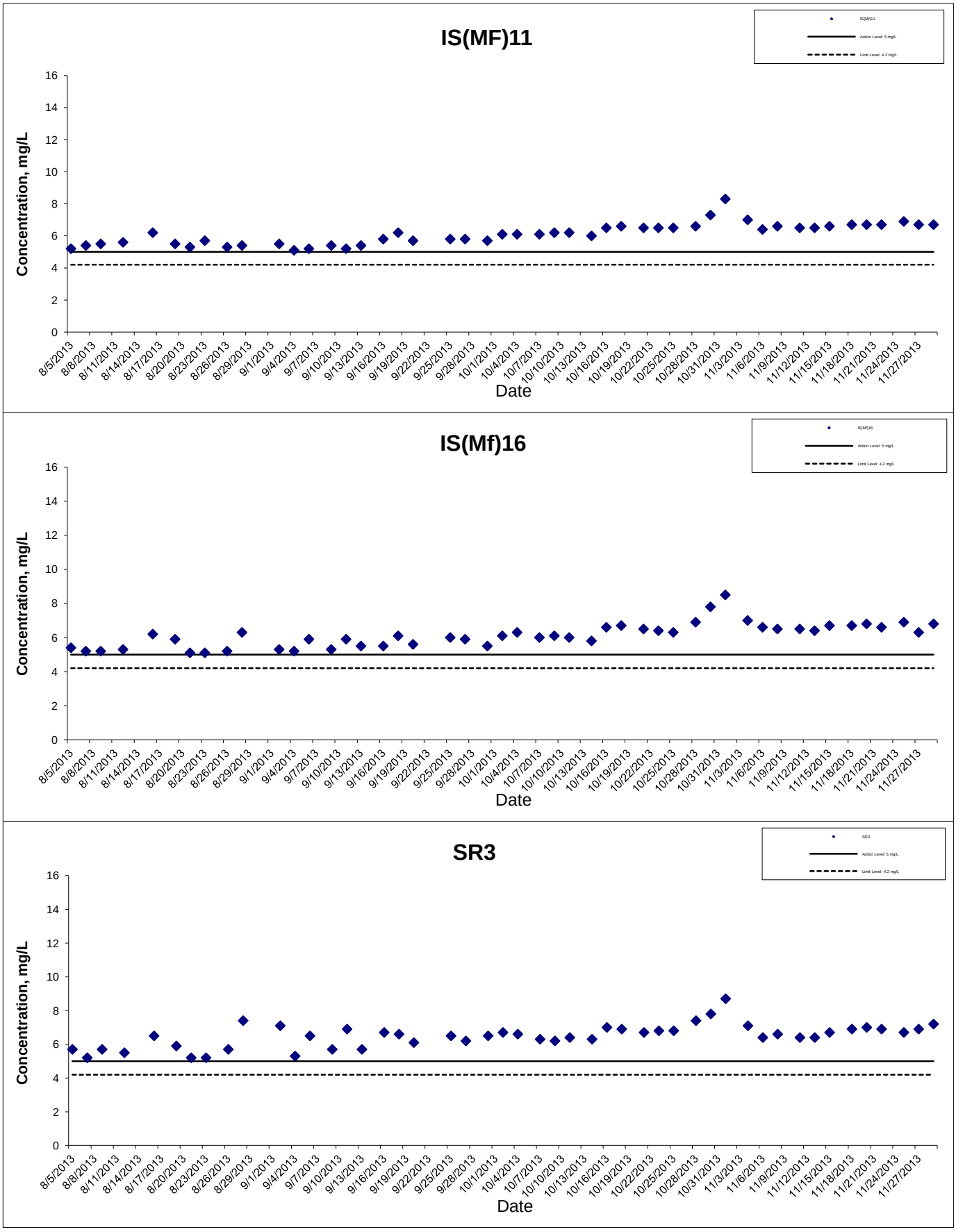
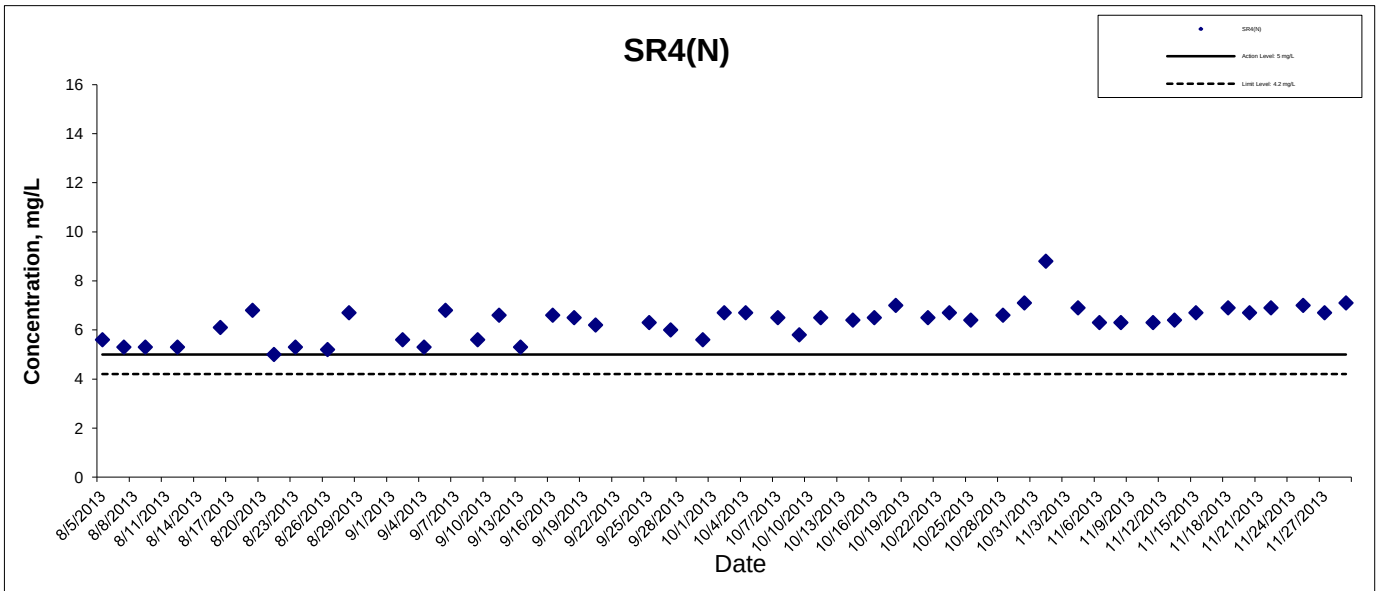
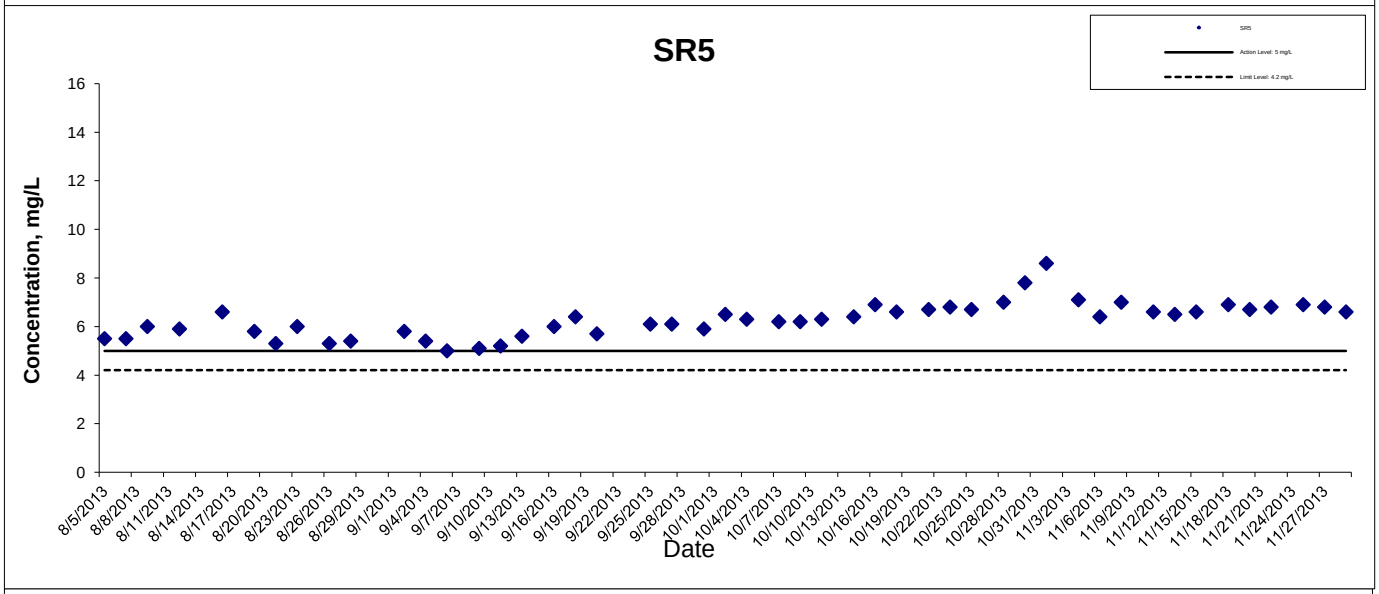
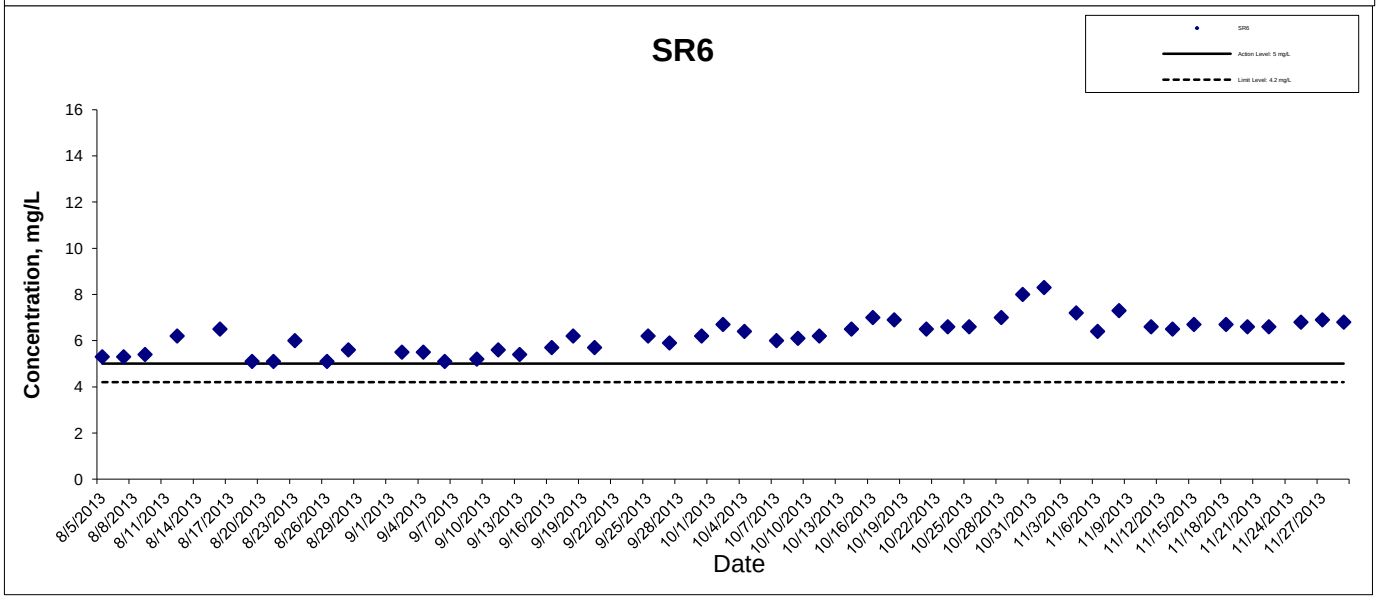
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



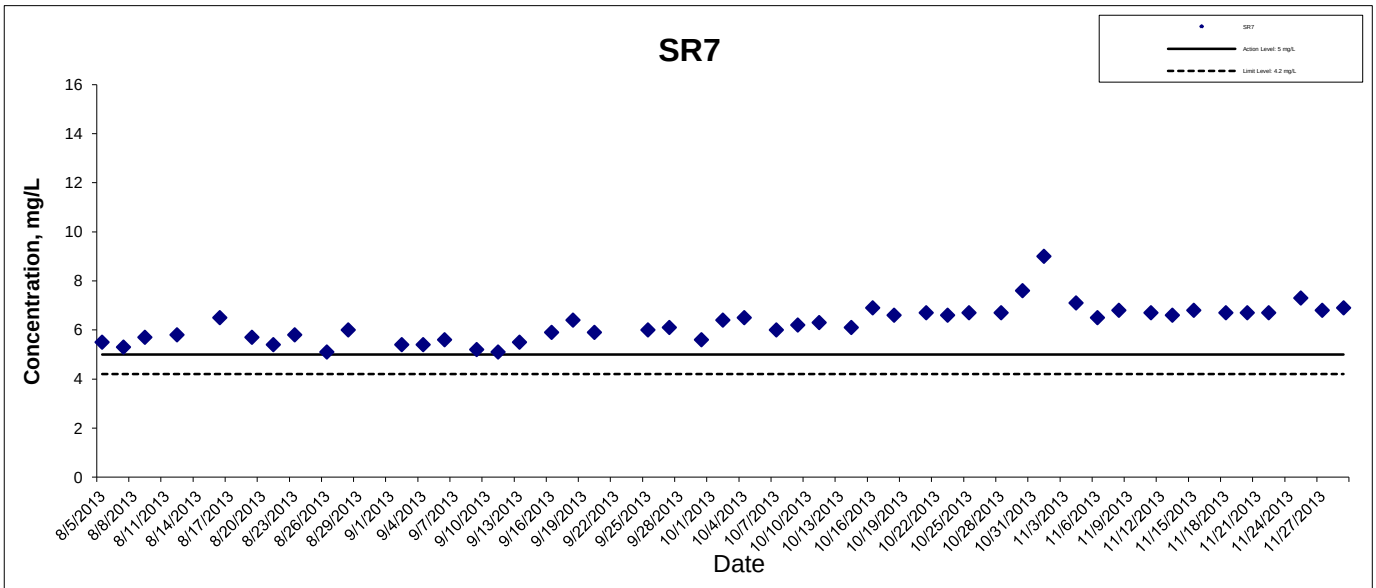
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

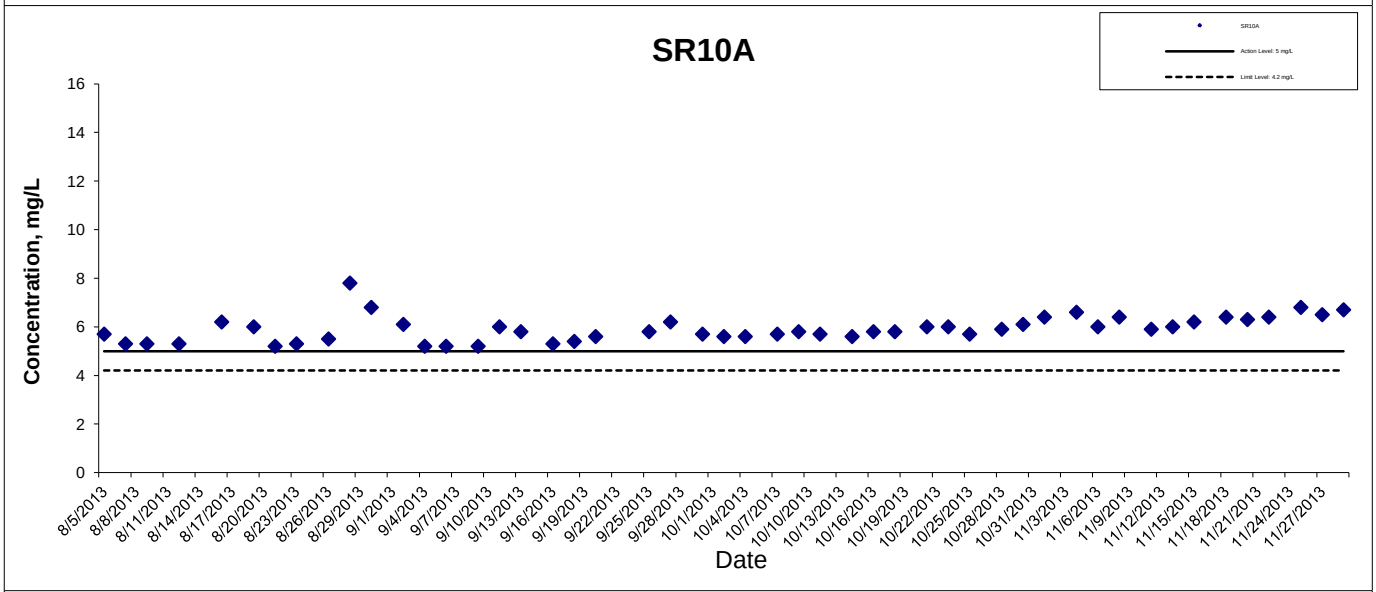


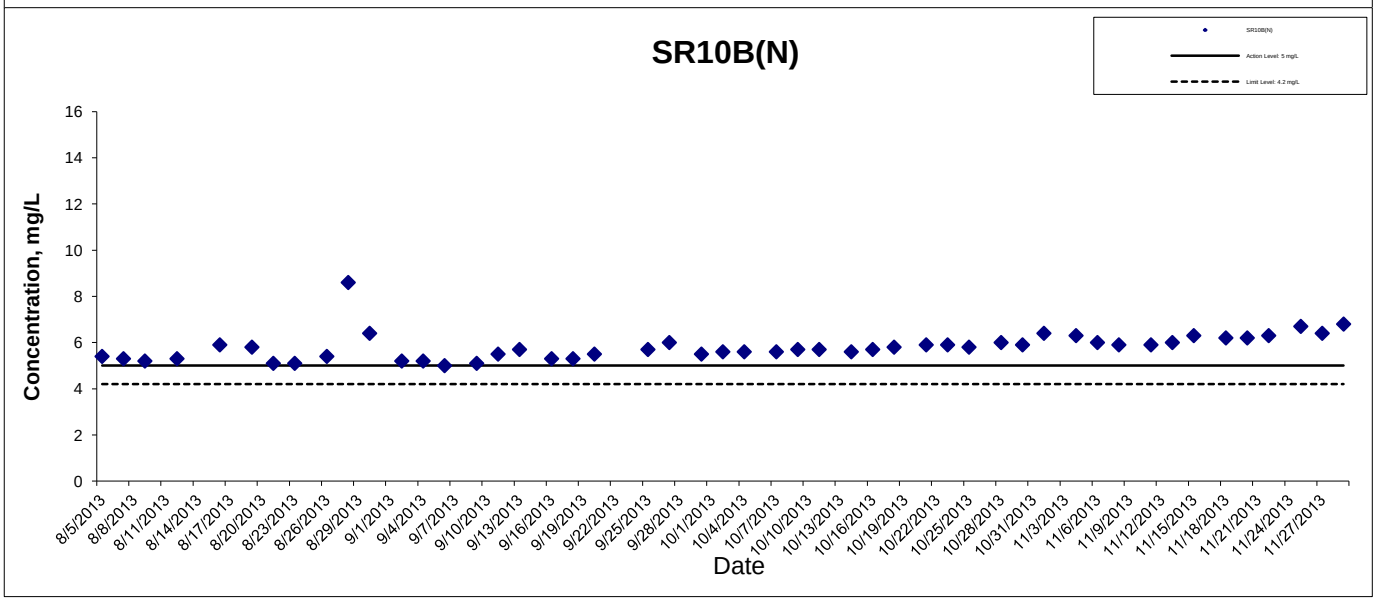




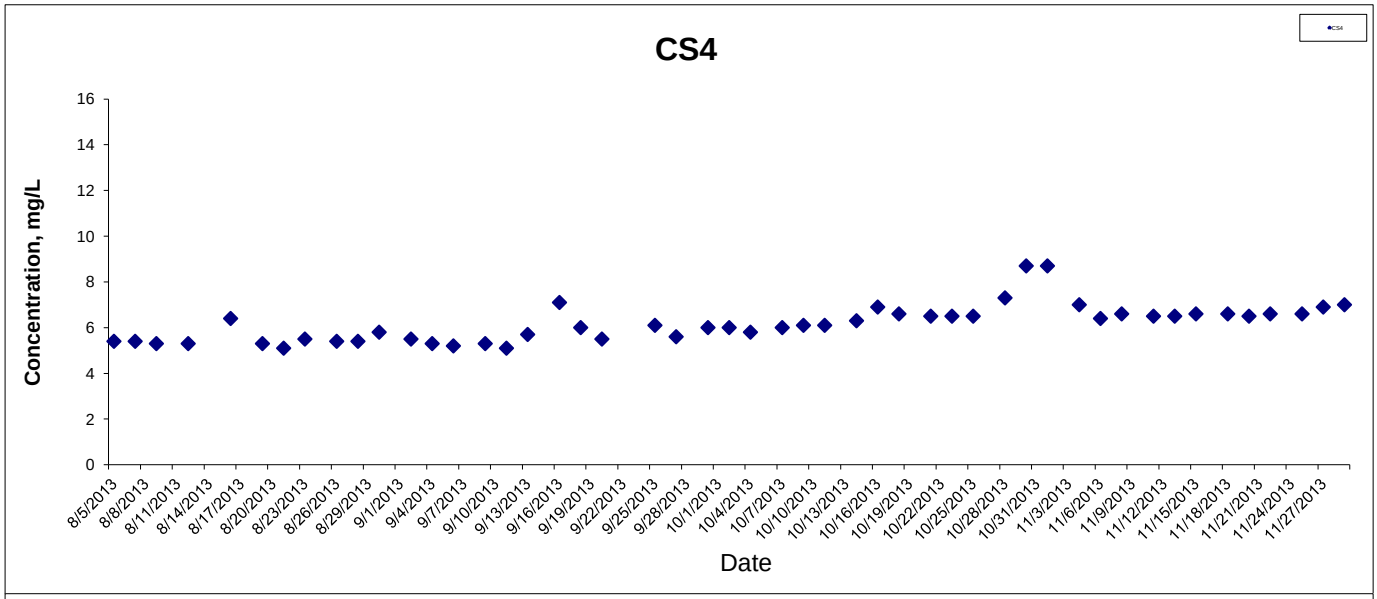
Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

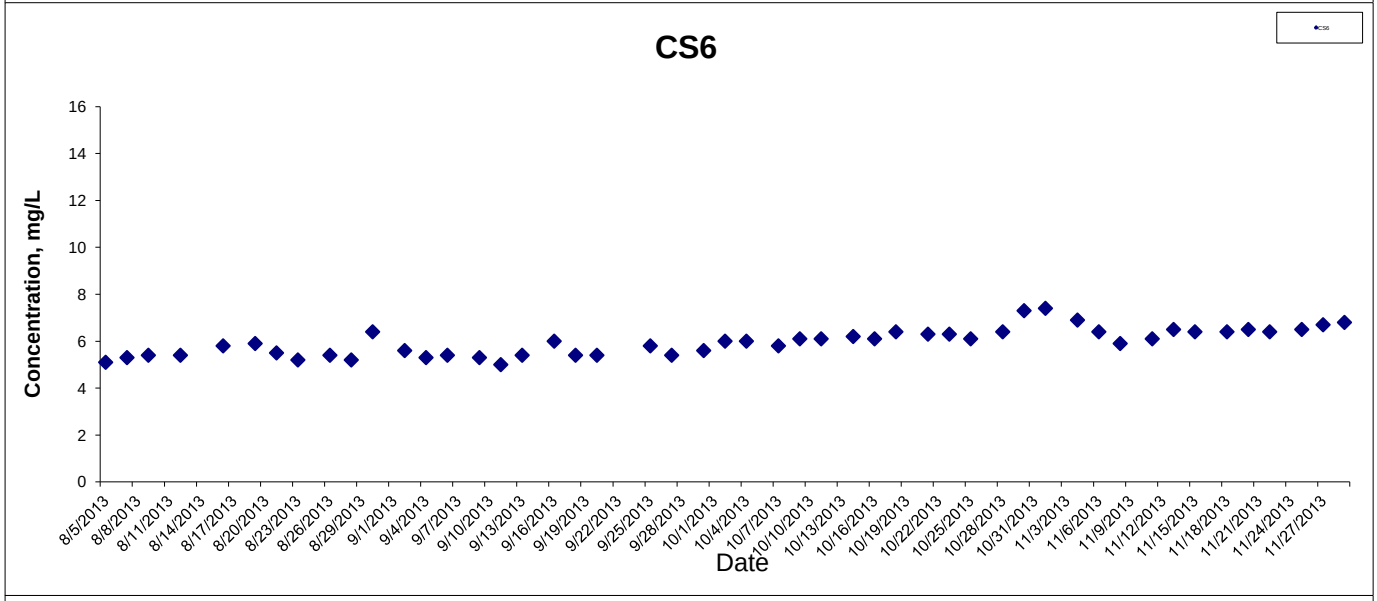


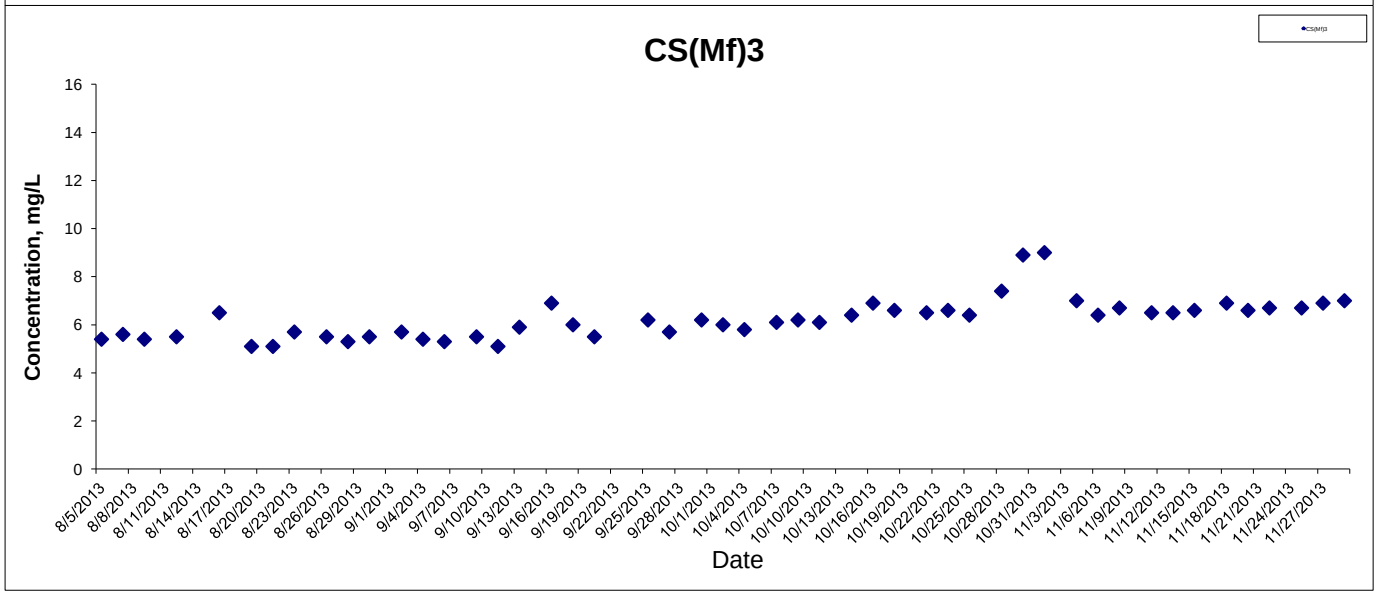




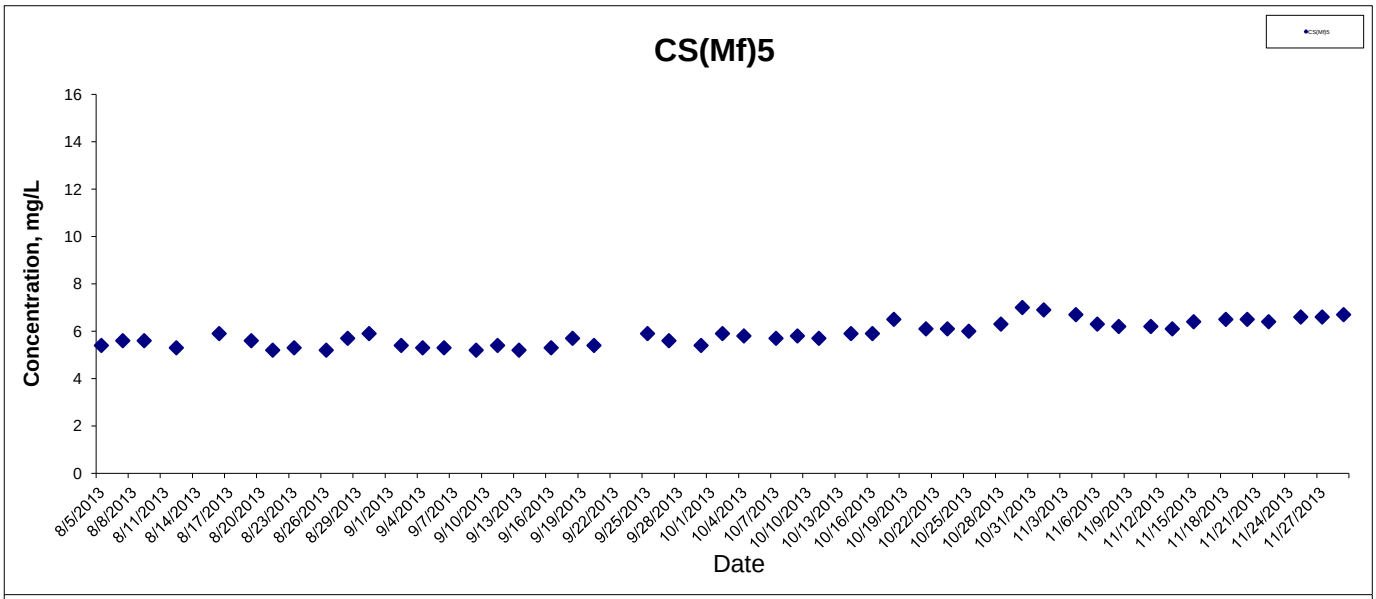
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

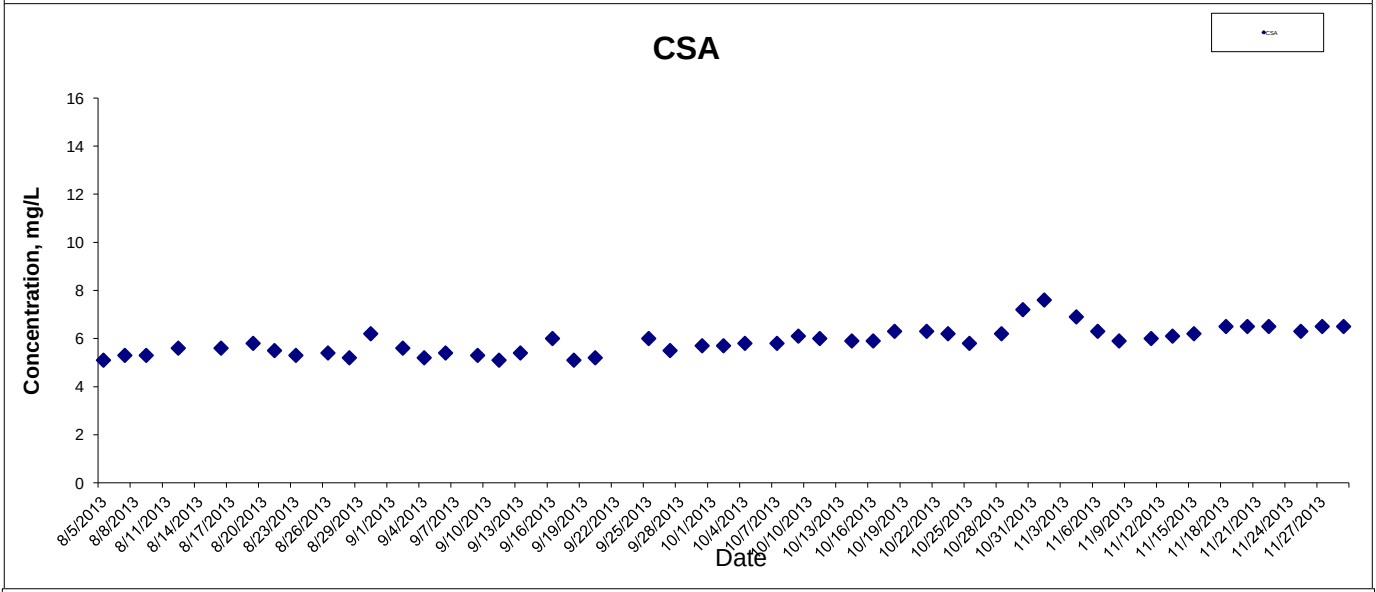


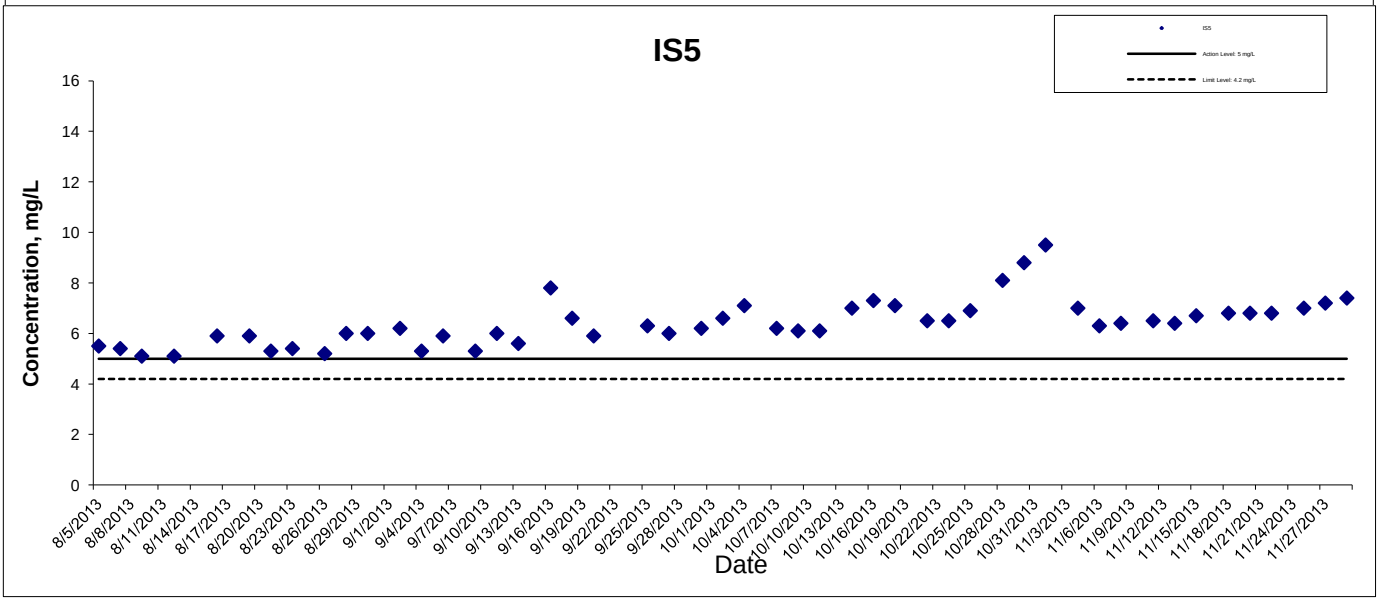




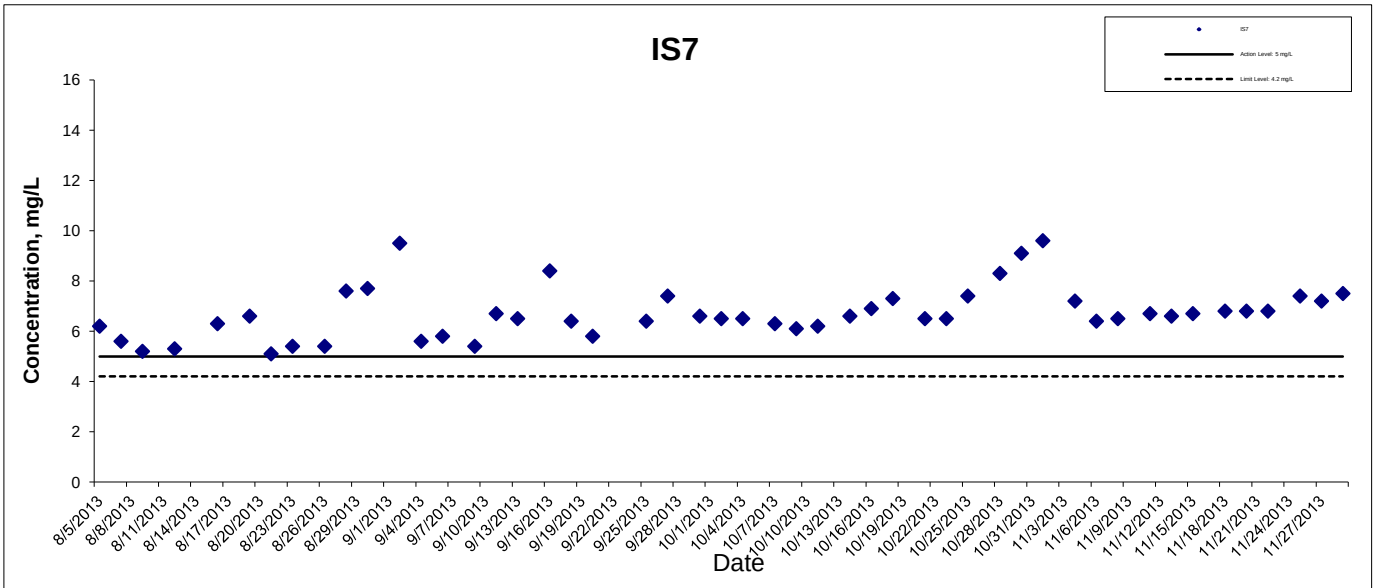
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

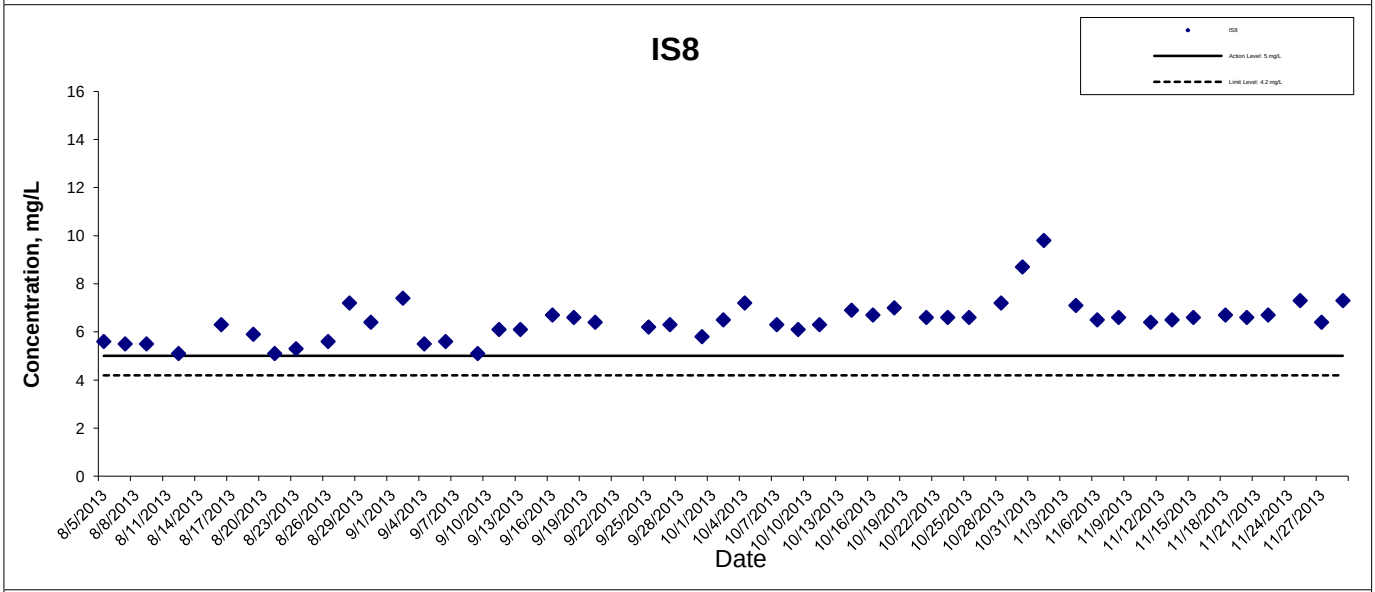


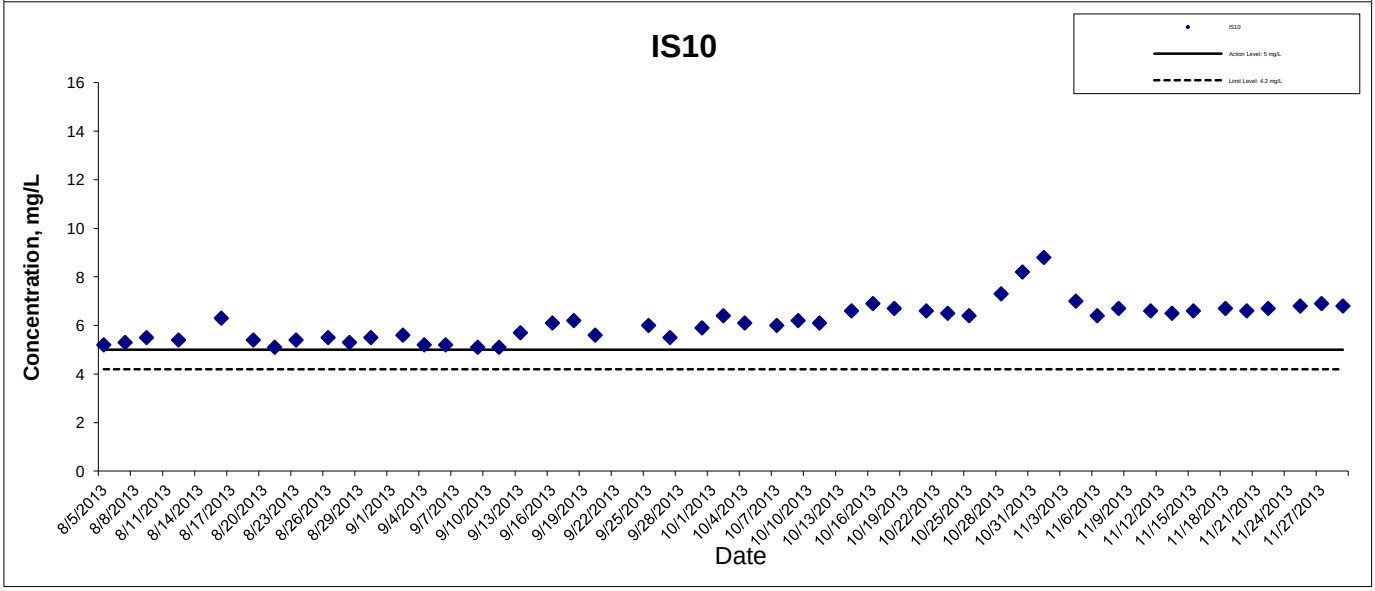




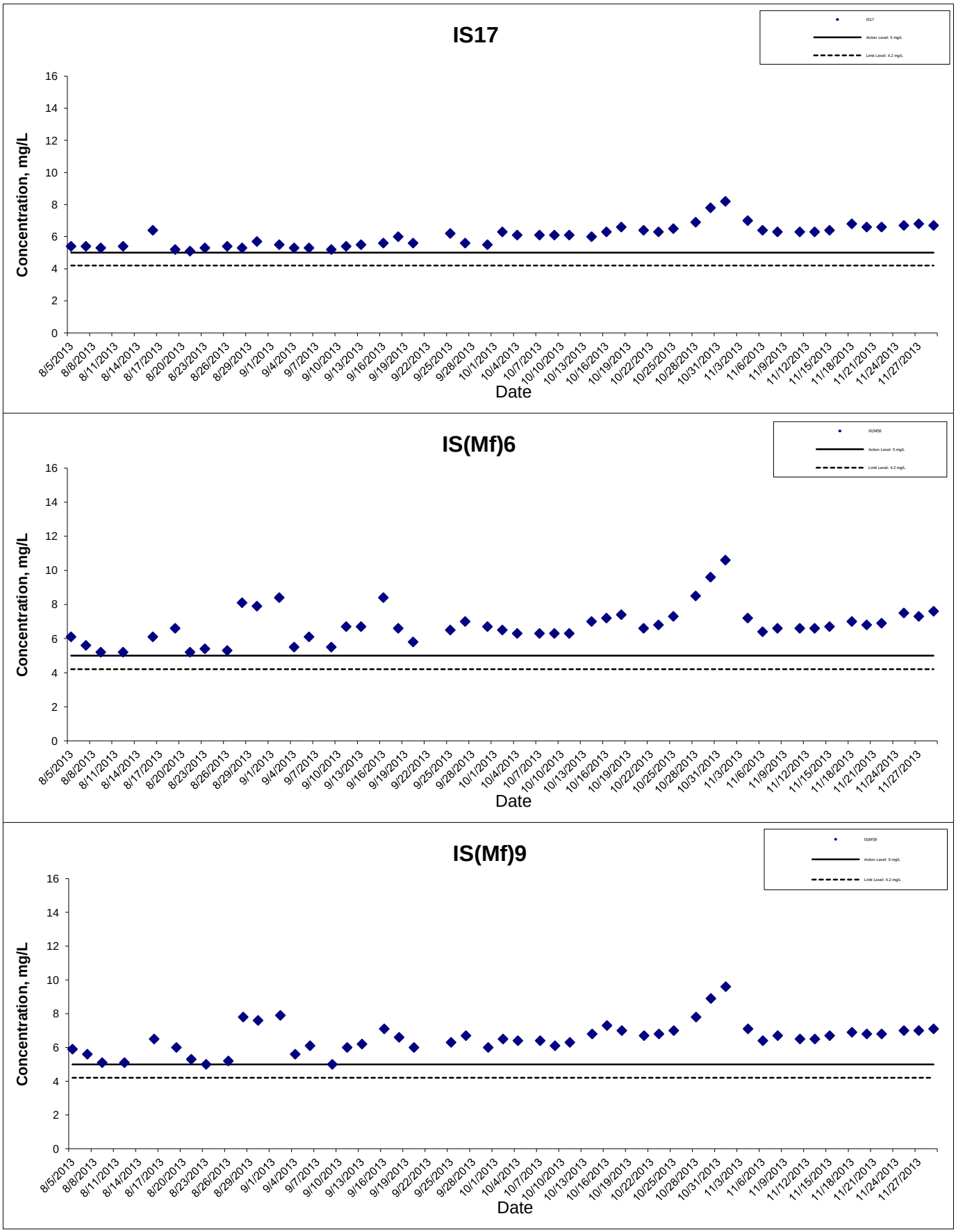
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide







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



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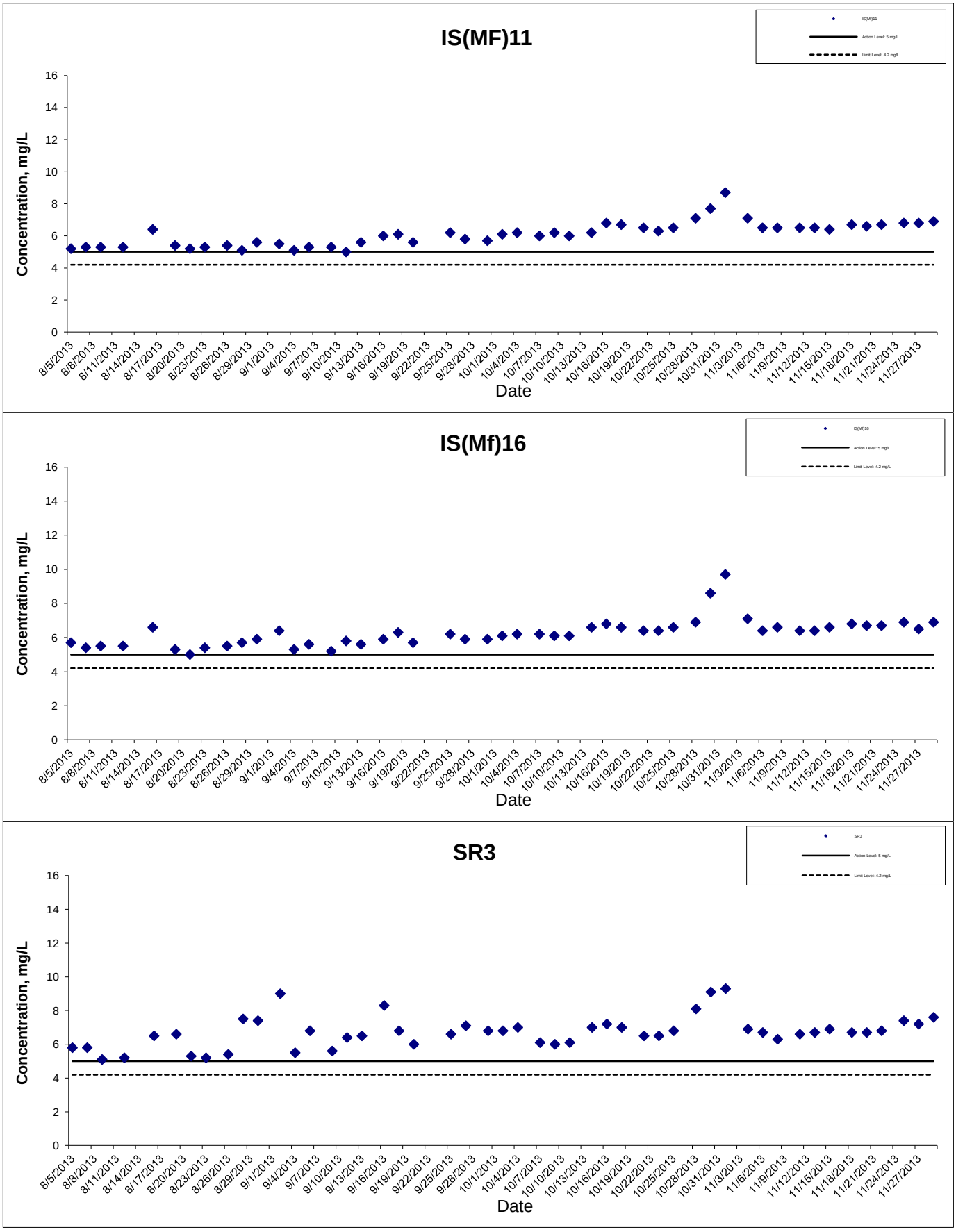
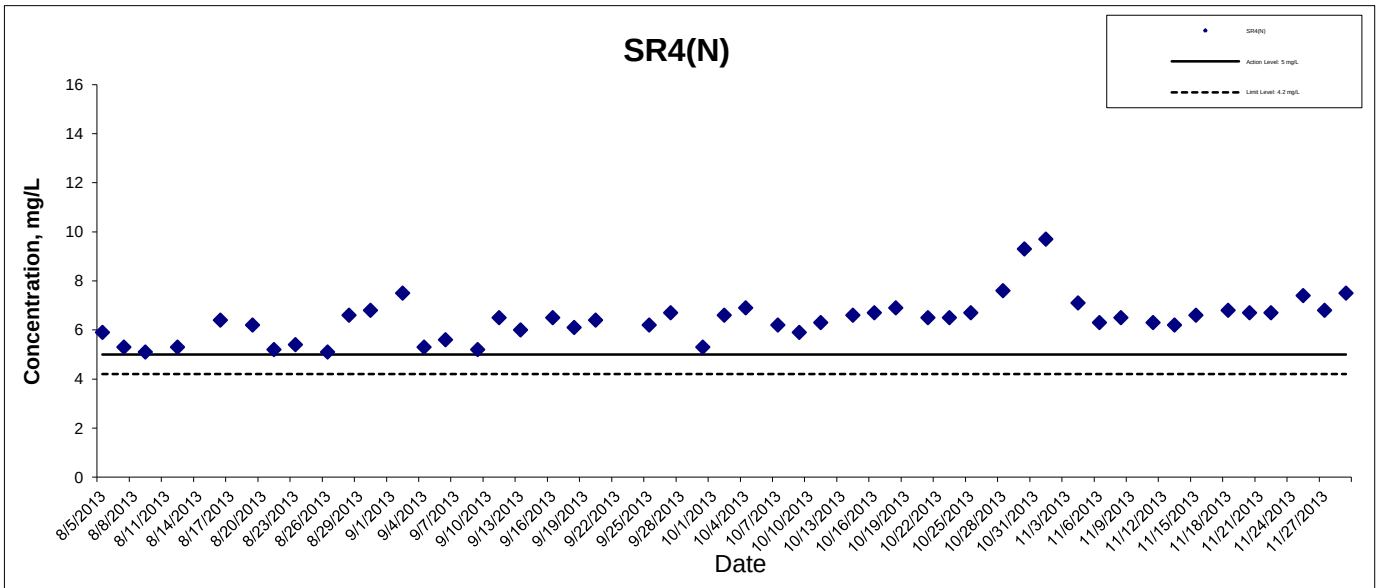
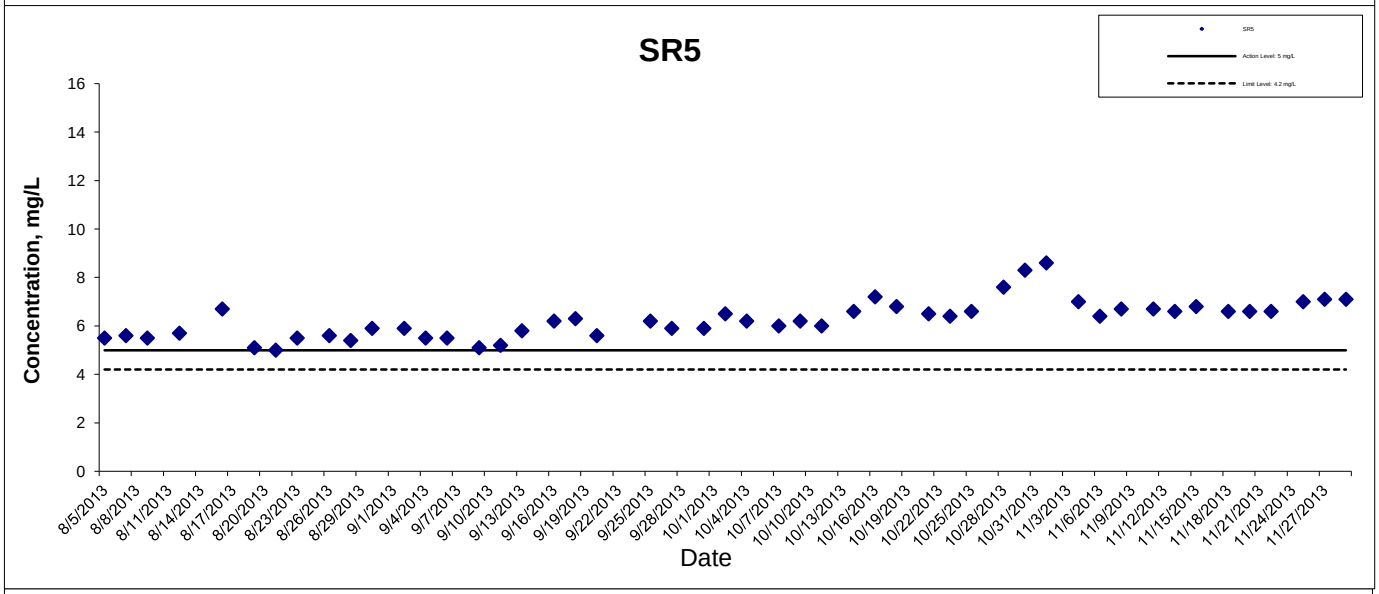
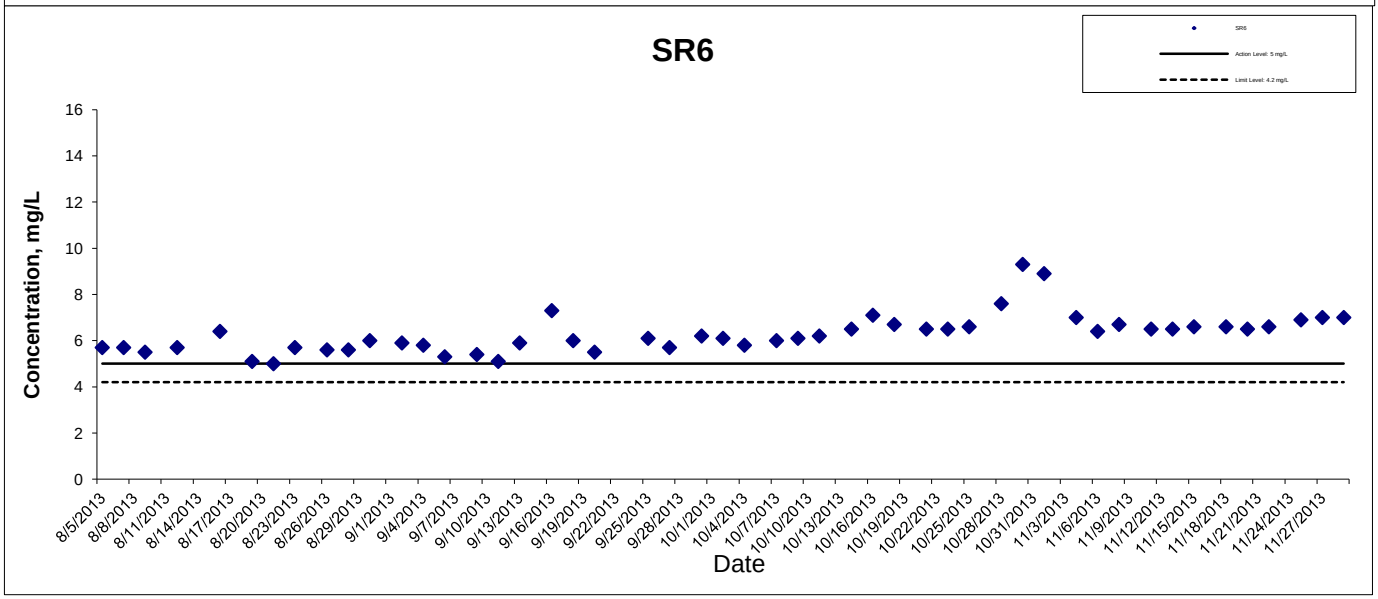
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



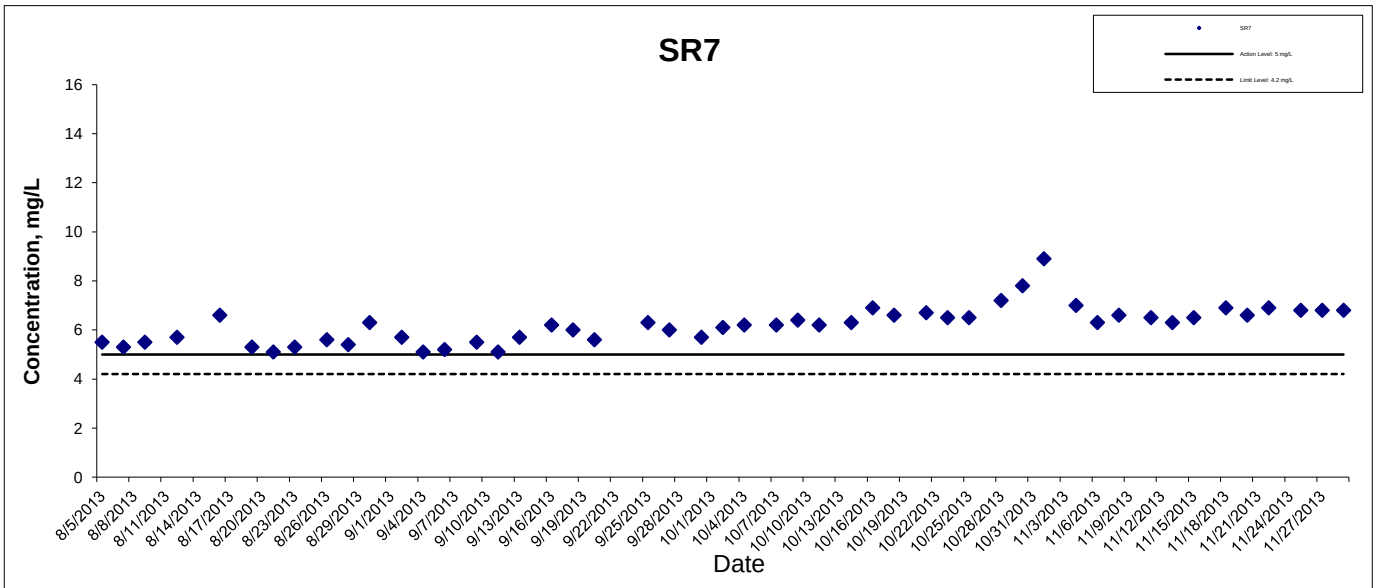
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

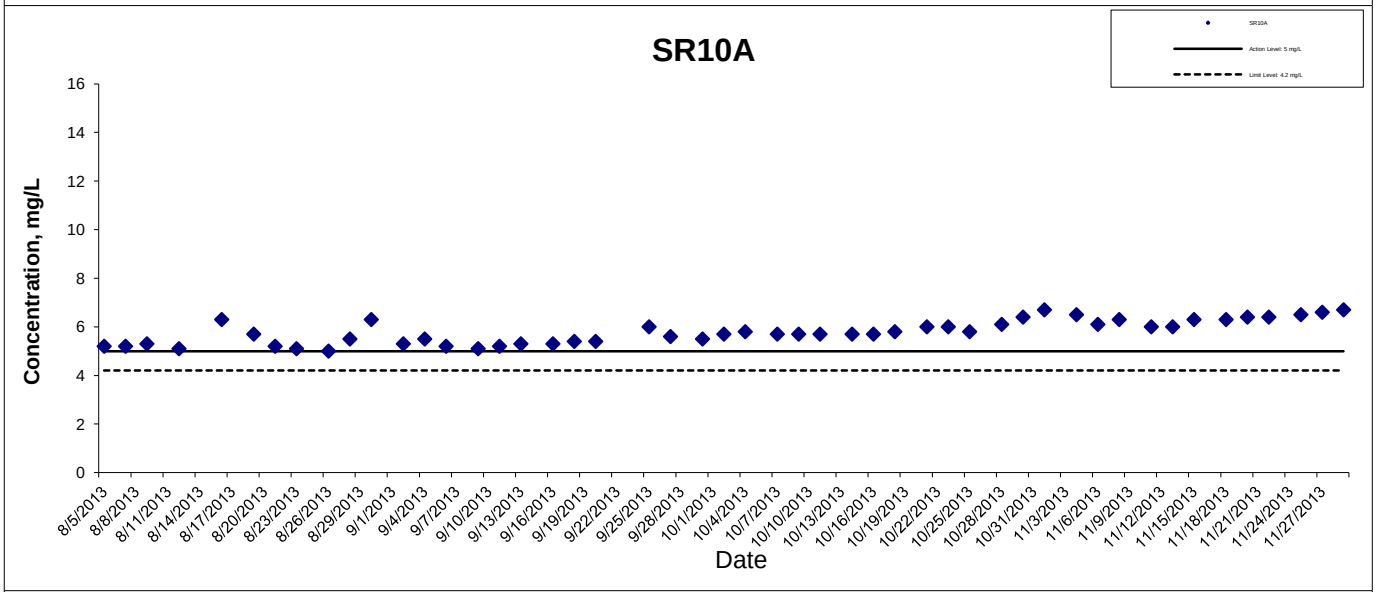


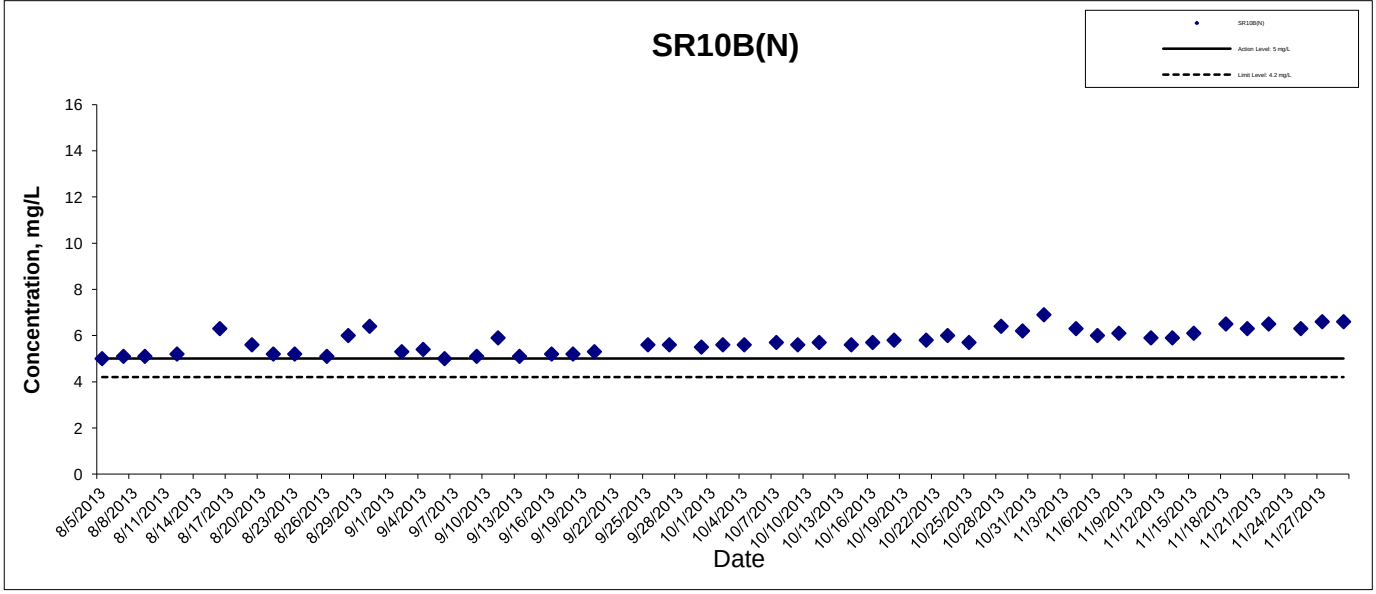




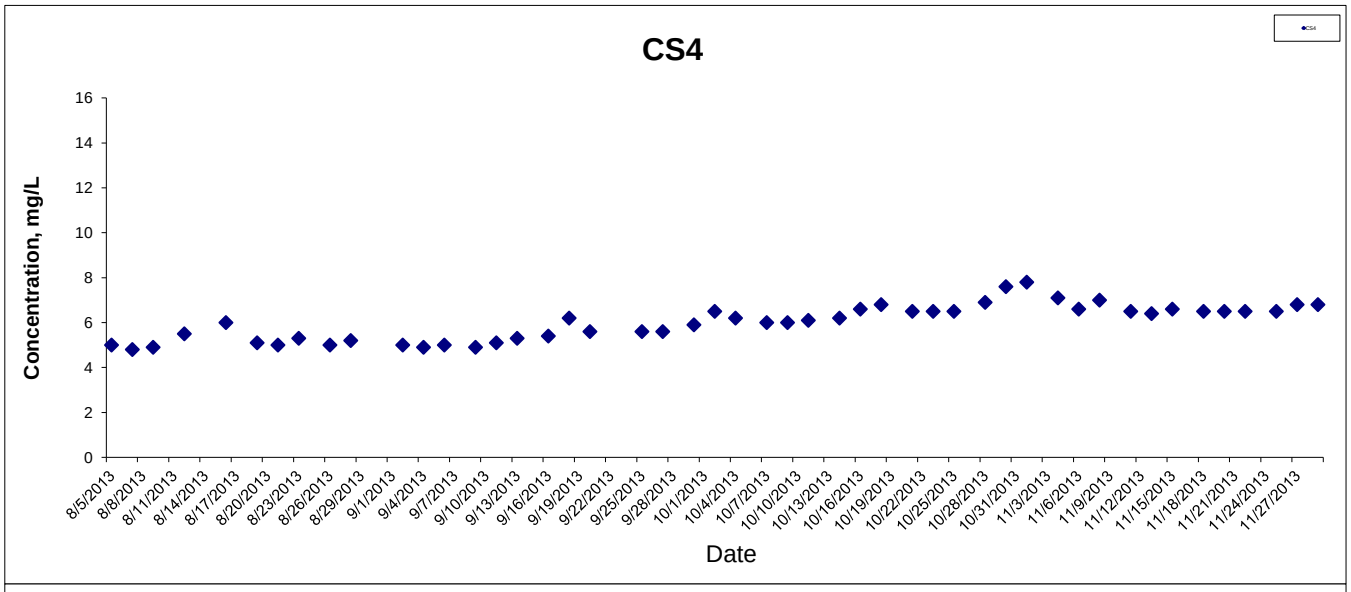
Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide

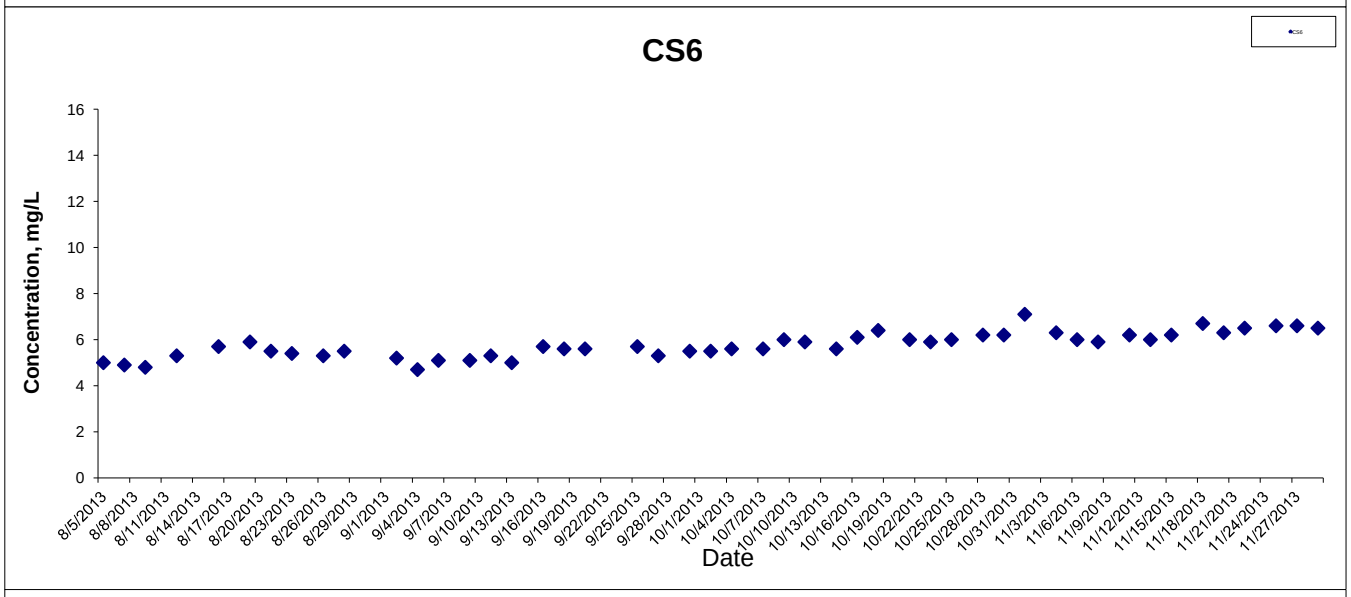


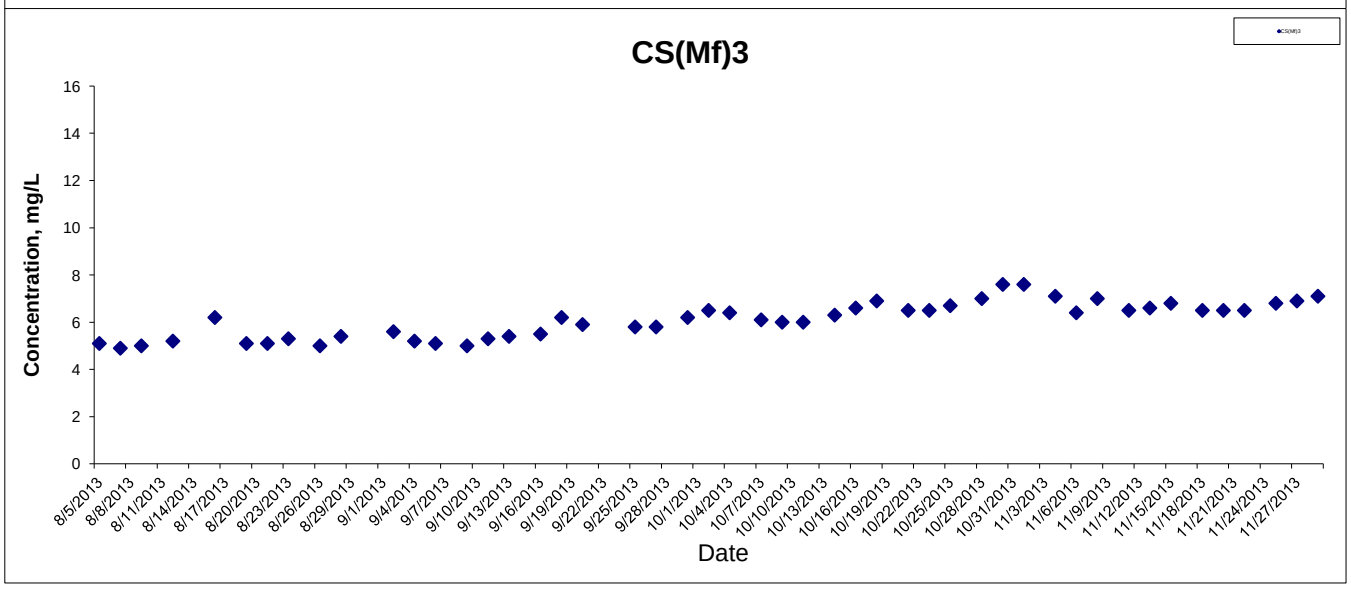




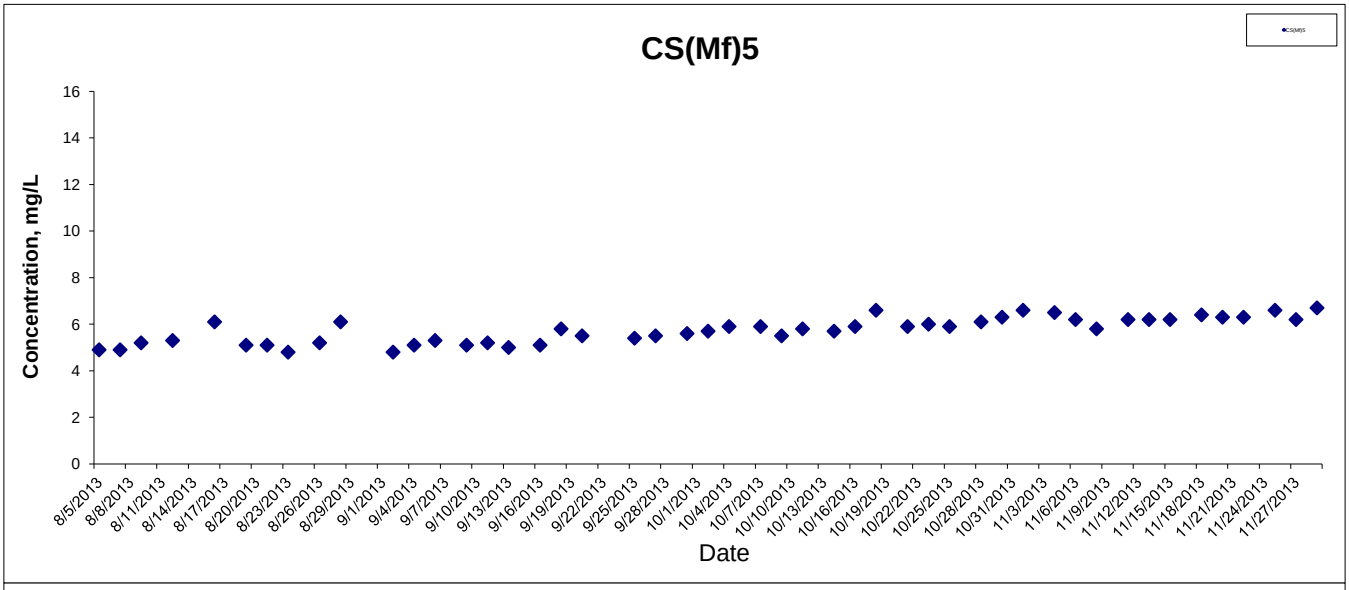
Dissolved Oxygen (Bottom) at Mid-Ebb Tide

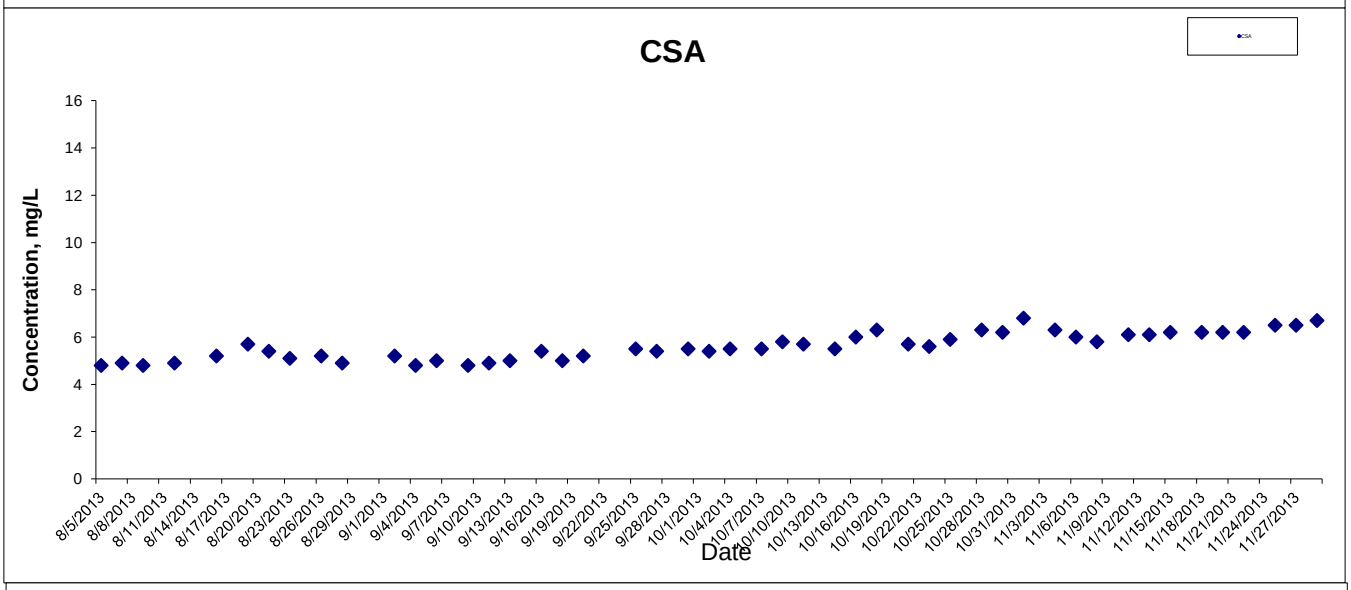


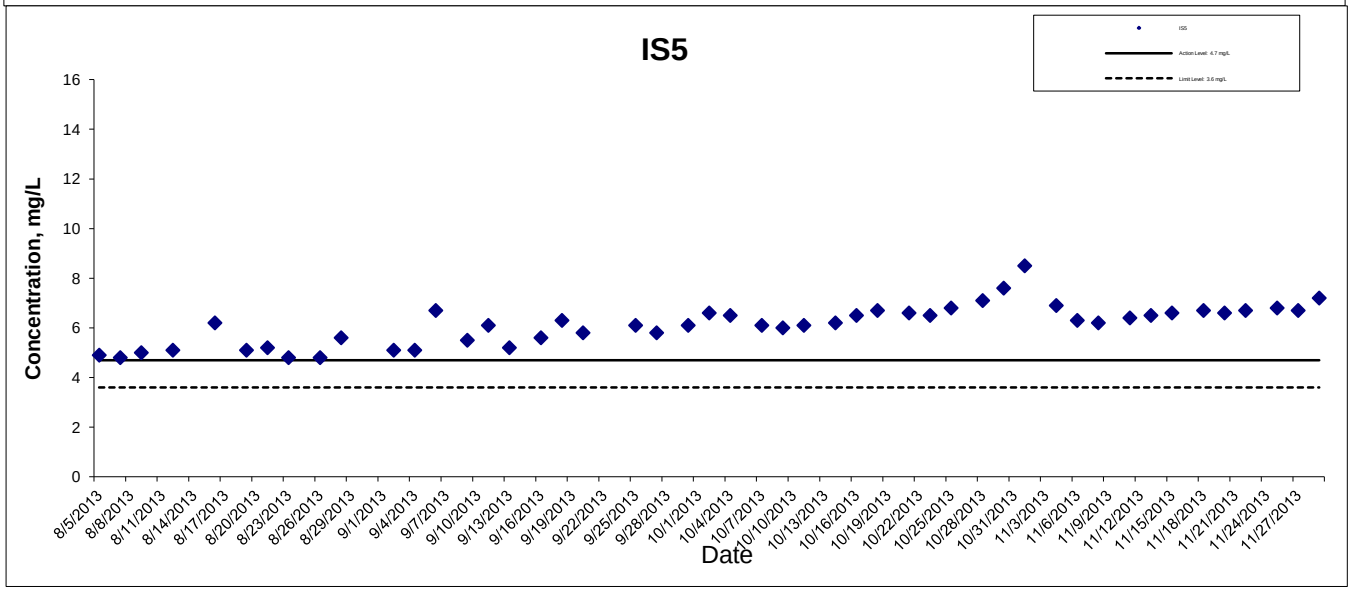




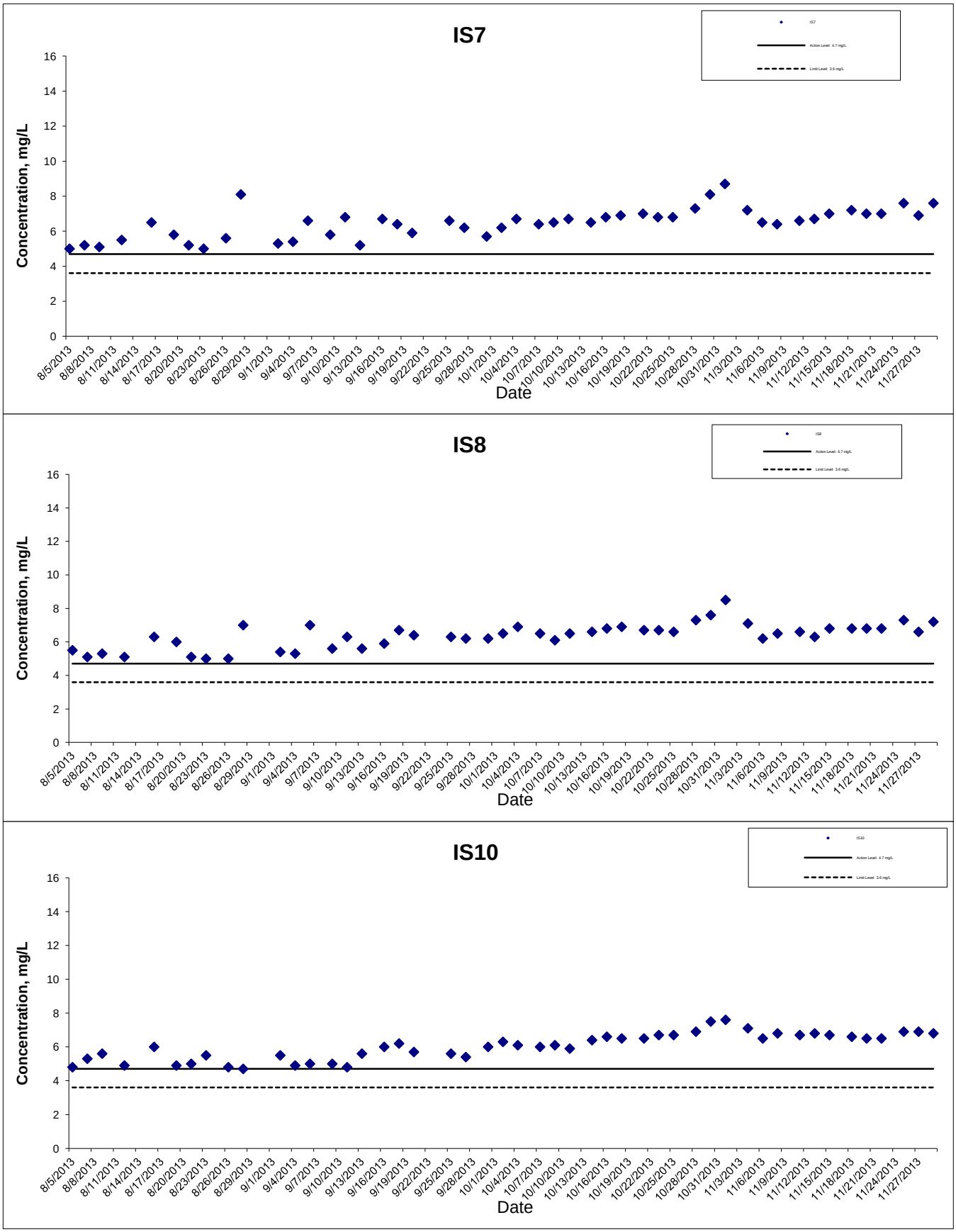
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



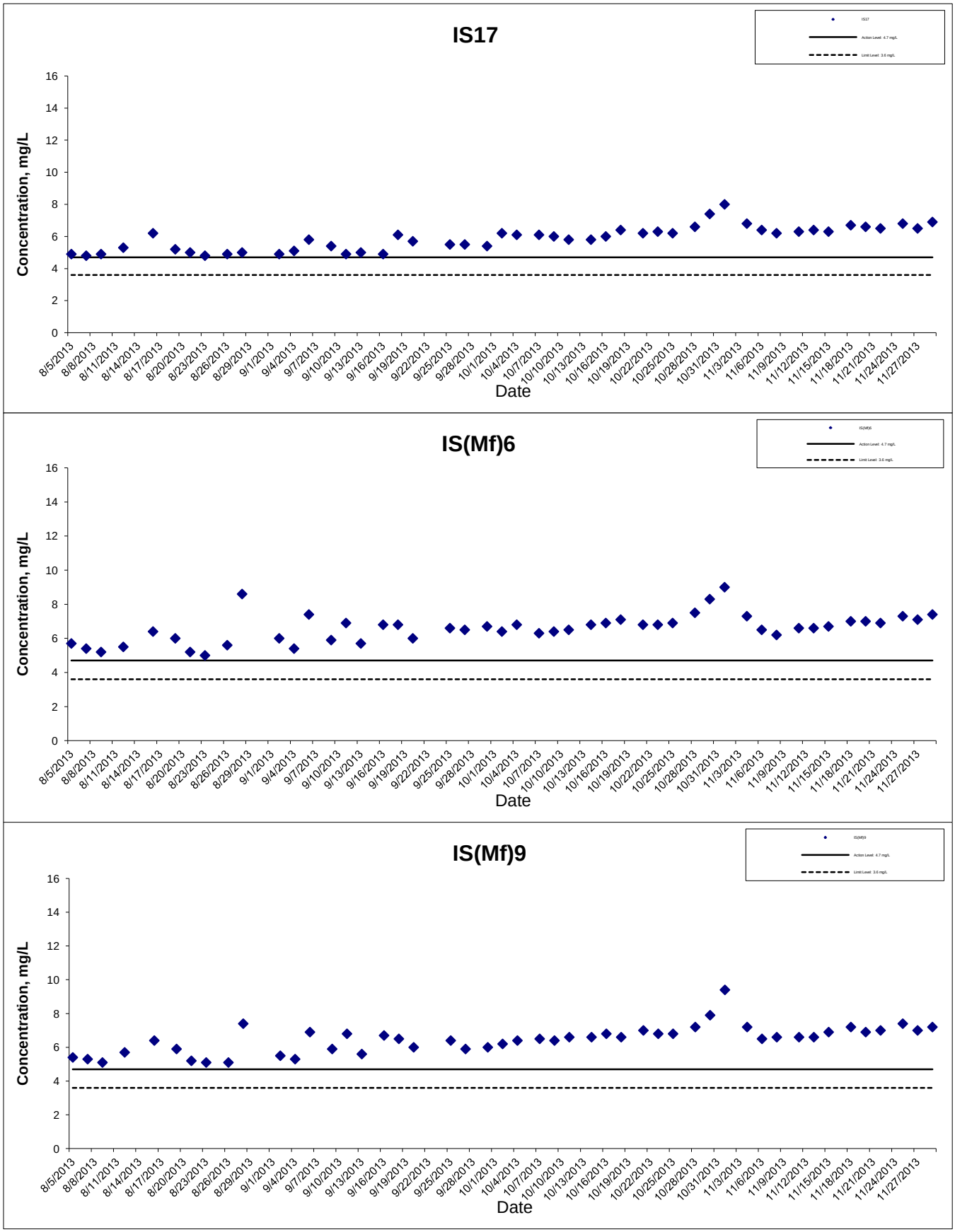




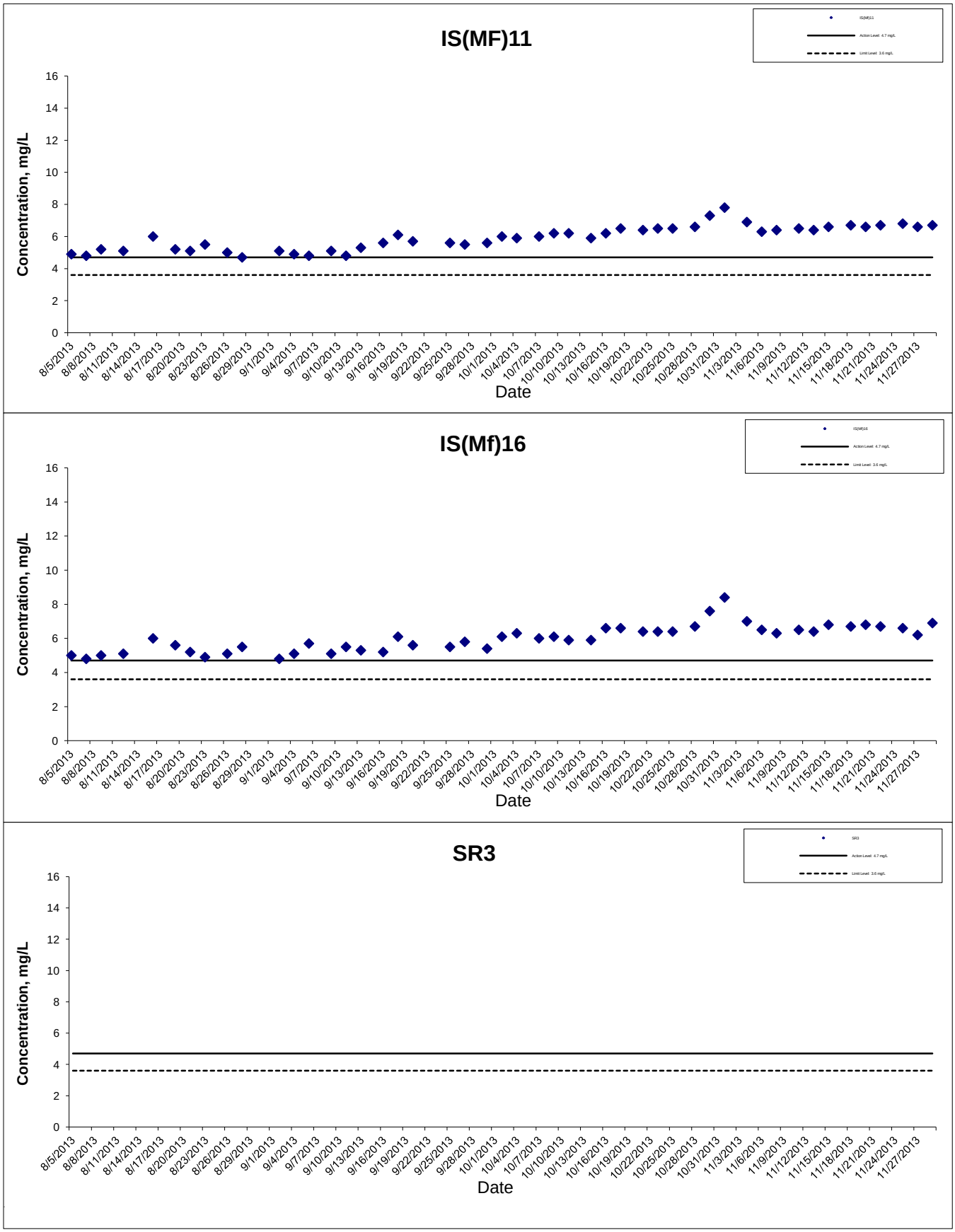
Dissolved Oxygen (Bottom) at Mid-Ebb Tide



Dissolved Oxygen (Bottom) at Mid-Ebb Tide



Dissolved Oxygen (Bottom) at Mid-Ebb Tide



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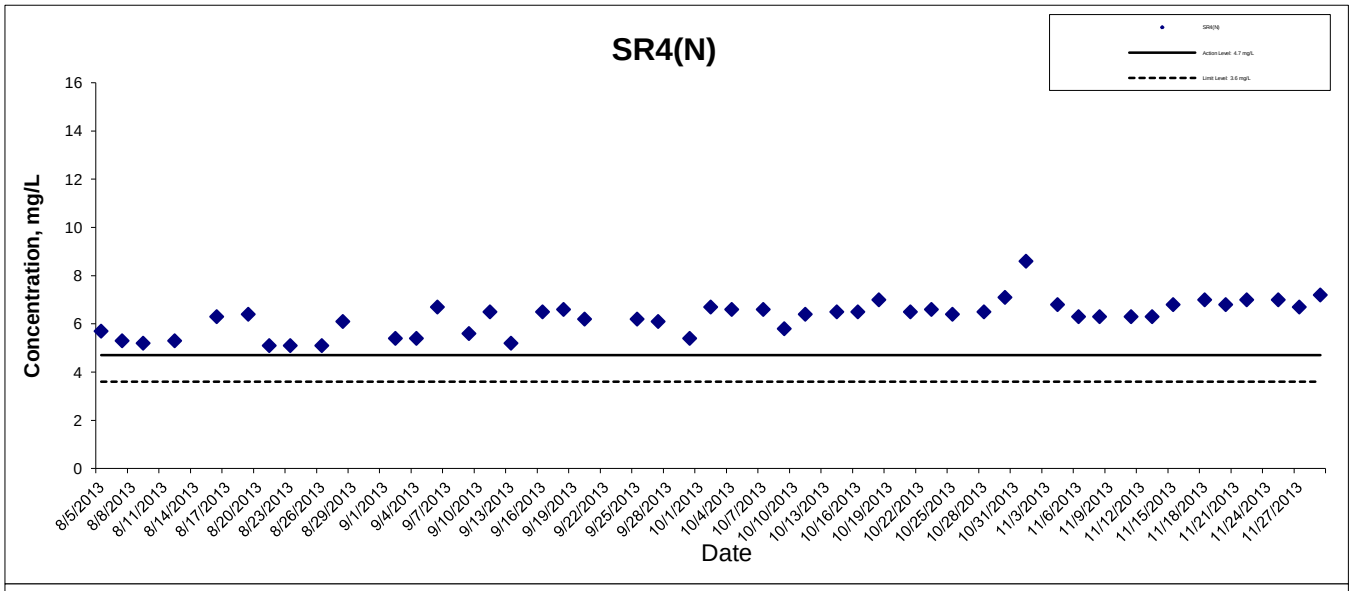
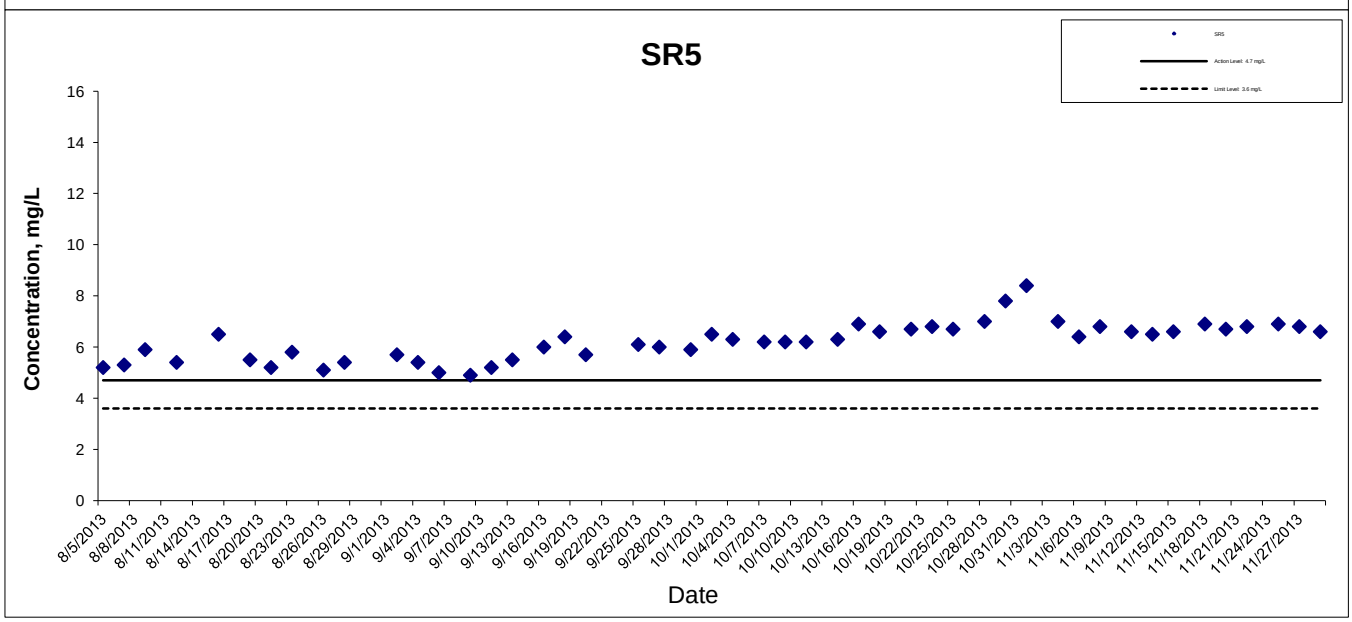
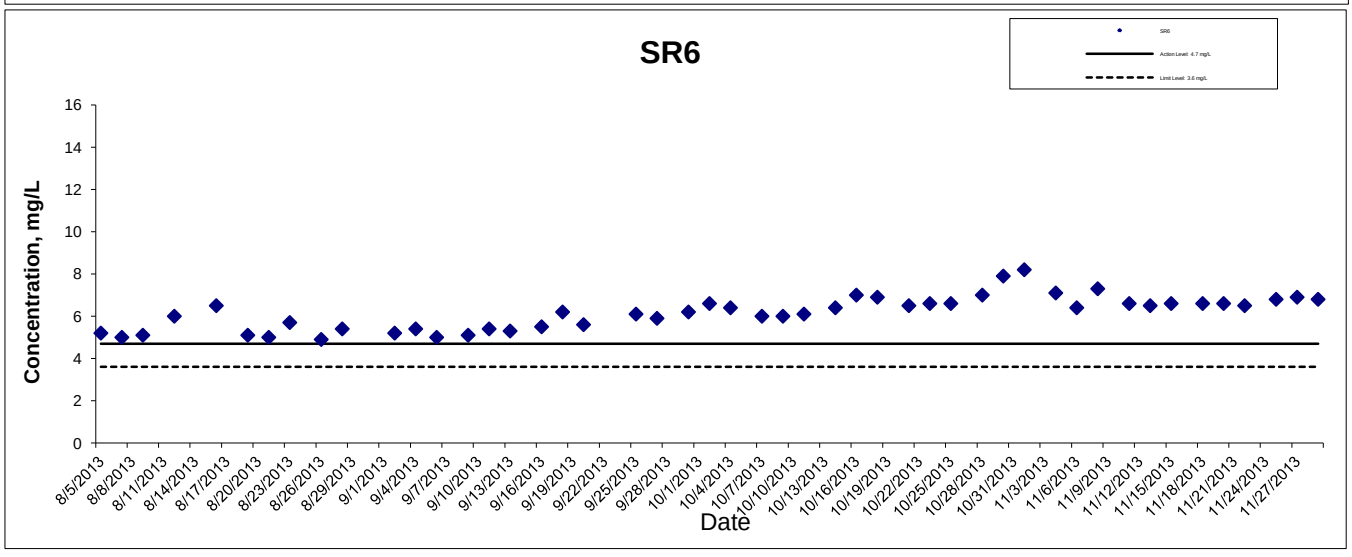
Appendix G

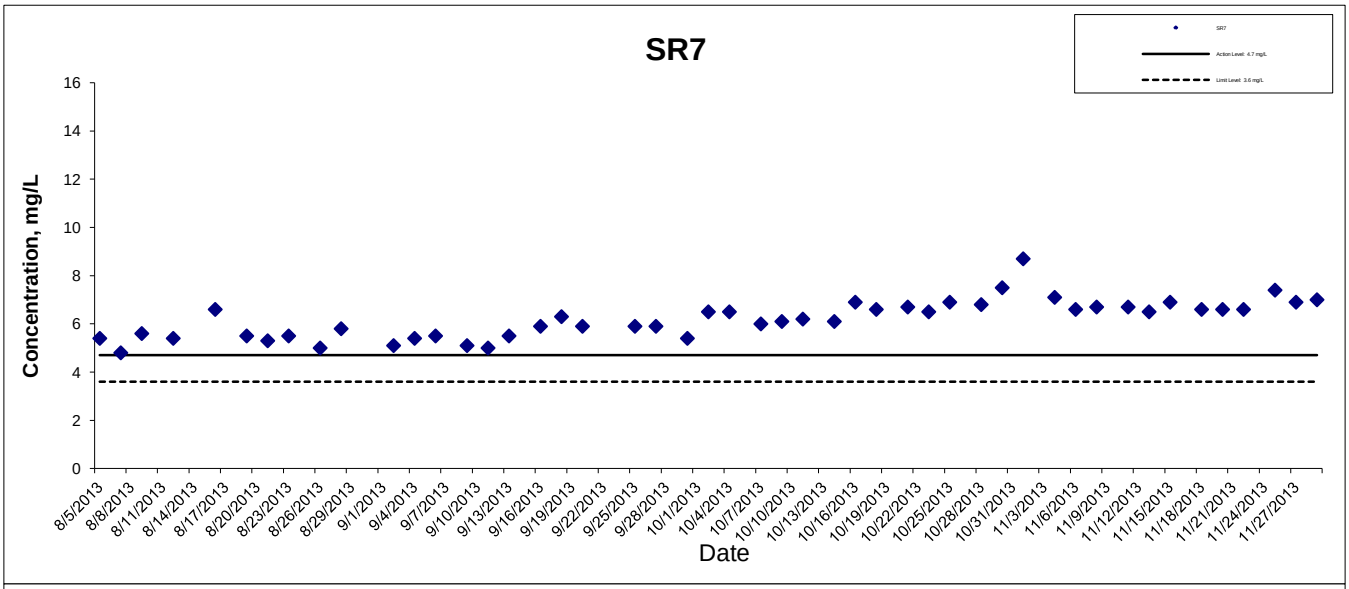
Dissolved Oxygen (Bottom) at Mid-Ebb Tide

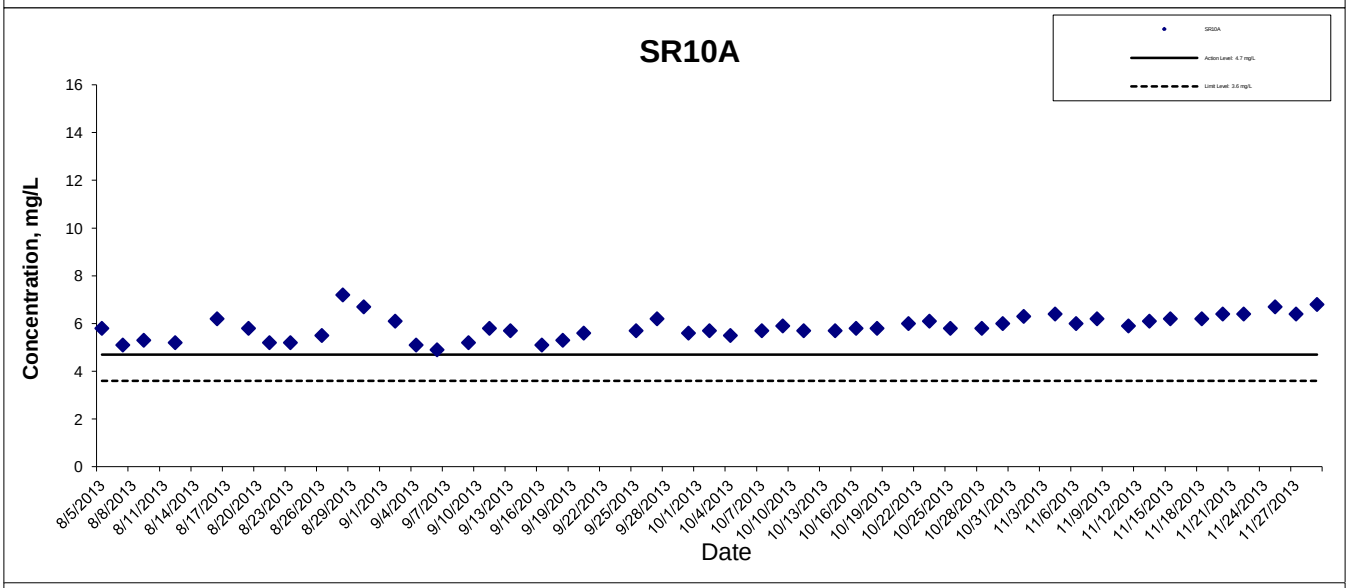


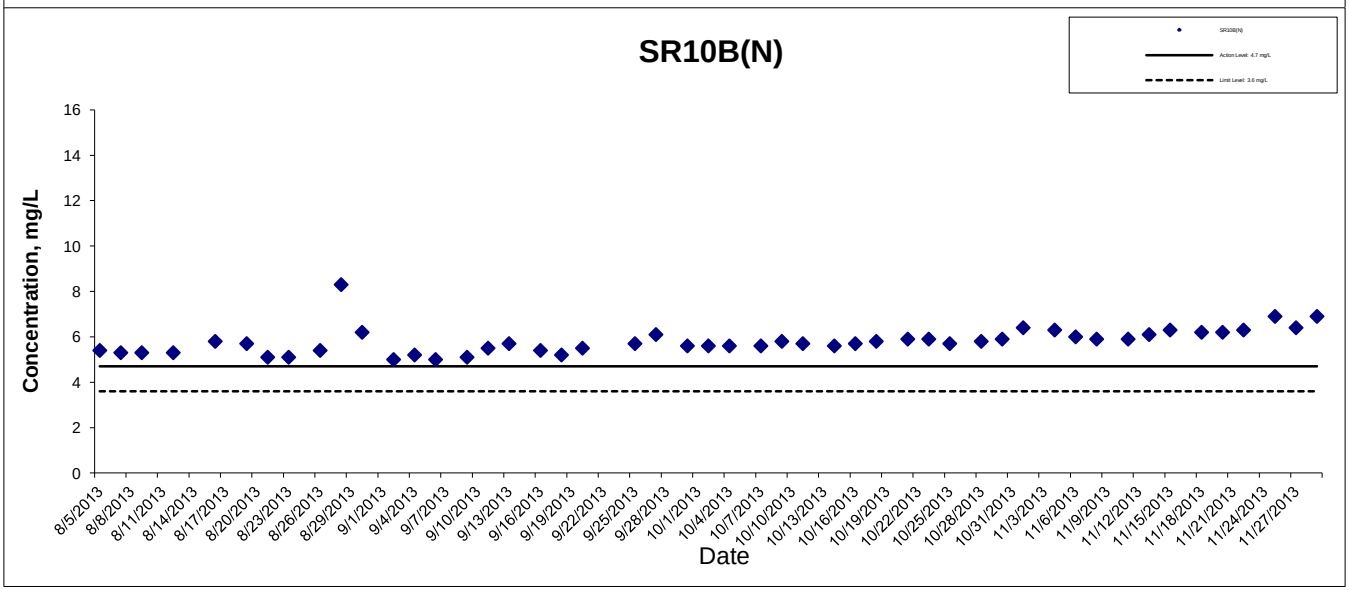




Dissolved Oxygen (Bottom) at Mid-Ebb Tide







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HONG KONG BOUNDARY CROSSING FACILITIES
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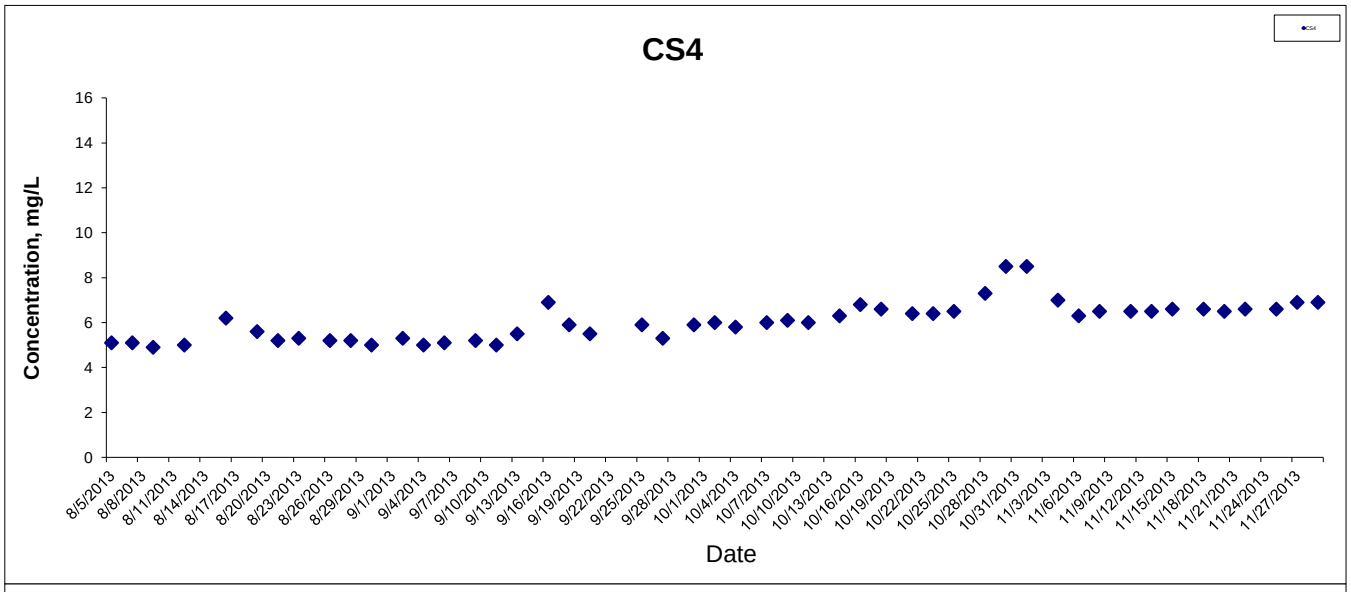
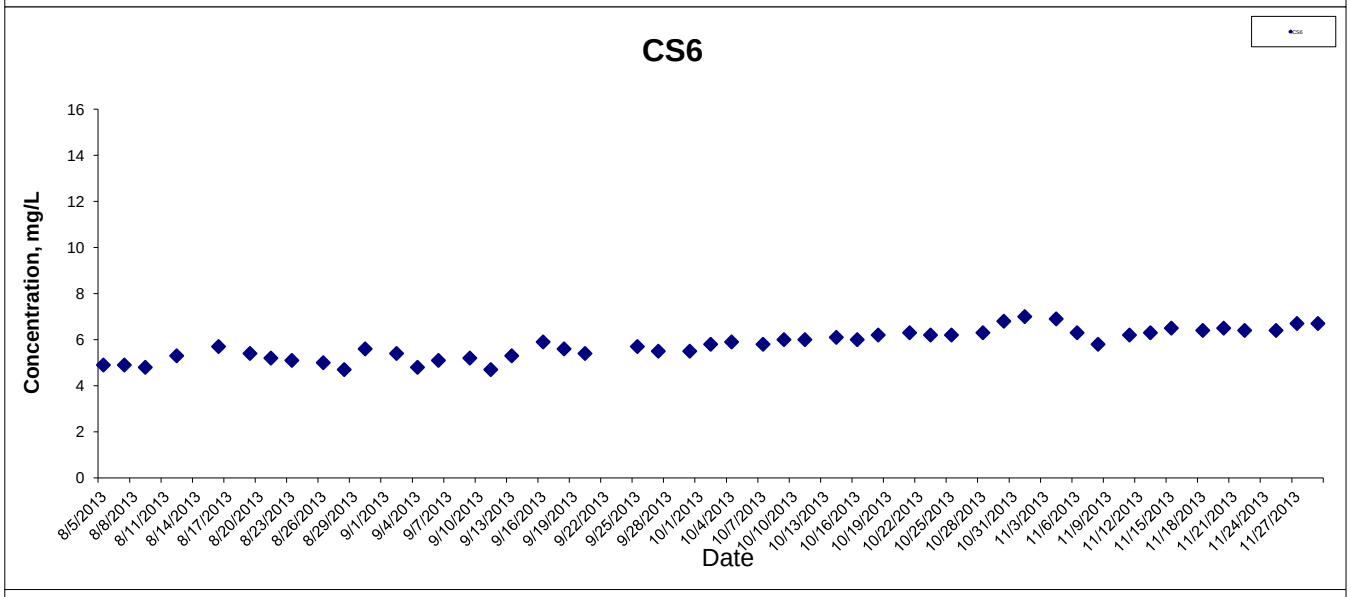
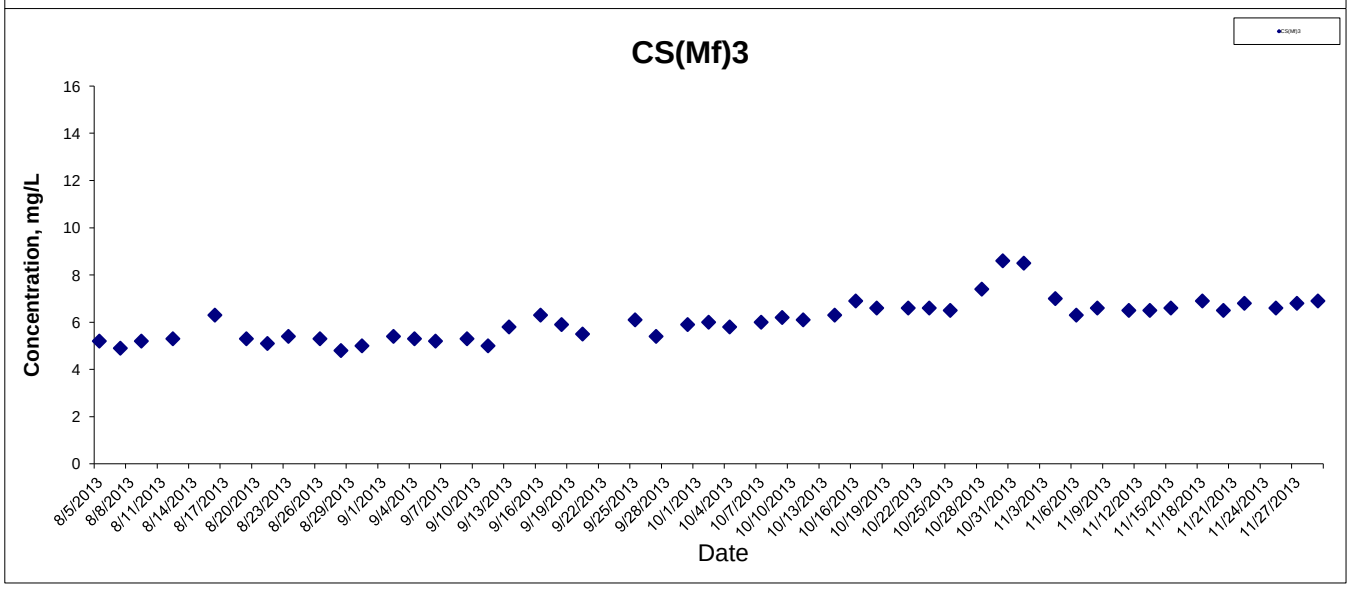
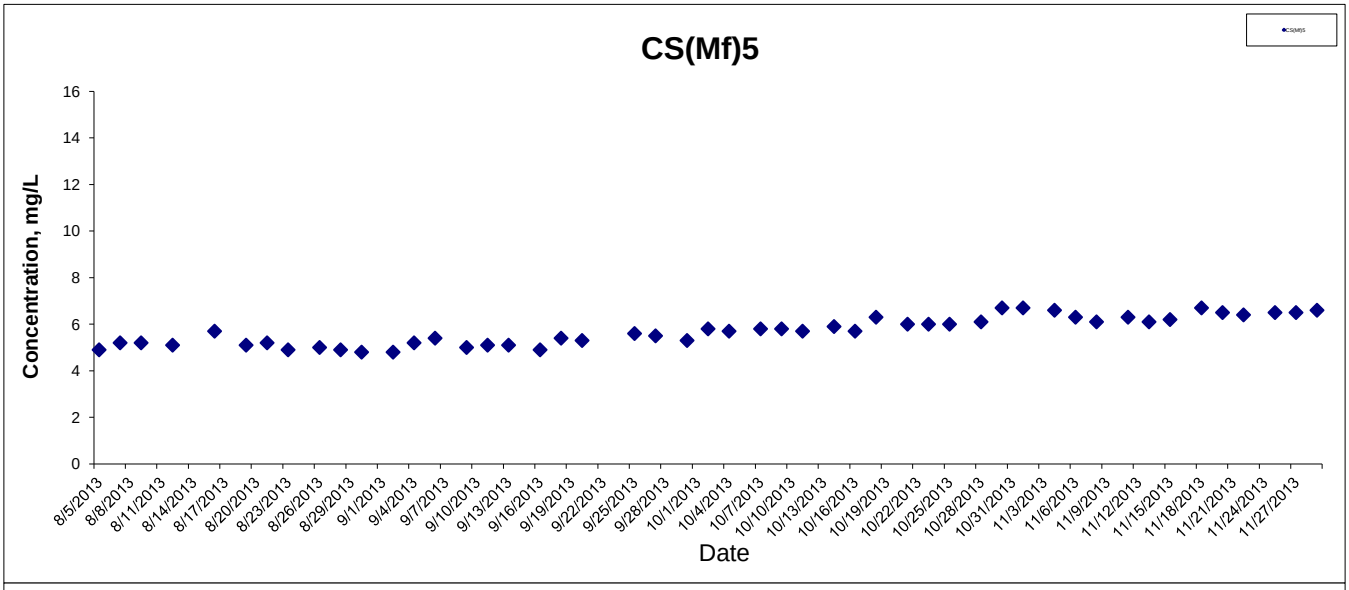
Dissolved Oxygen (Bottom) at Mid-Flood Tide

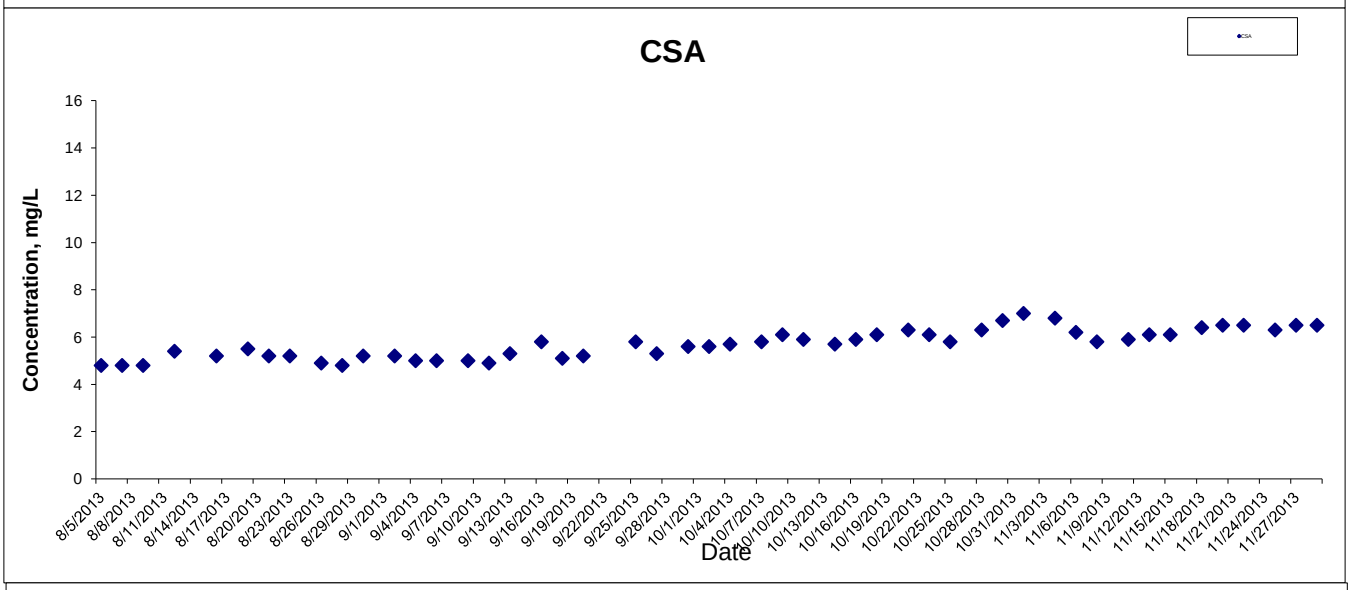


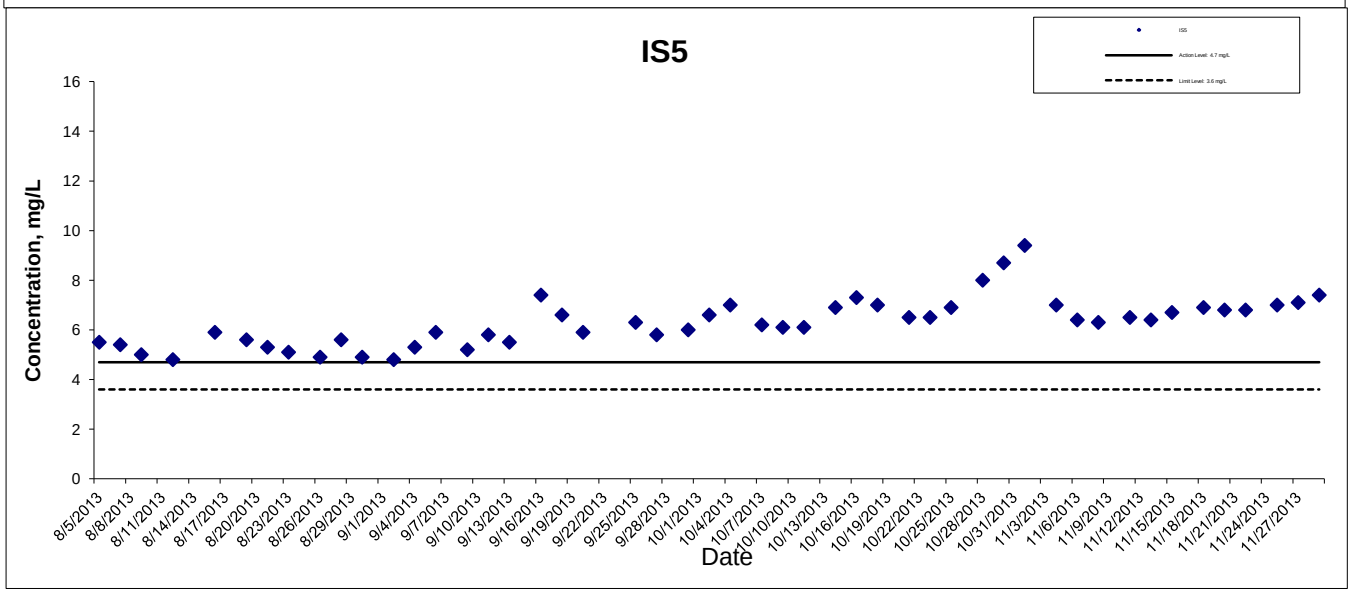




Dissolved Oxygen (Bottom) at Mid-Flood Tide







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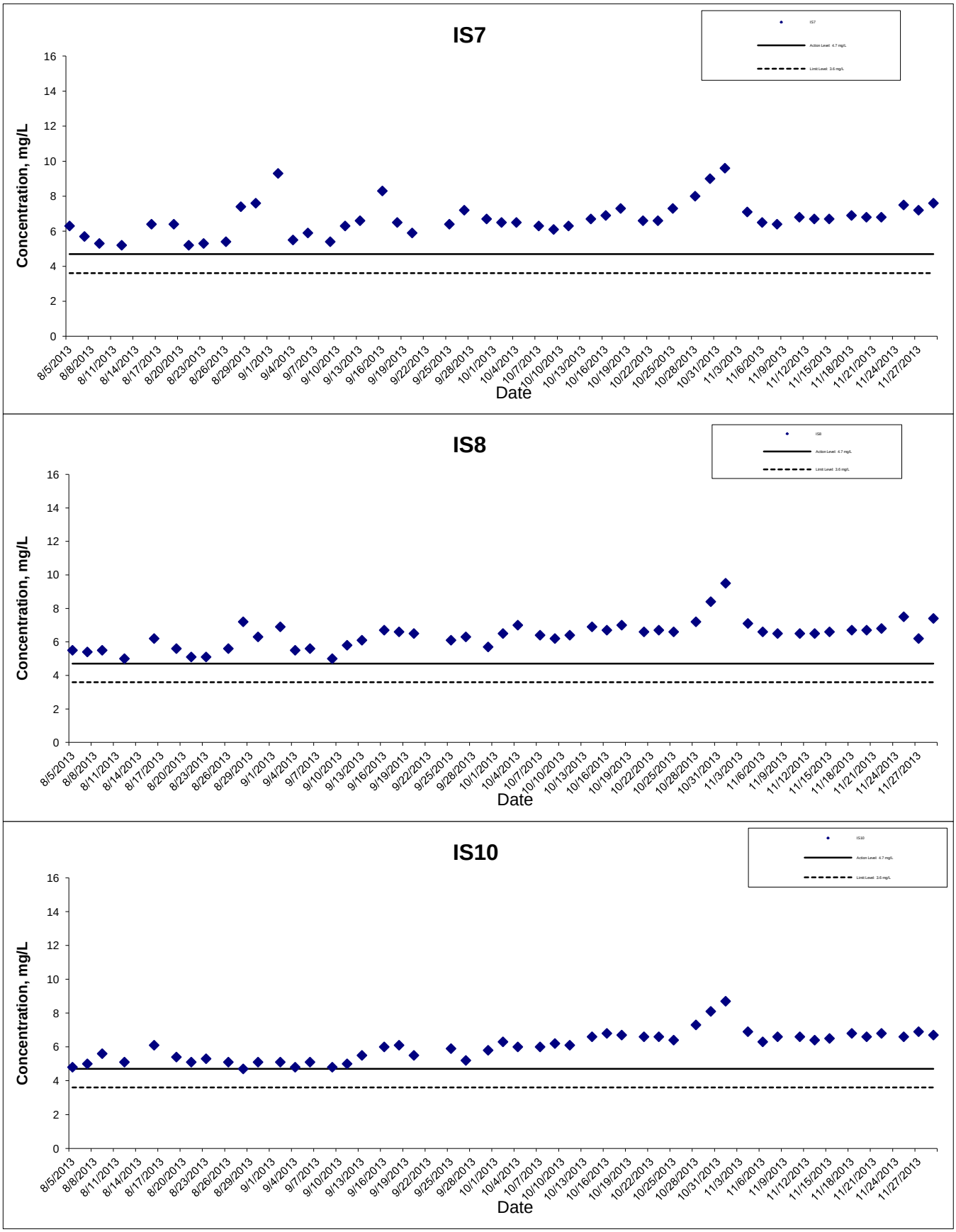
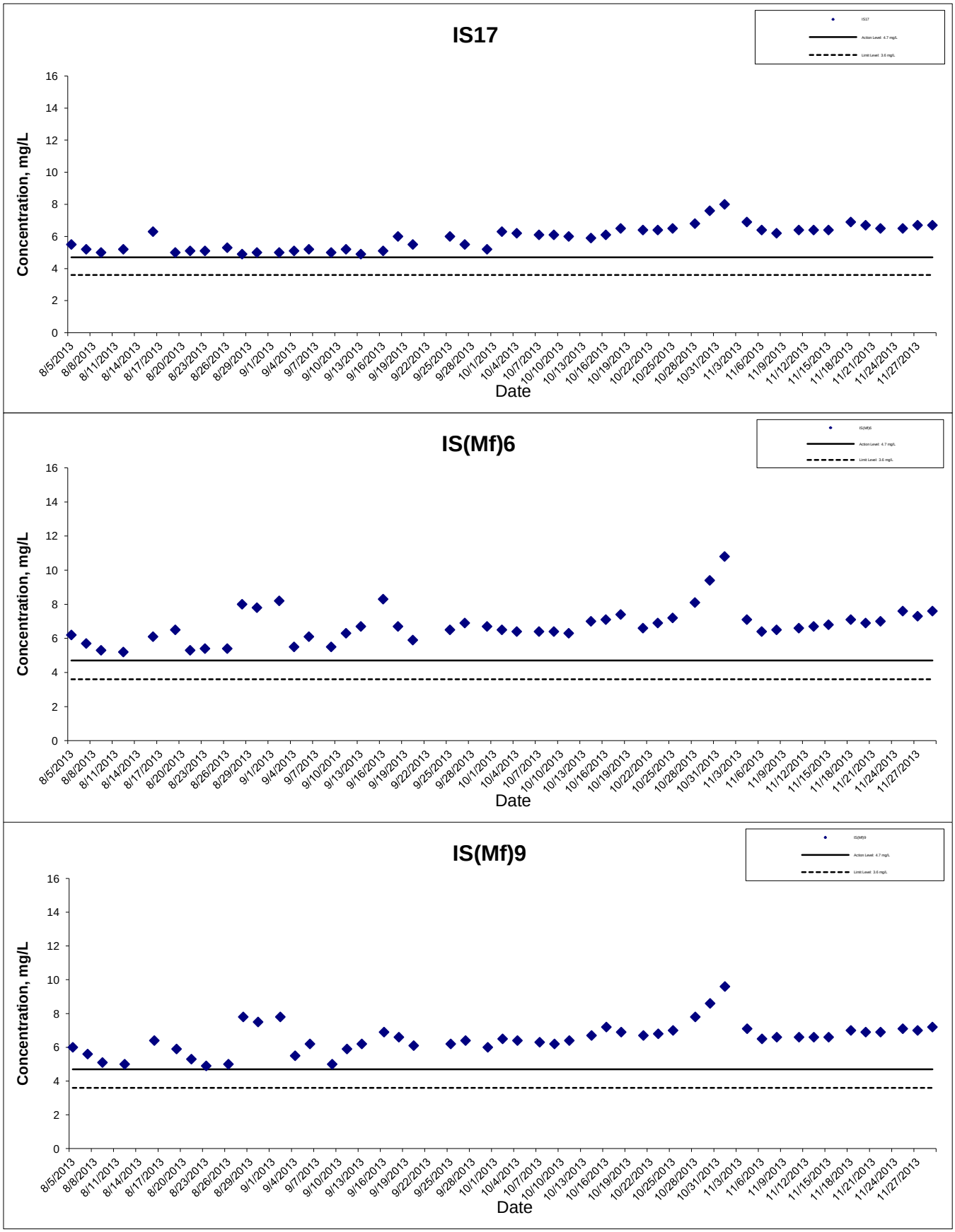
Appendix G

Dissolved Oxygen (Bottom) at Mid-Flood Tide



Dissolved Oxygen (Bottom) at Mid-Flood Tide



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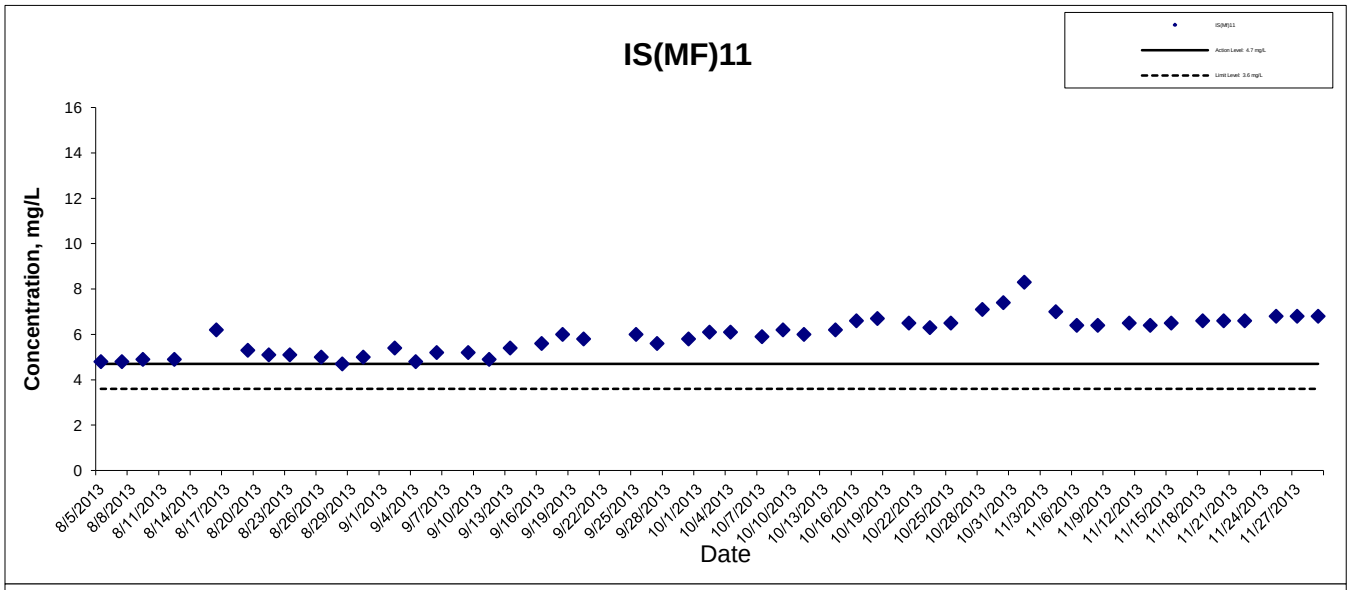
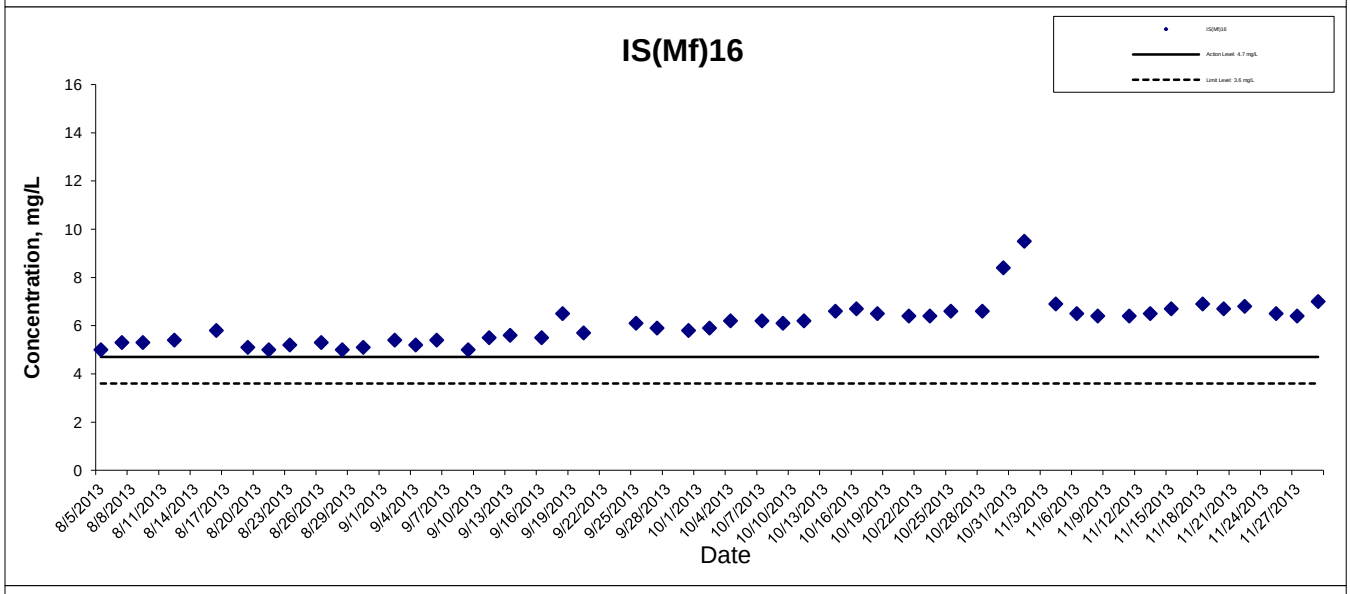
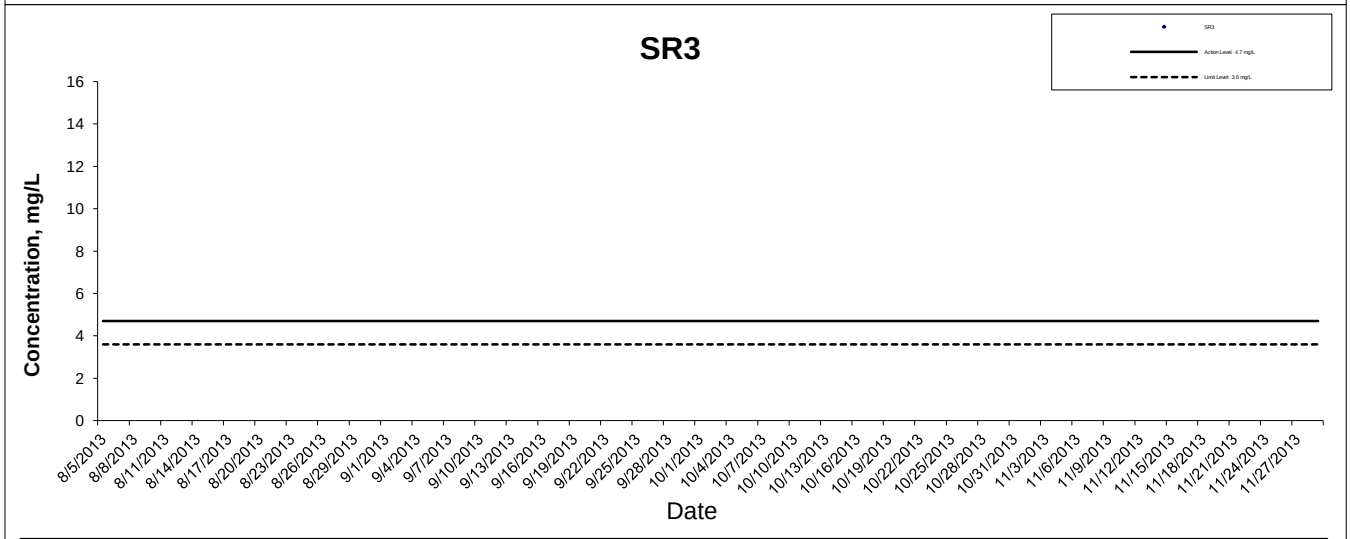
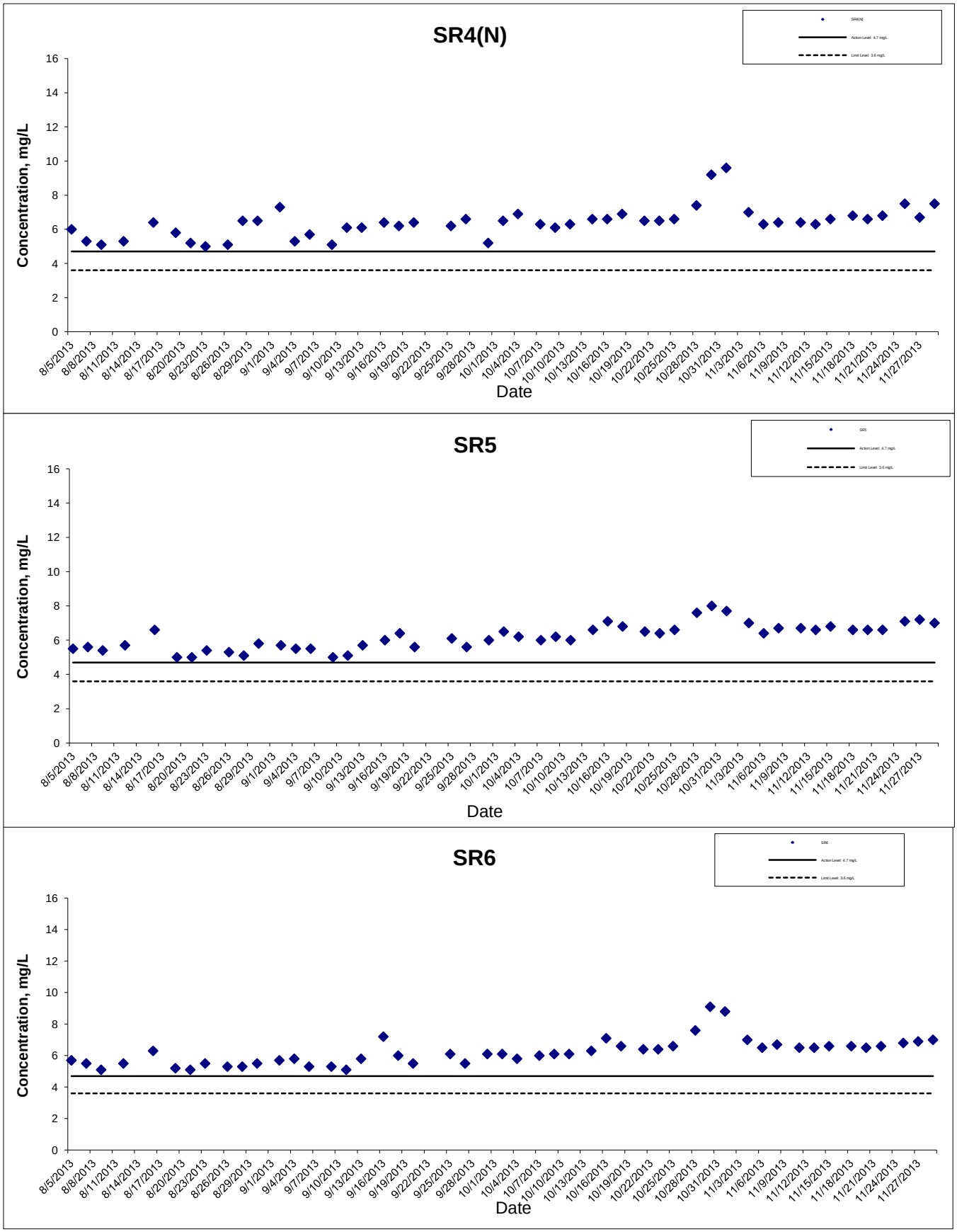






As the measured water depths were less than 3 m during all monitoring days, water samples are collected at mid-depth only .

Dissolved Oxygen (Bottom) at Mid-Flood Tide



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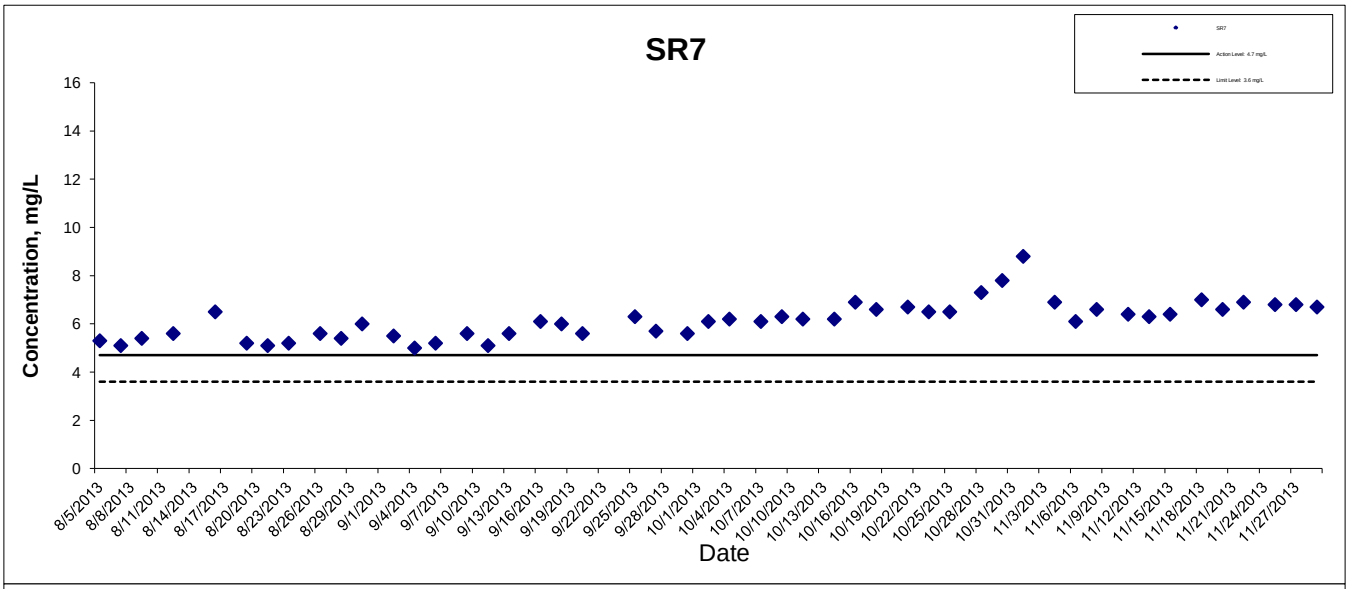
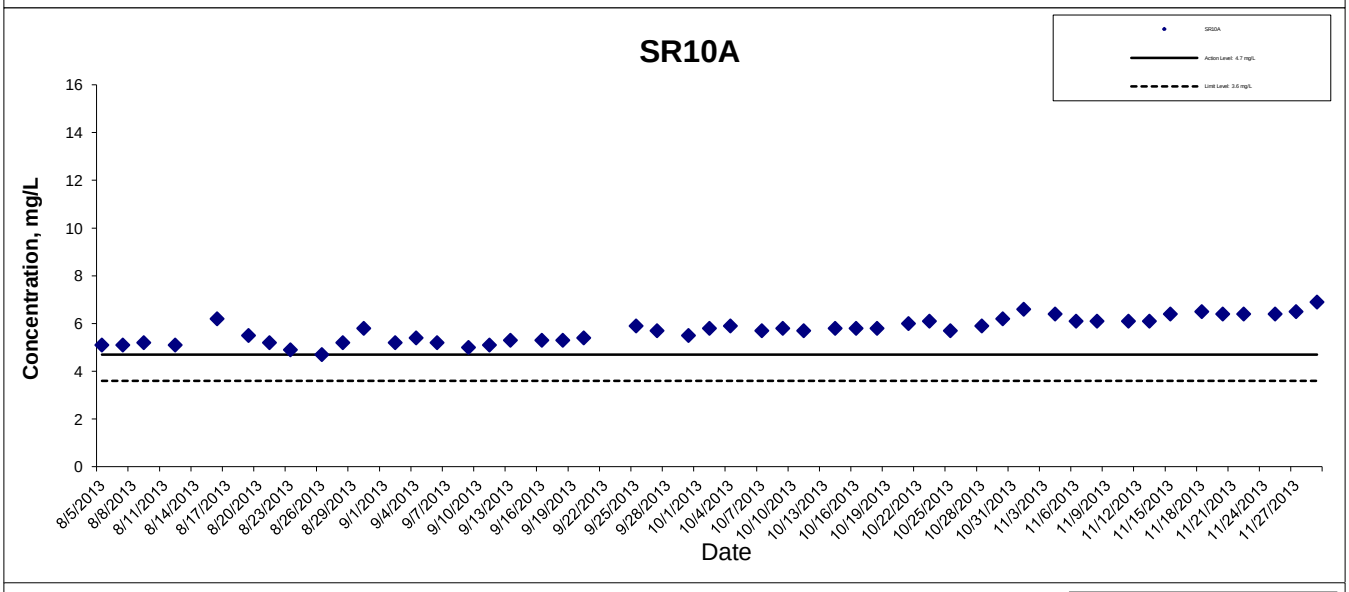
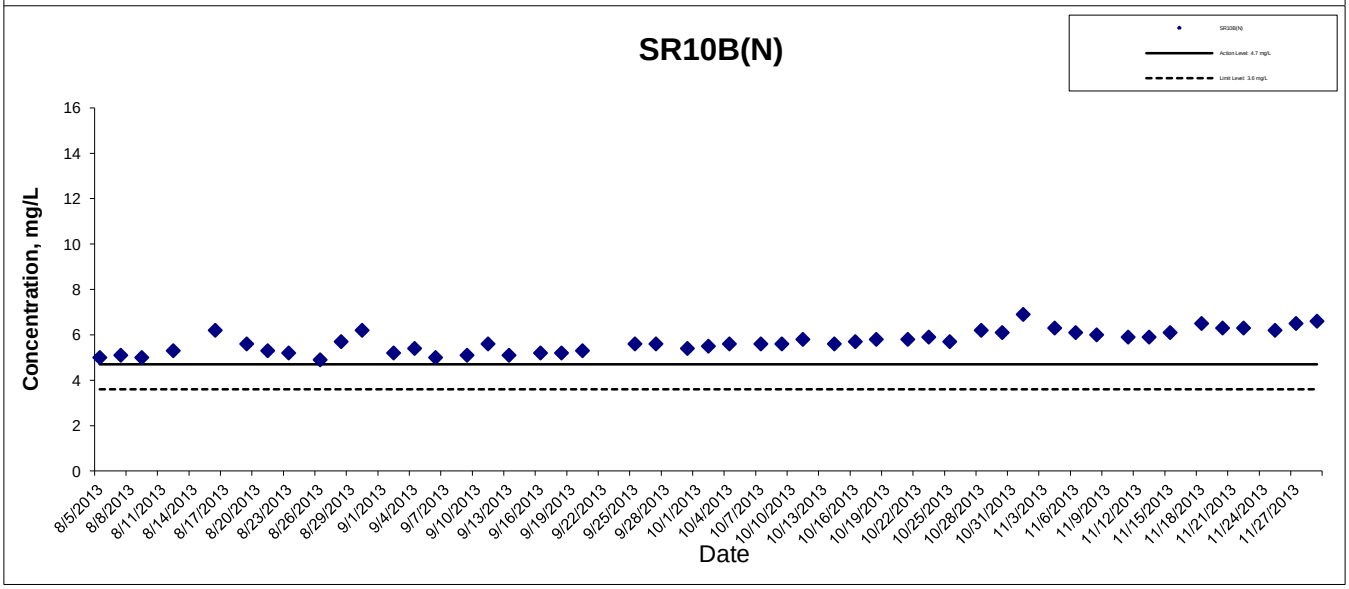
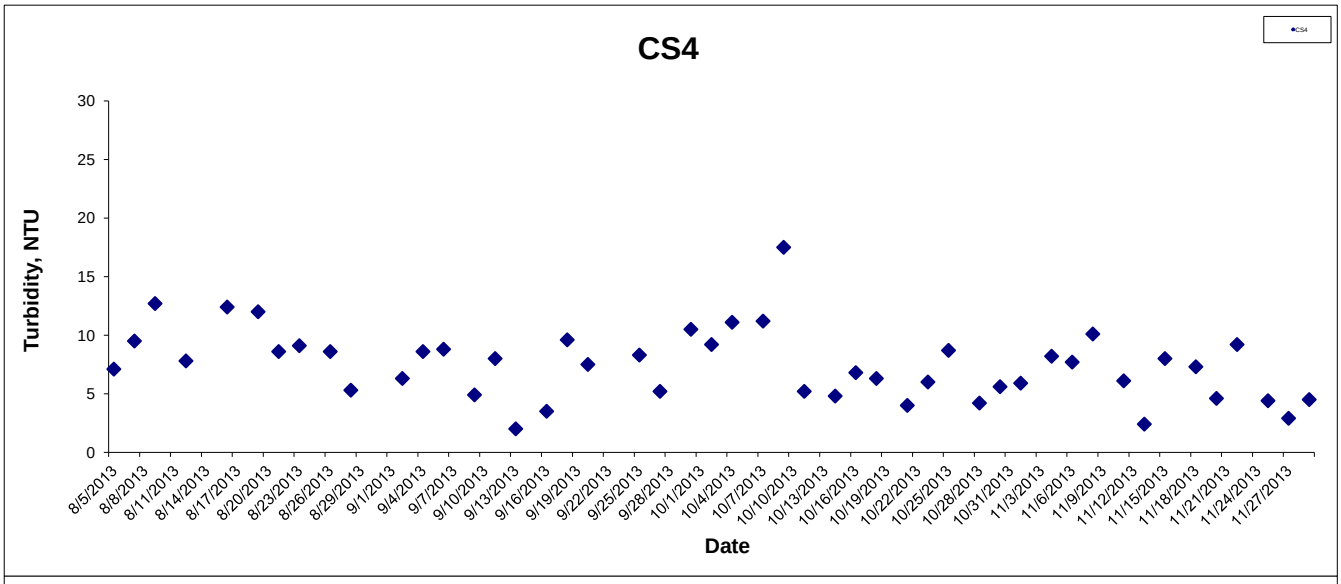
Dissolved Oxygen (Bottom) at Mid-Flood Tide

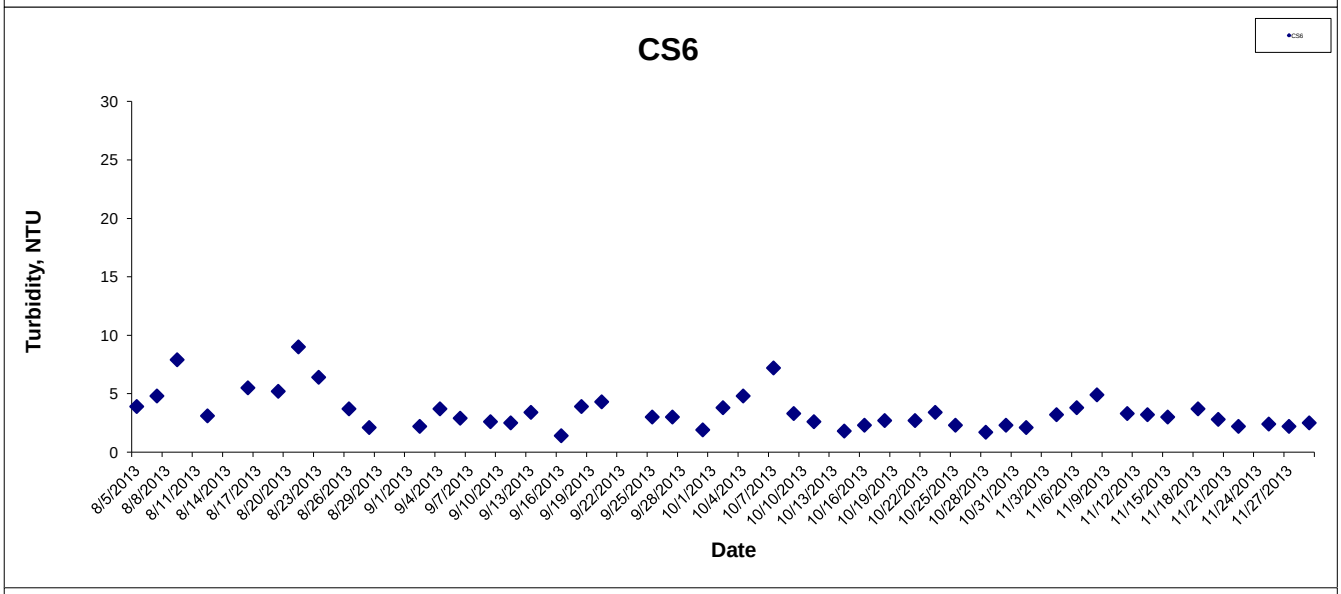


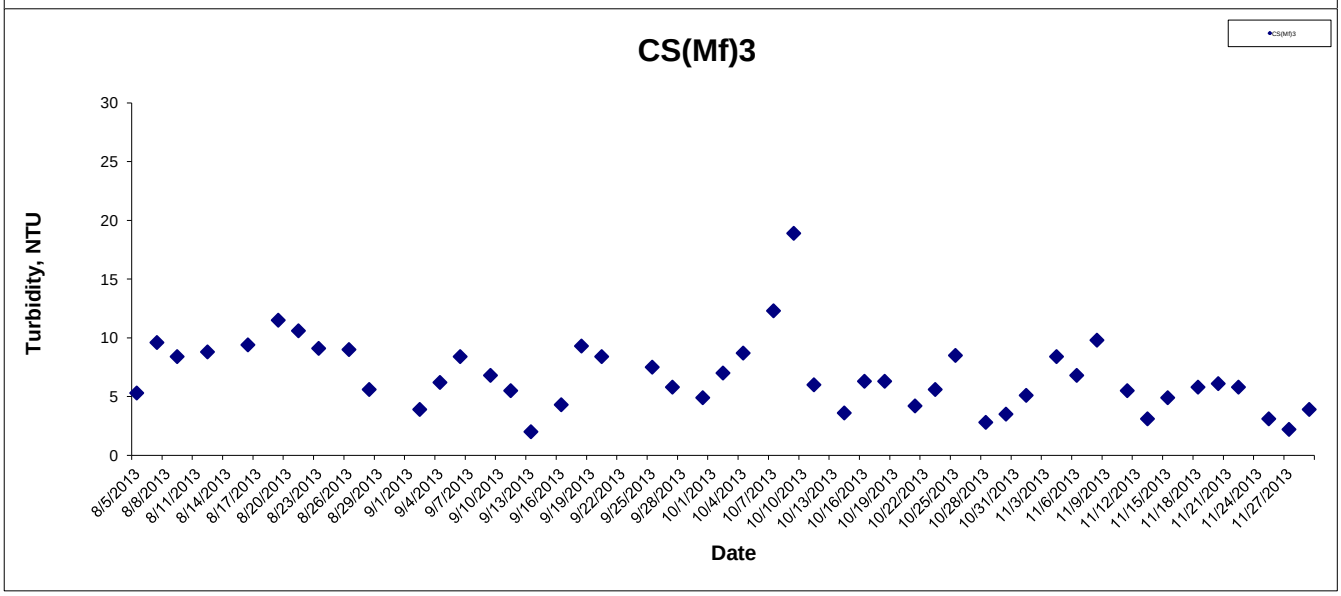




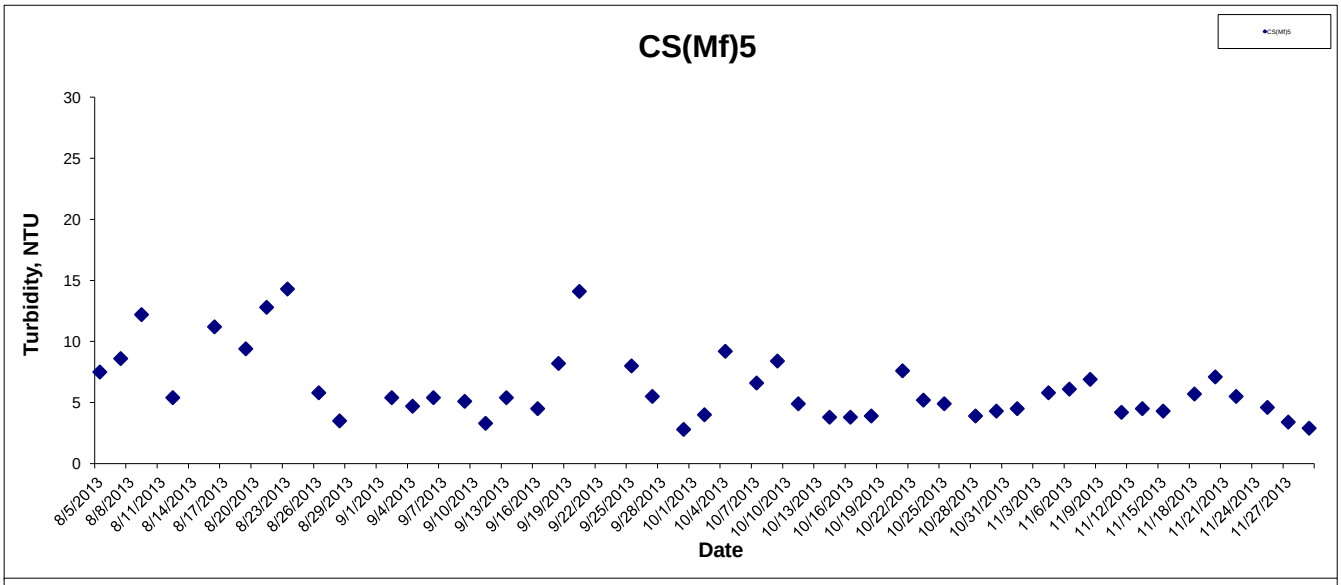
Turbidity at Mid-Ebb Tide

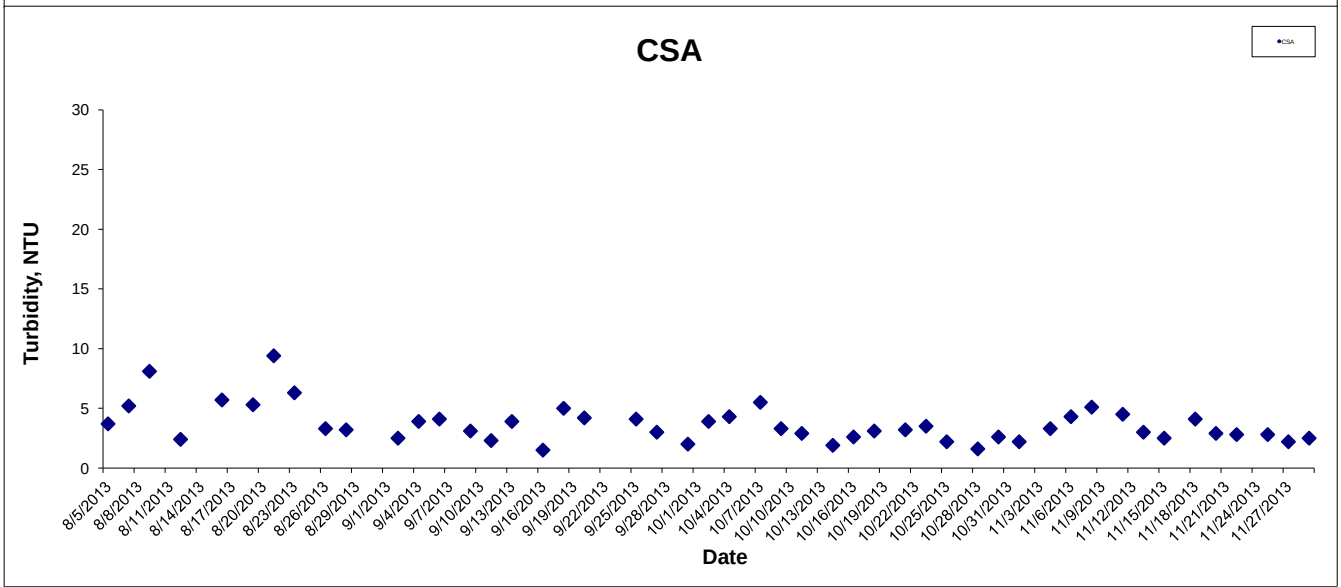


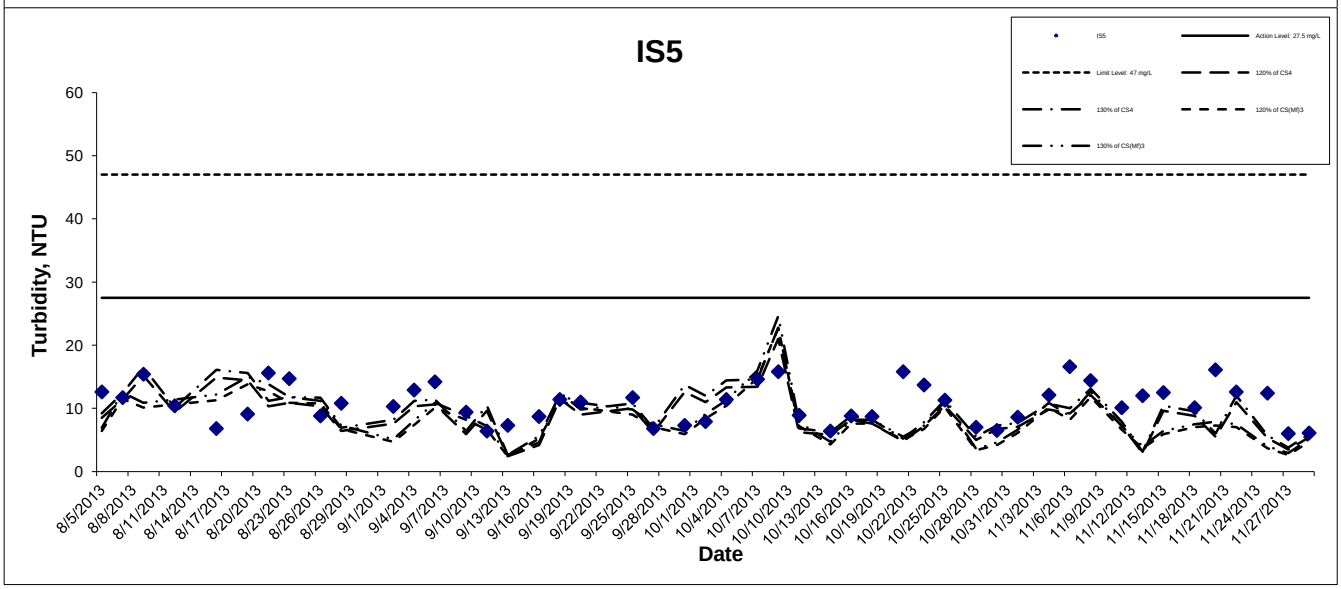




Turbidity at Mid-Ebb Tide







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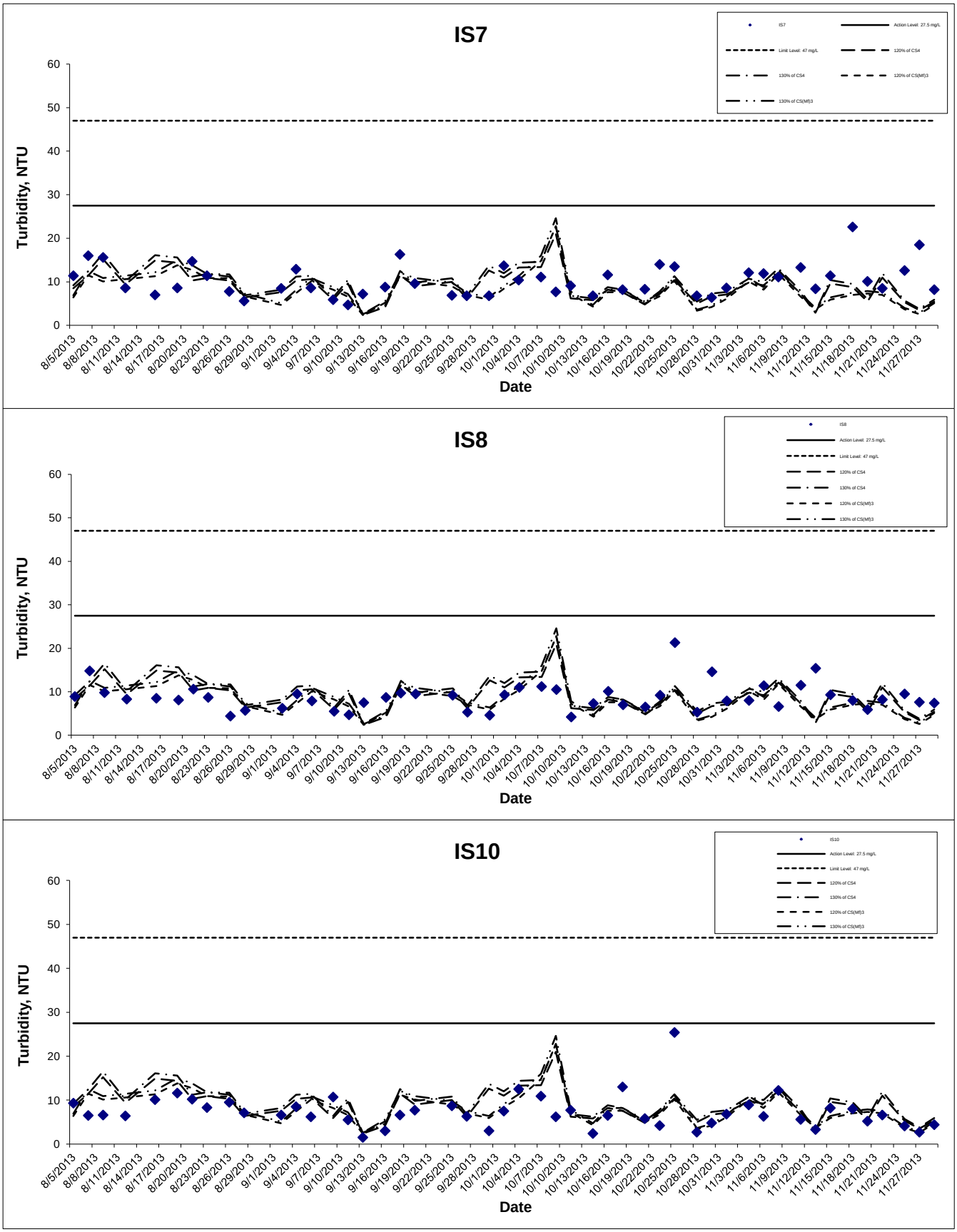
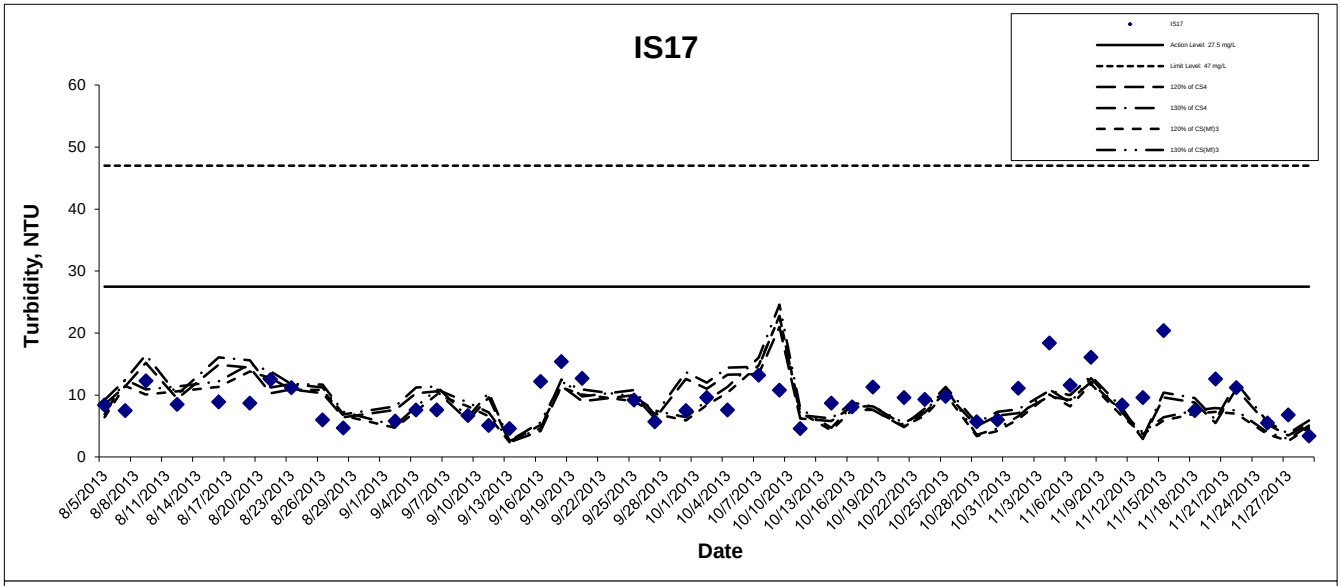
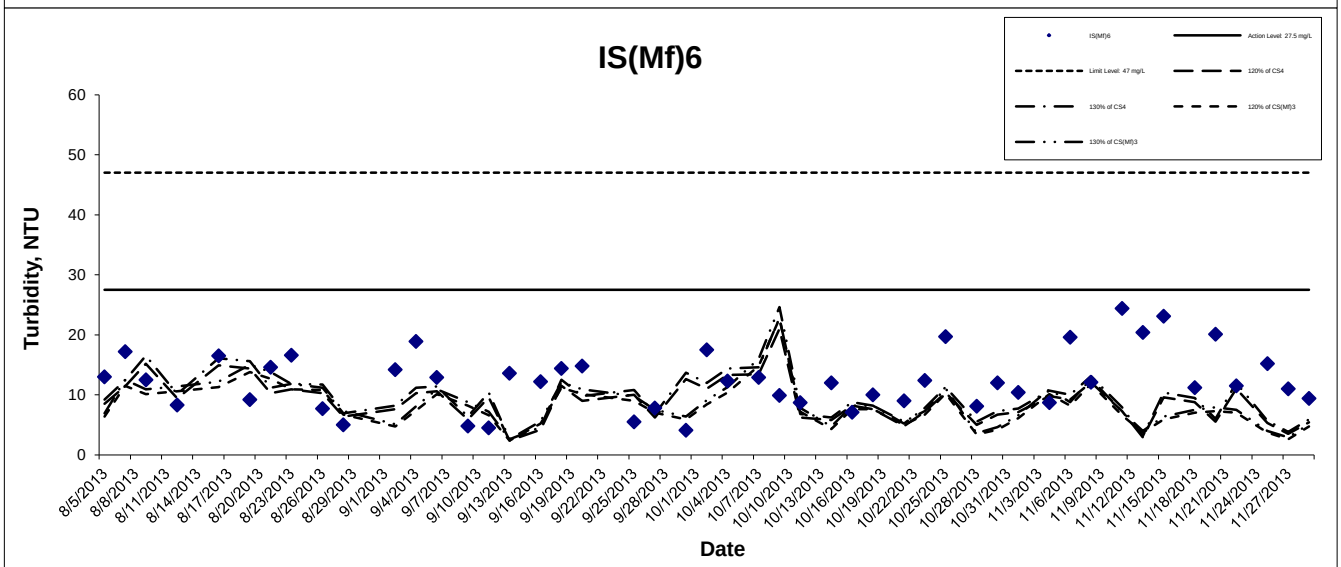
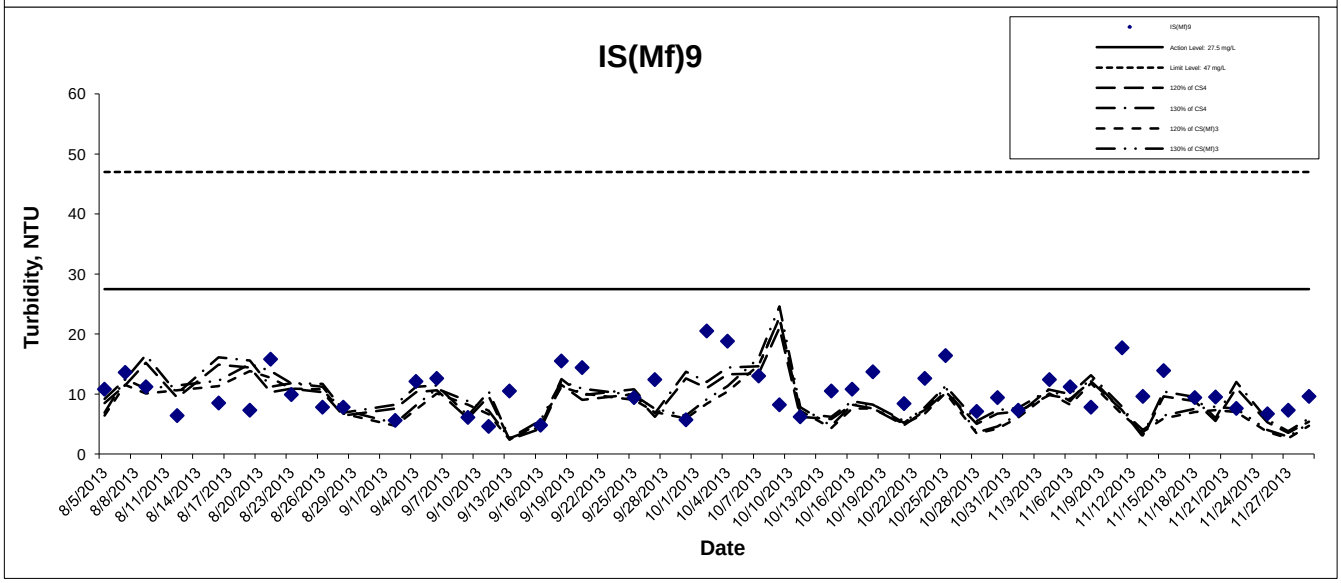


Turbidity at Mid-Ebb Tide







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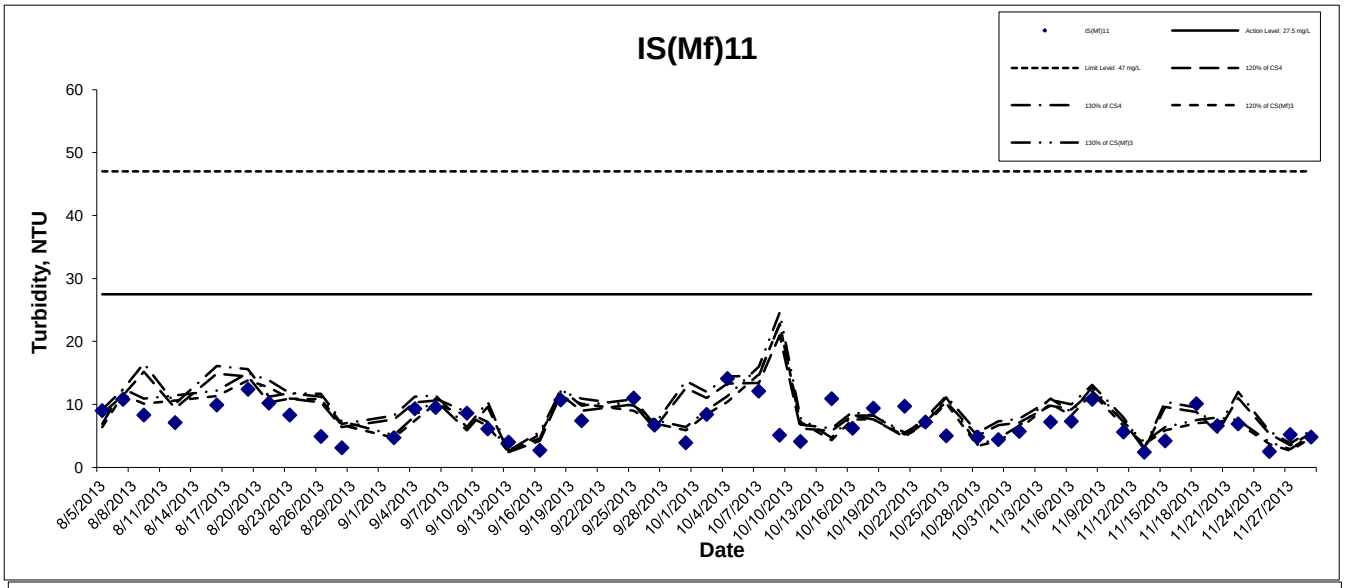

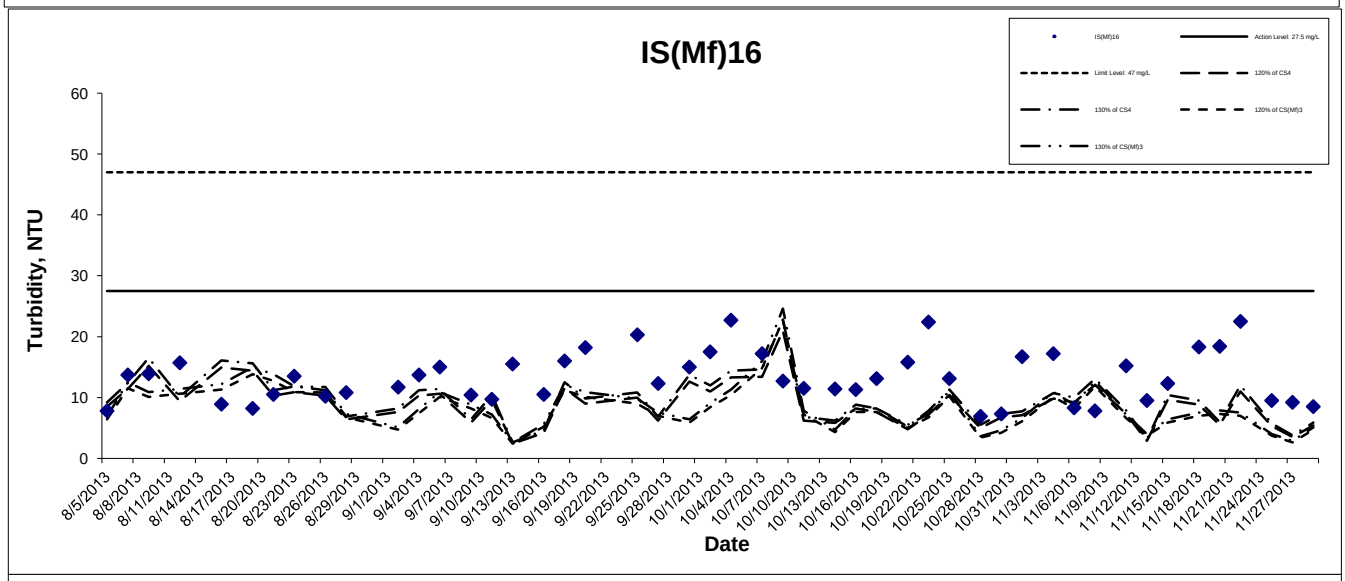

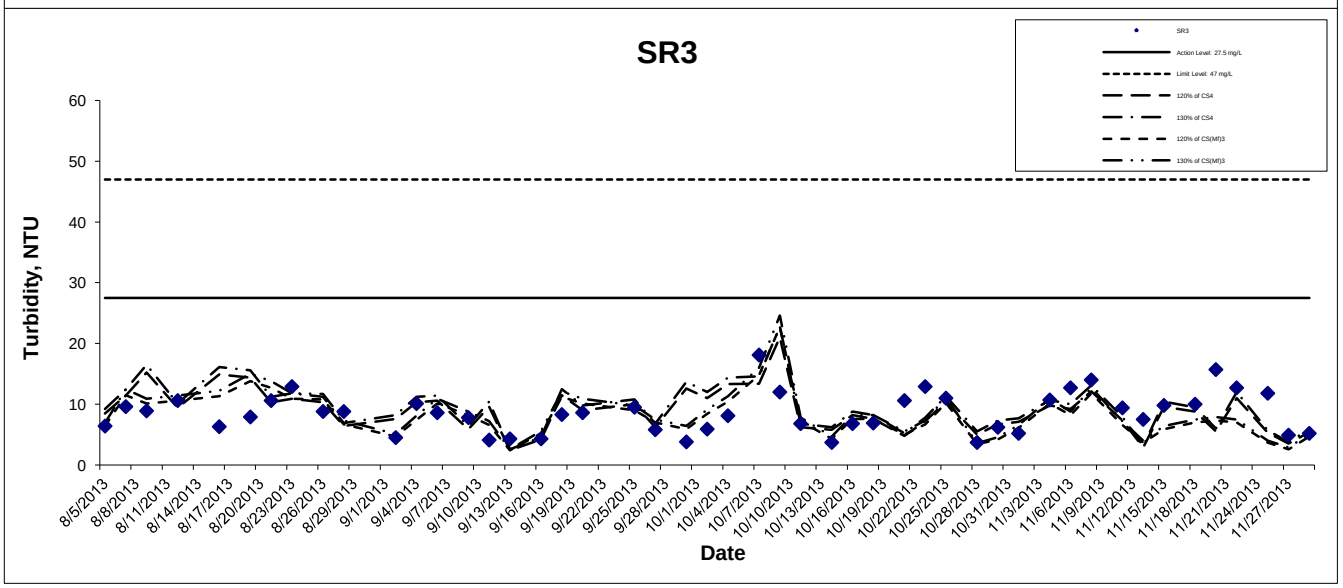

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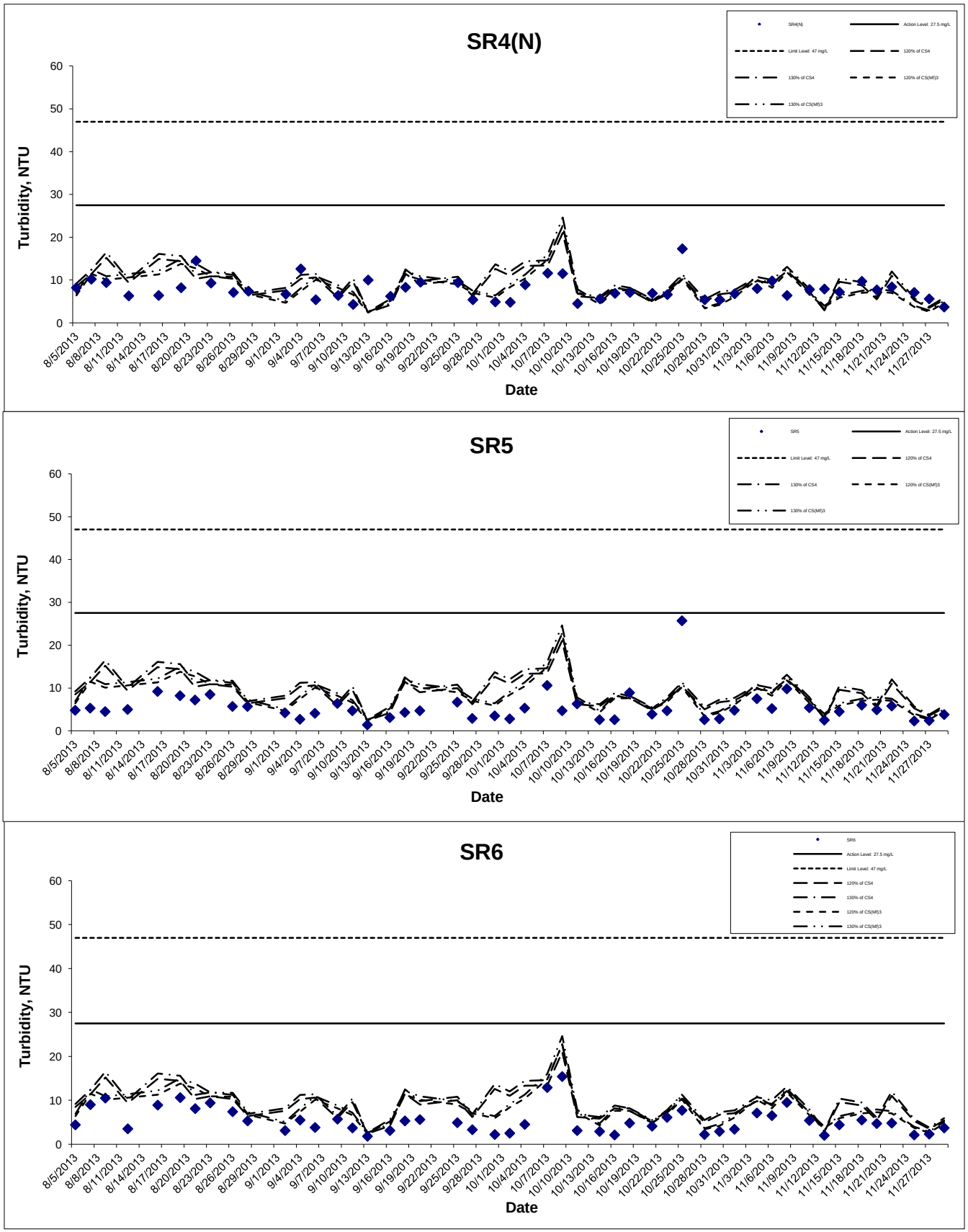

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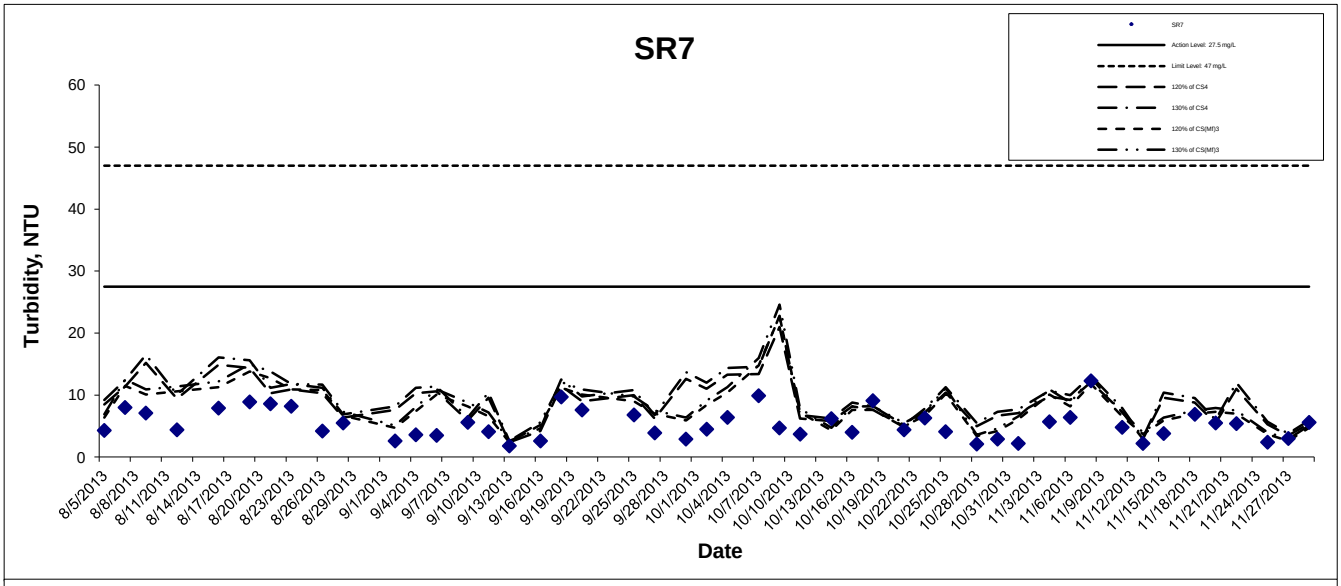
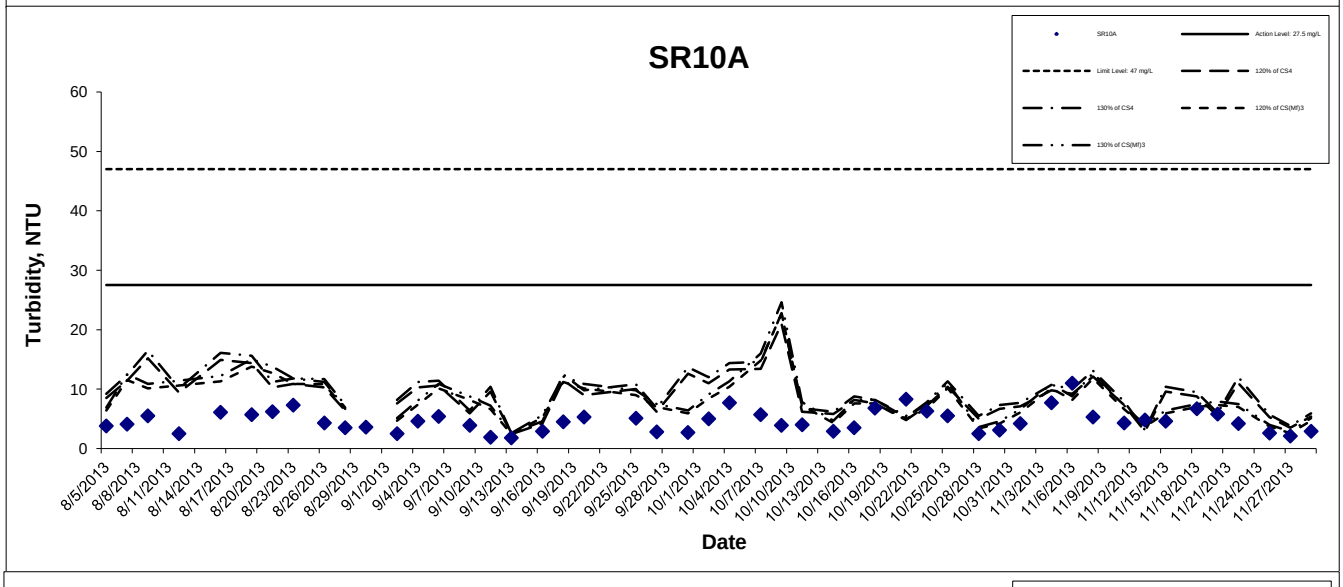
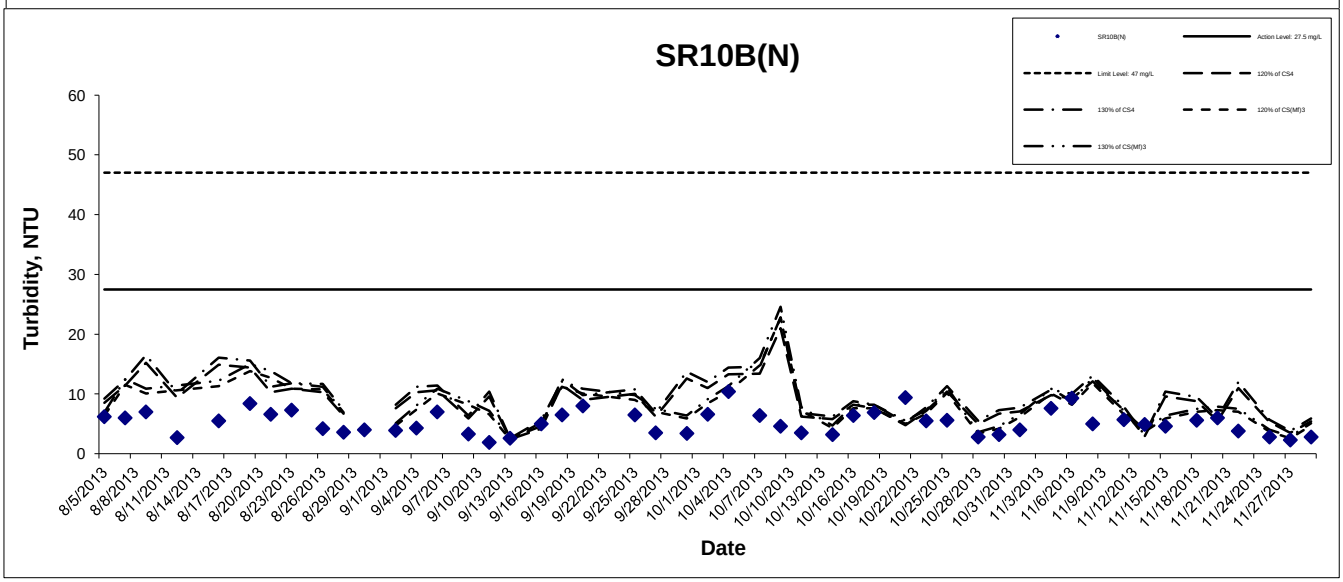
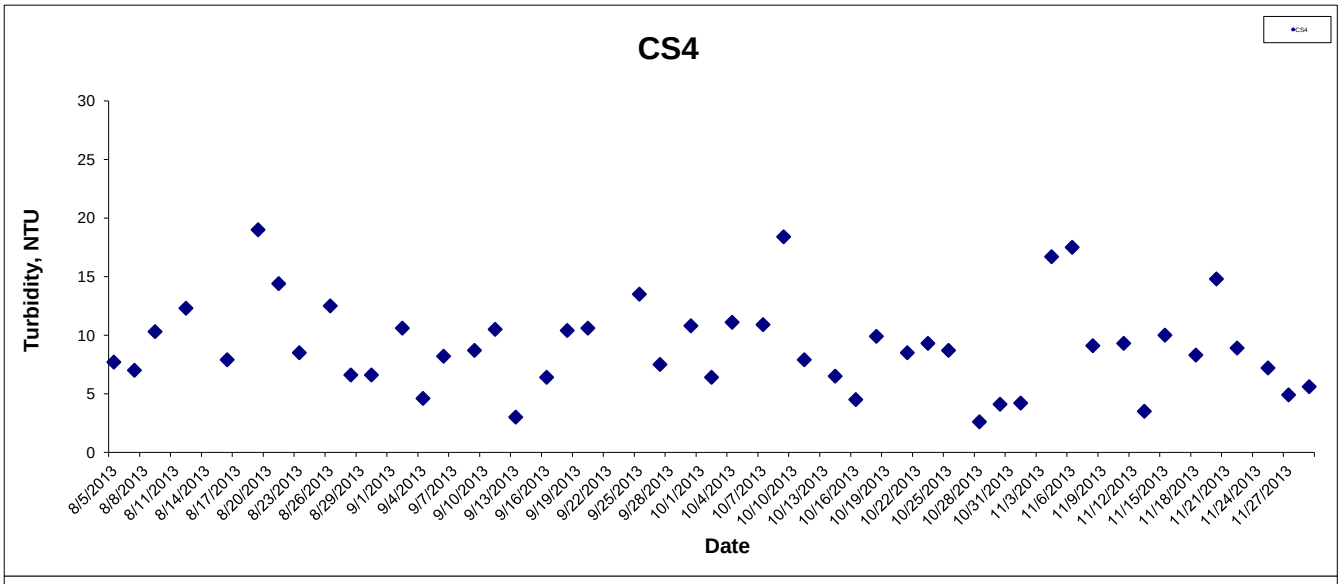
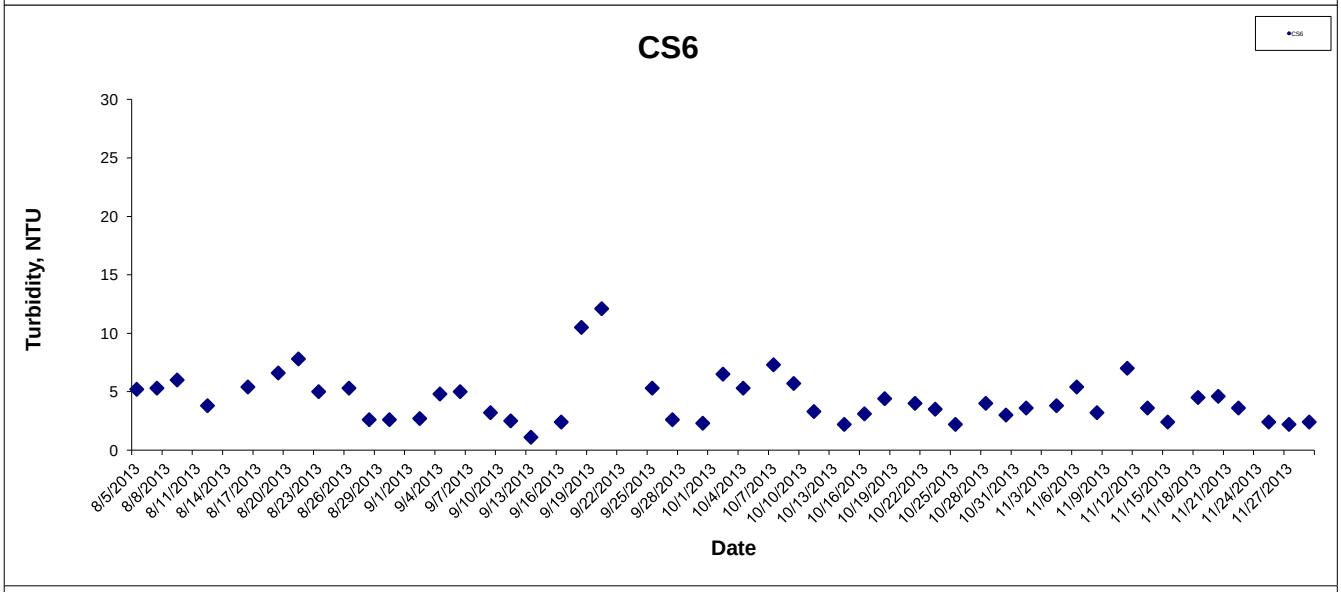


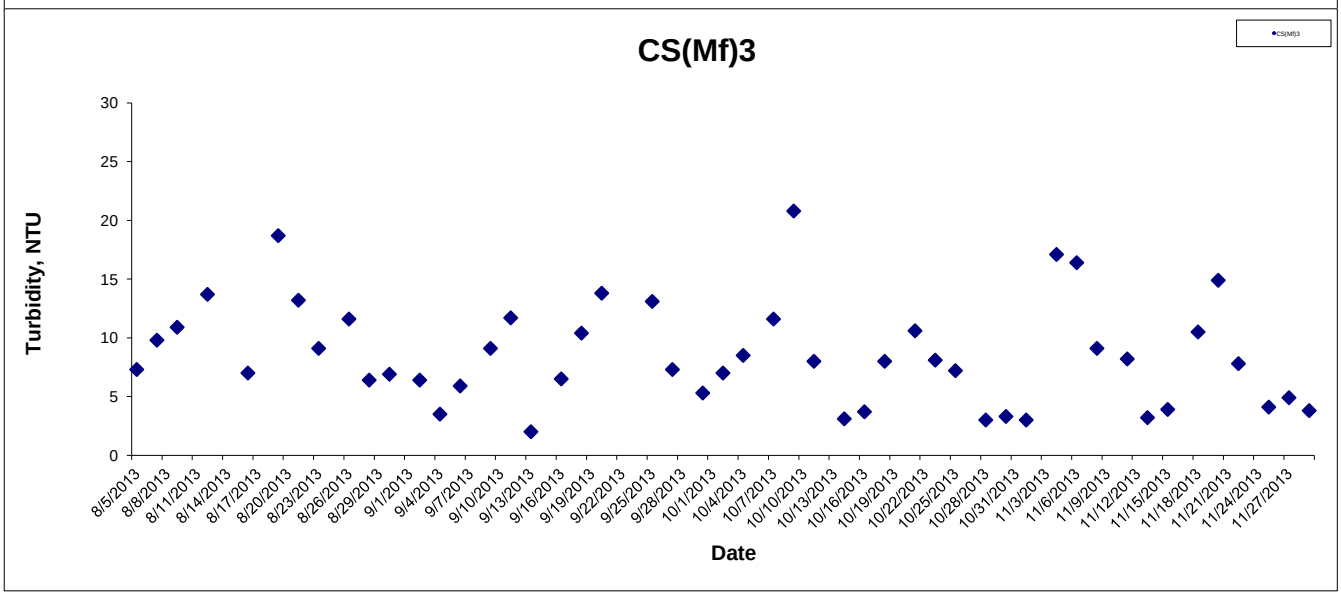




Turbidity at Mid-Flood Tide







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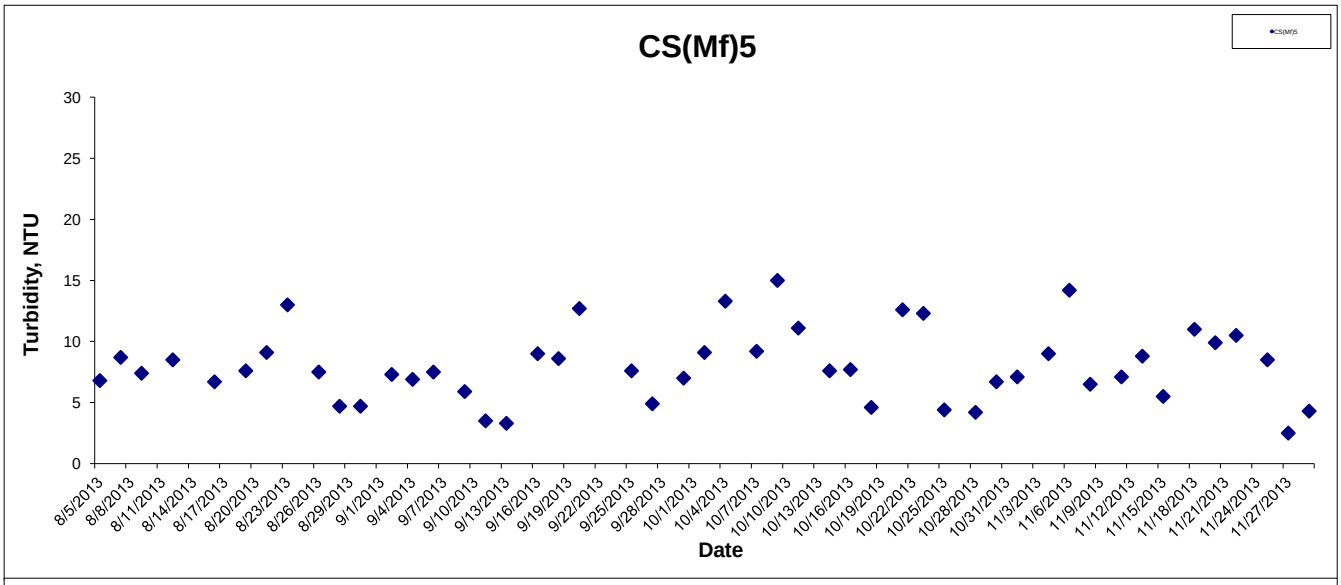
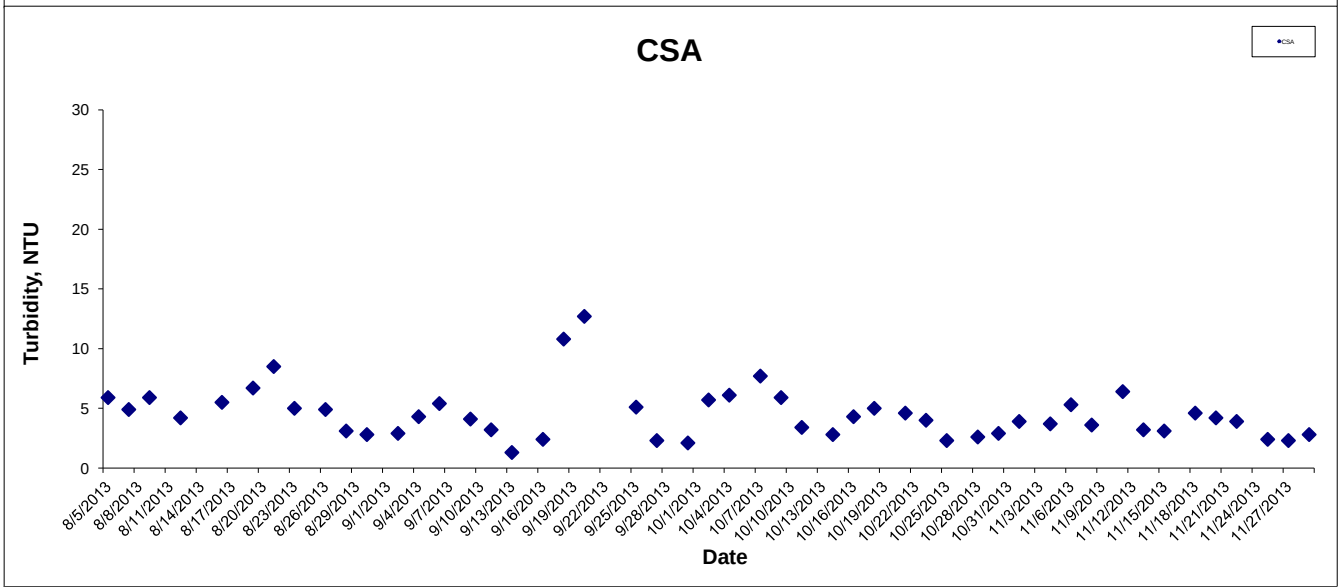
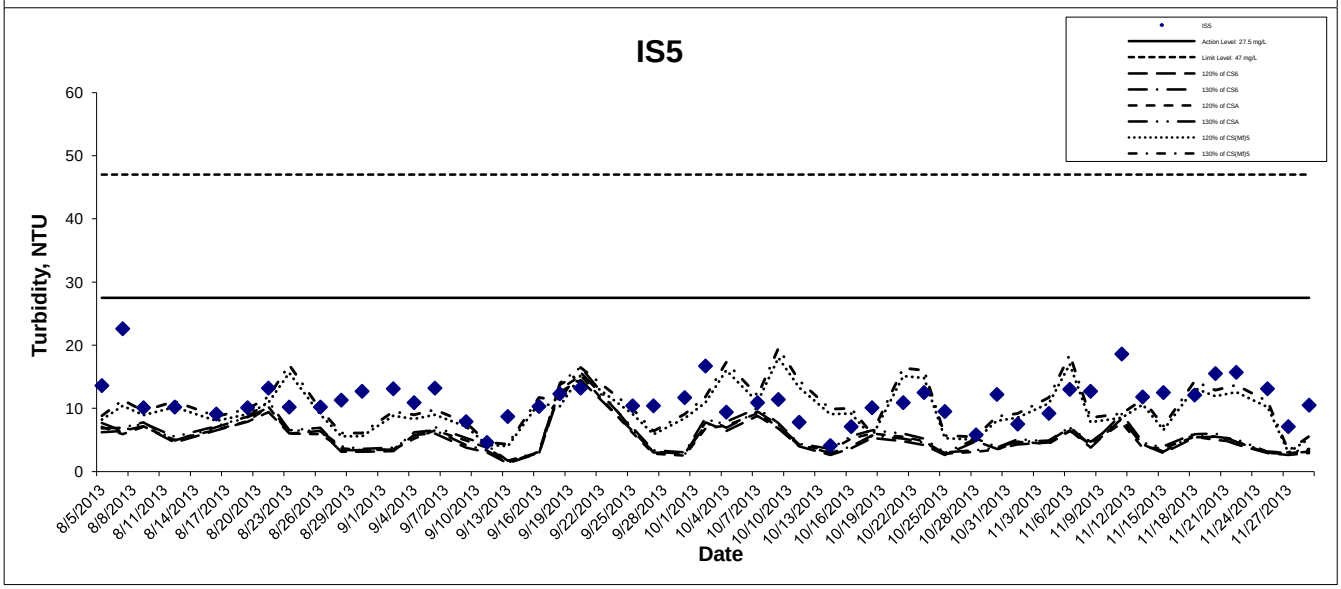
Turbidity at Mid-Flood Tide







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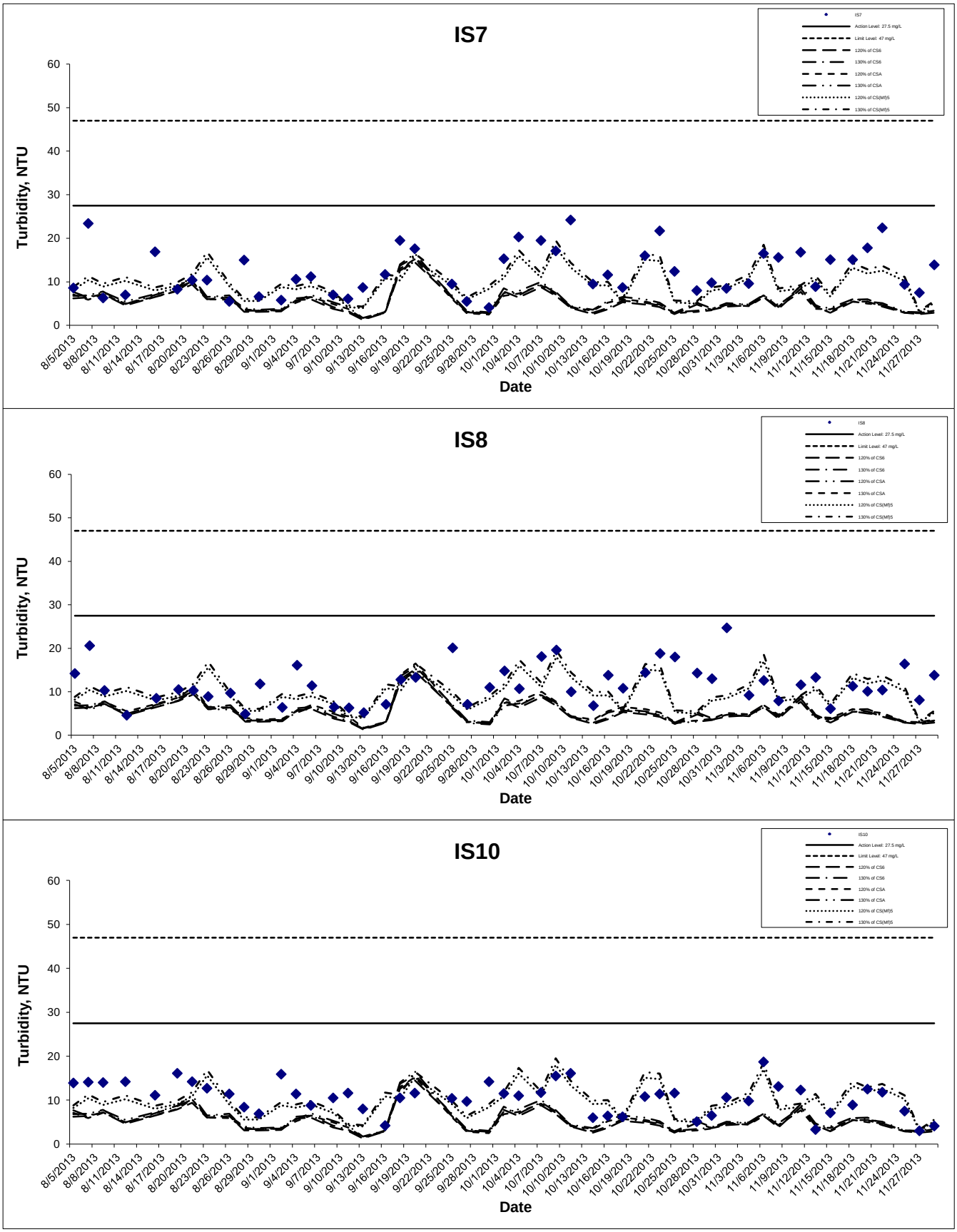

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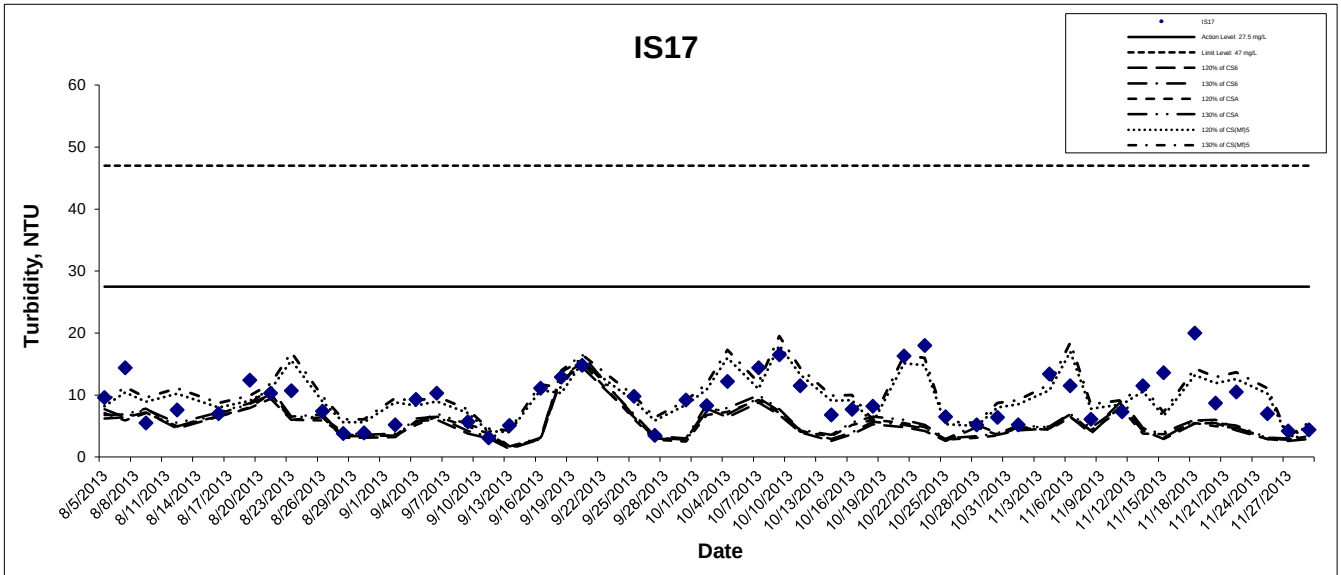

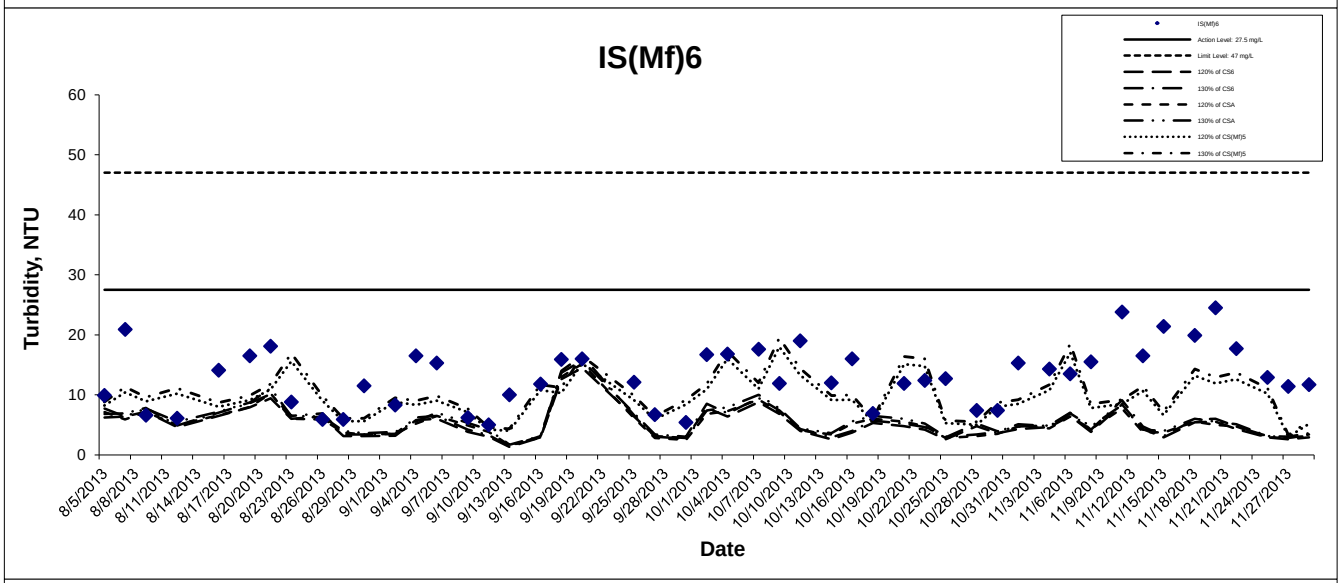

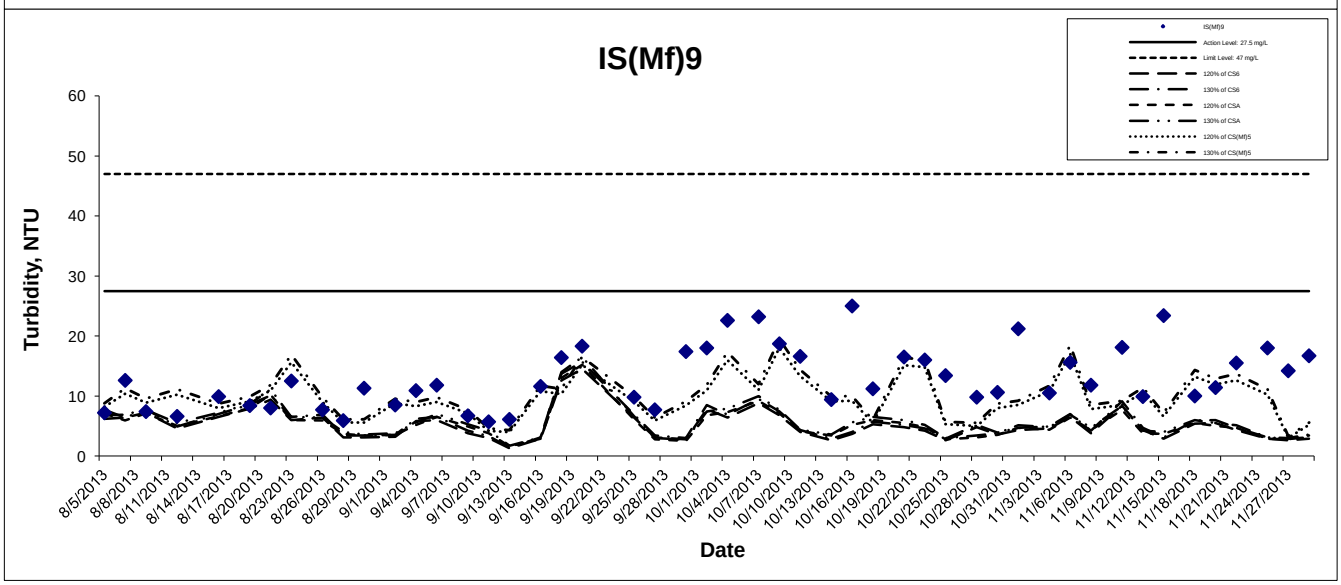

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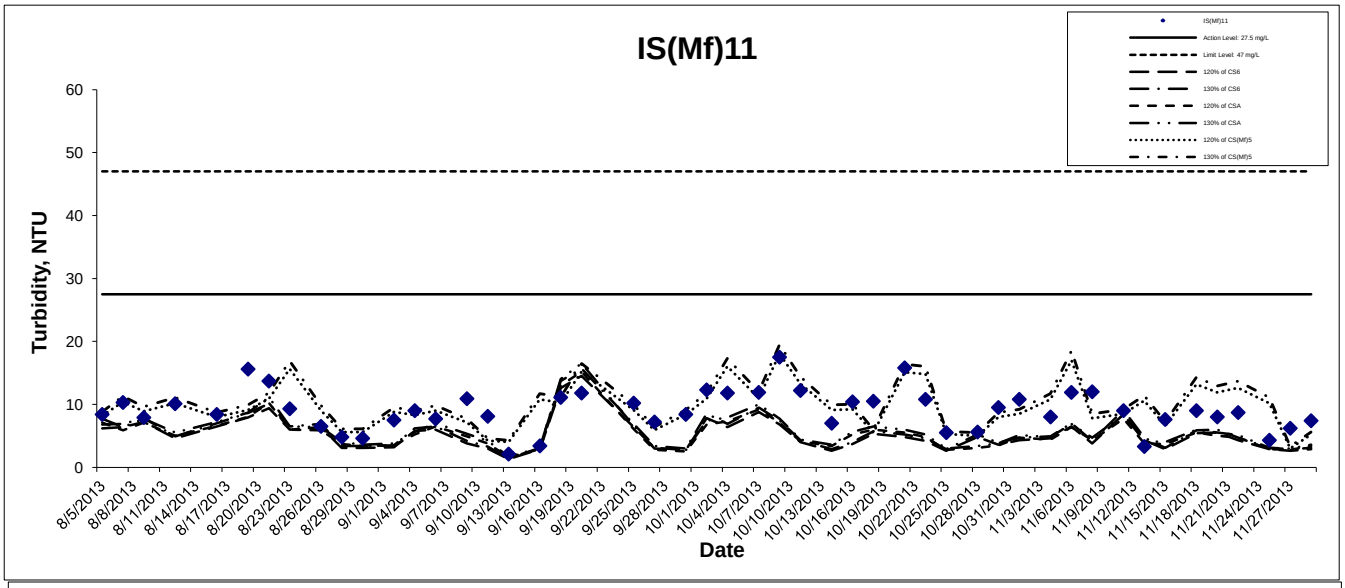

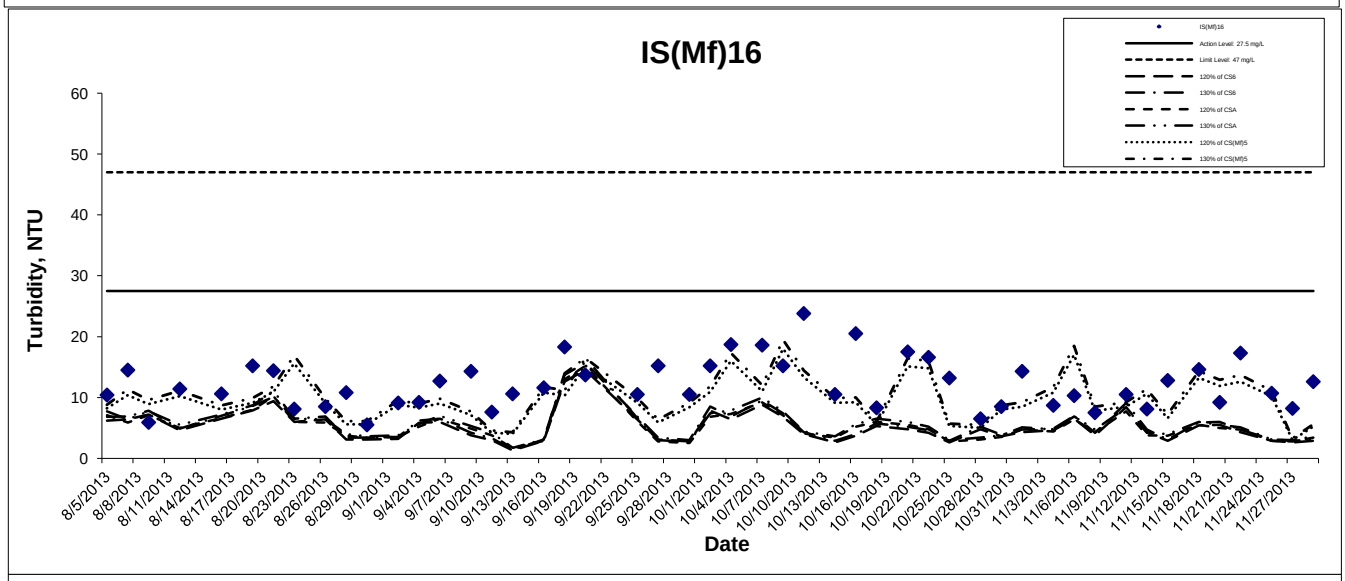

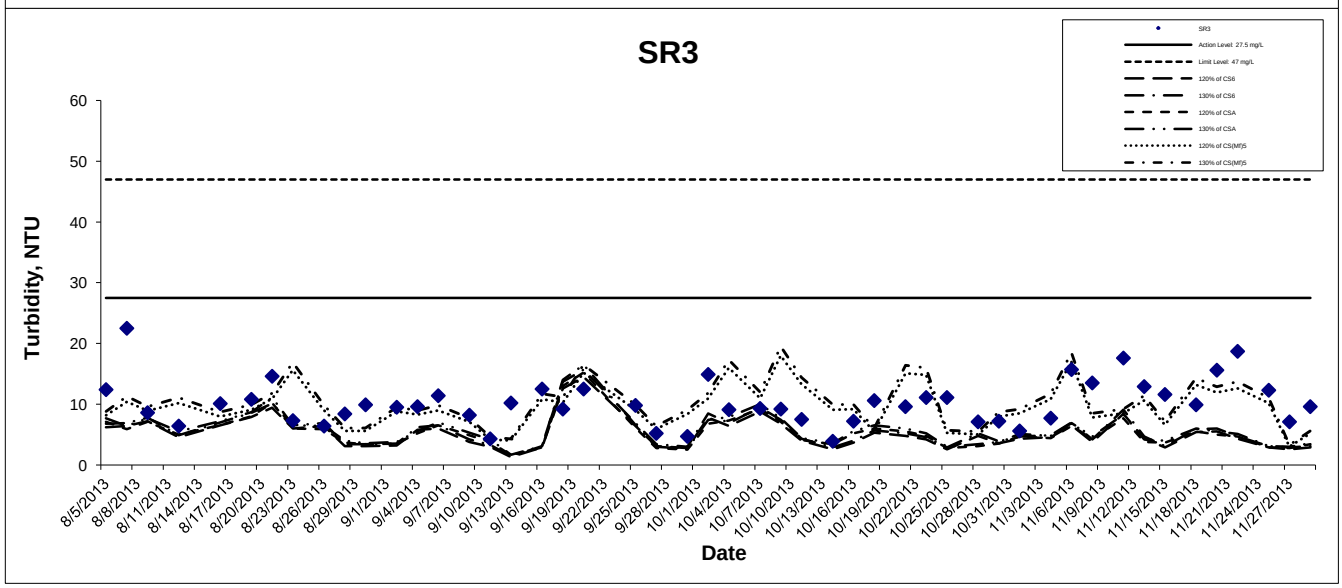

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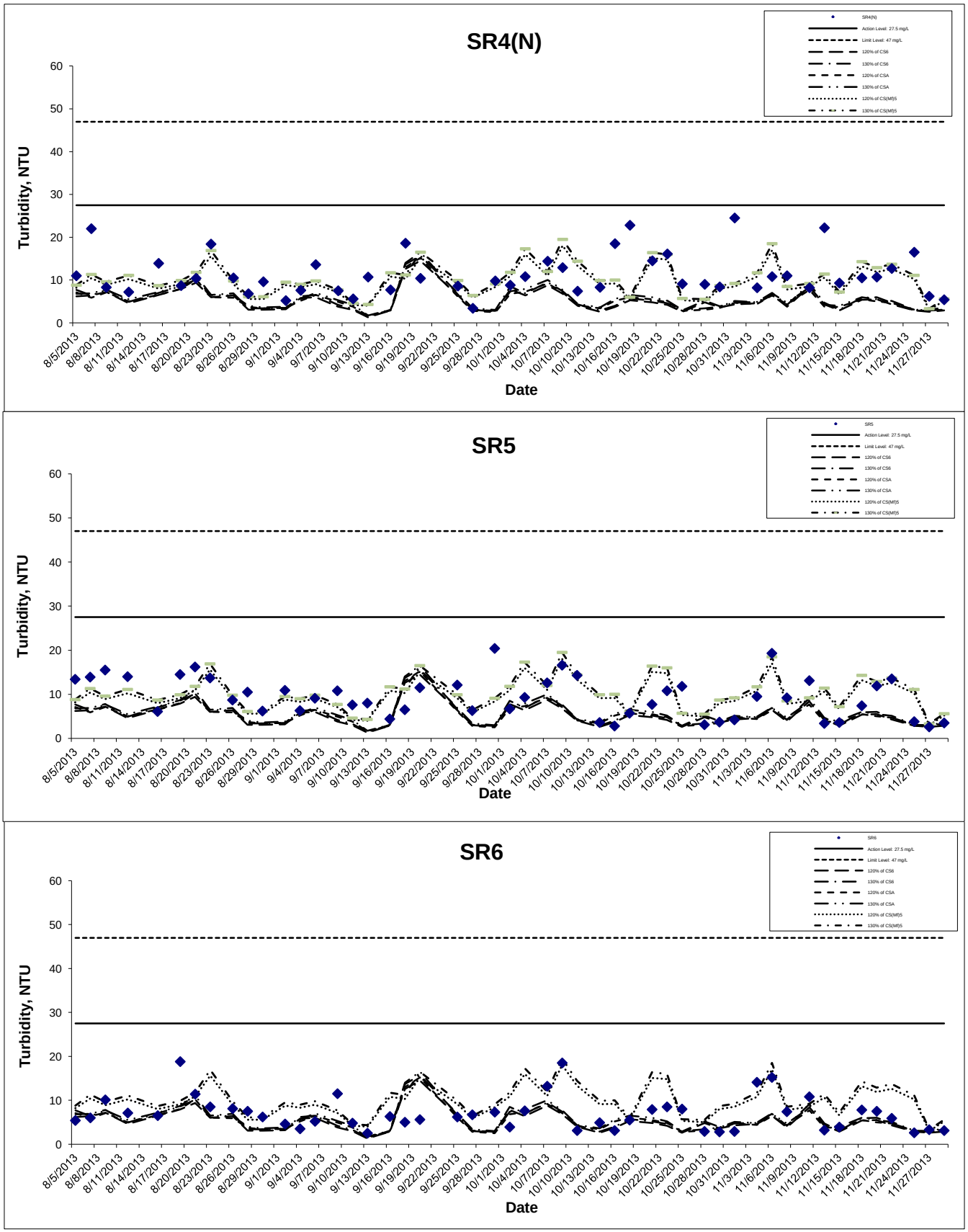

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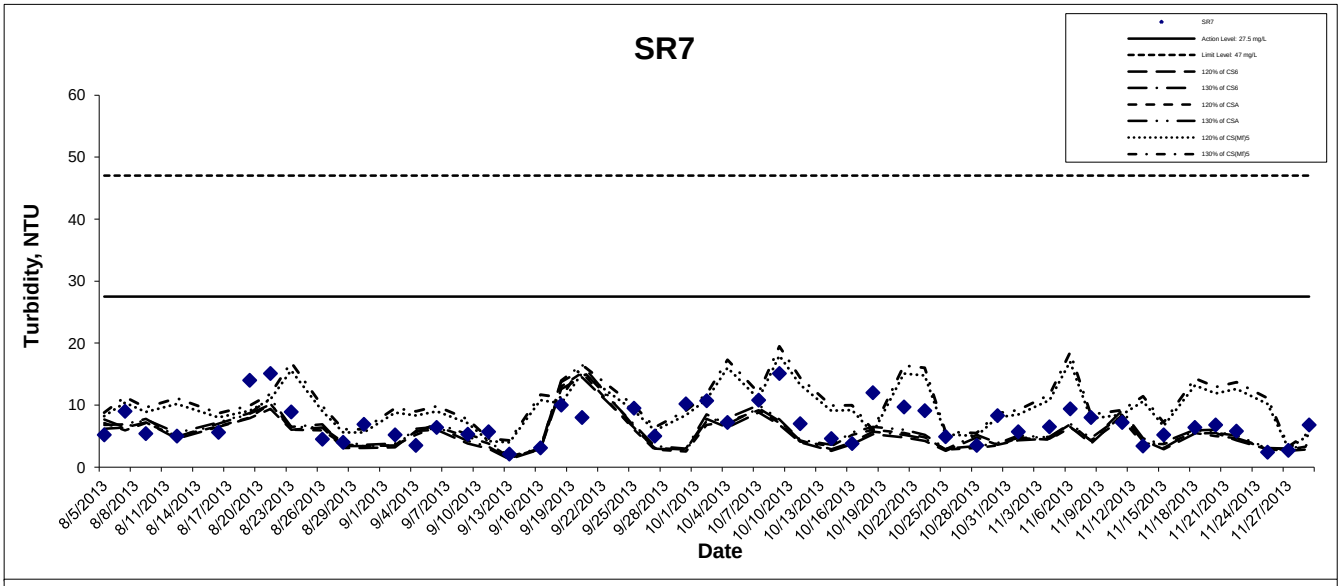

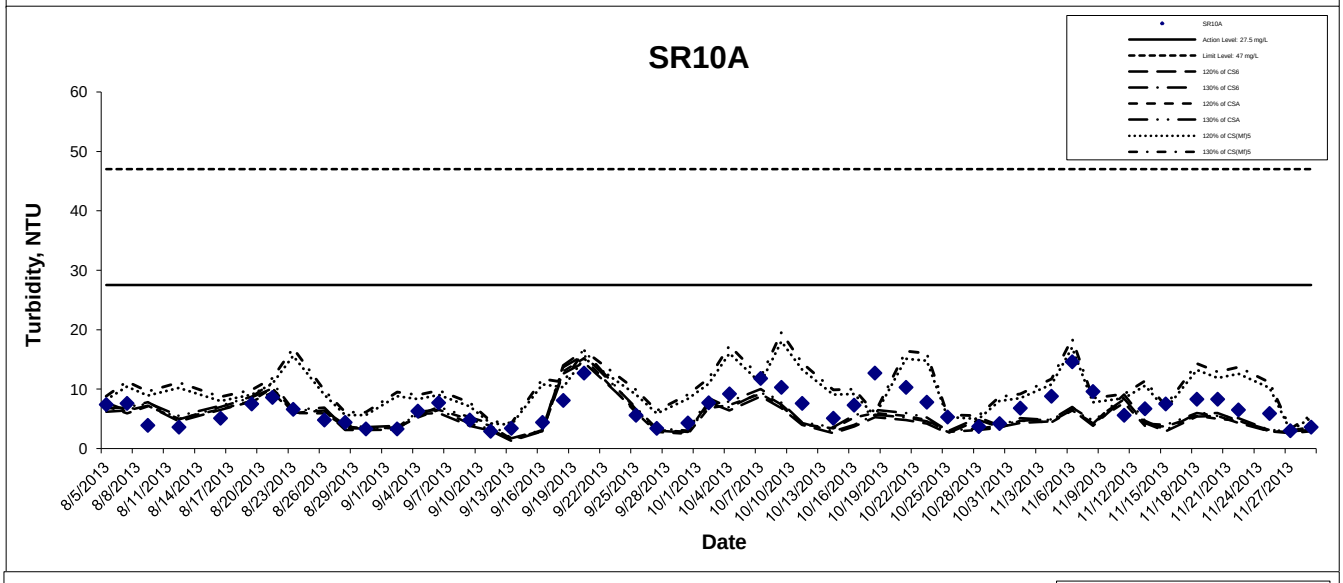

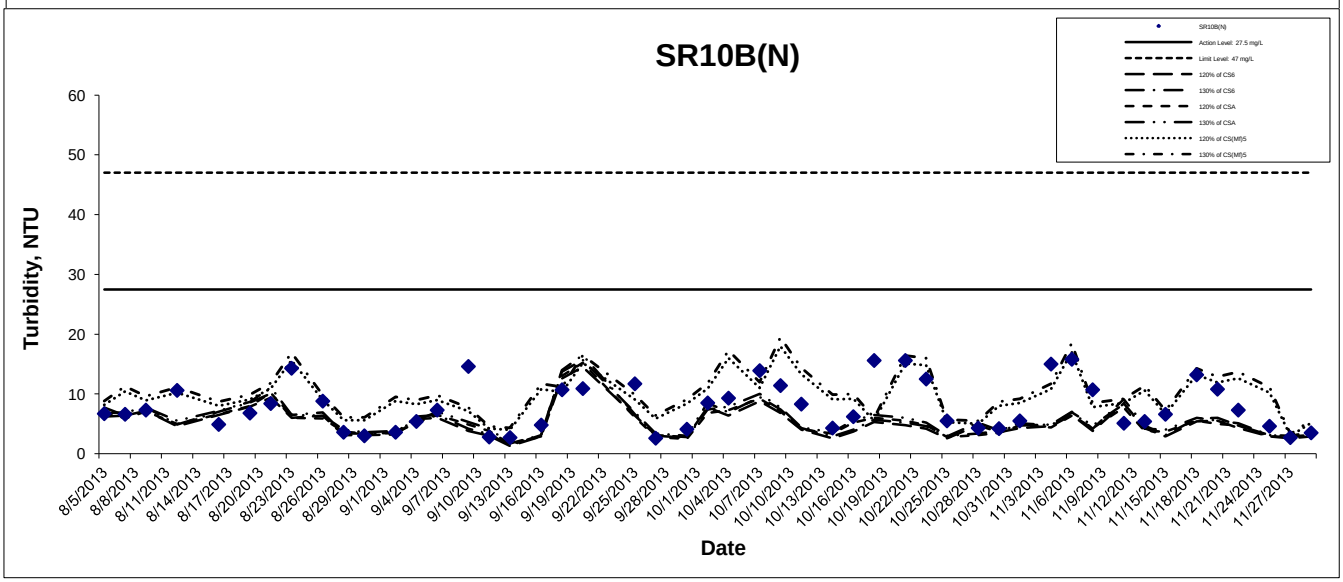

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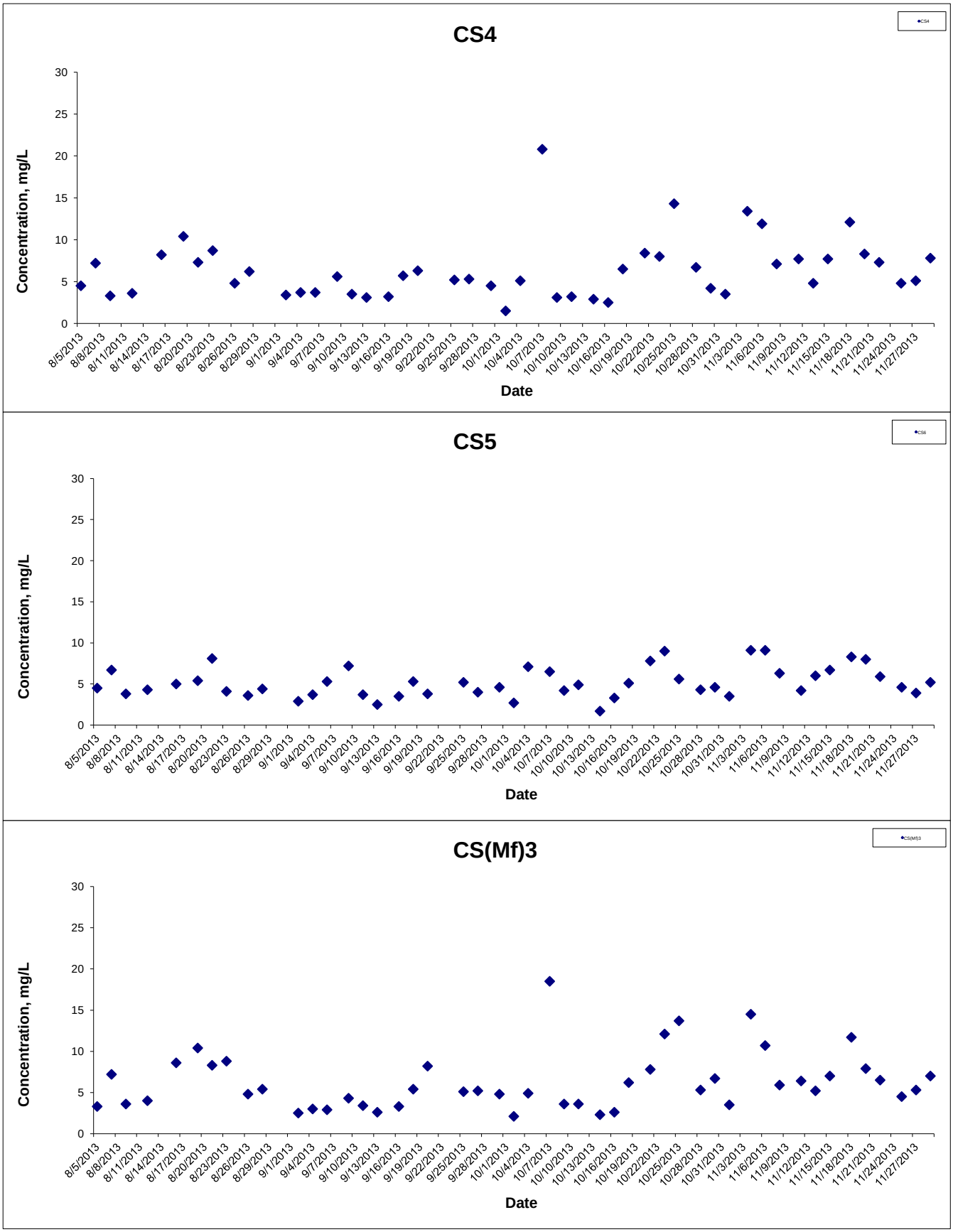
Suspended Solids at Mid-Ebb Tide



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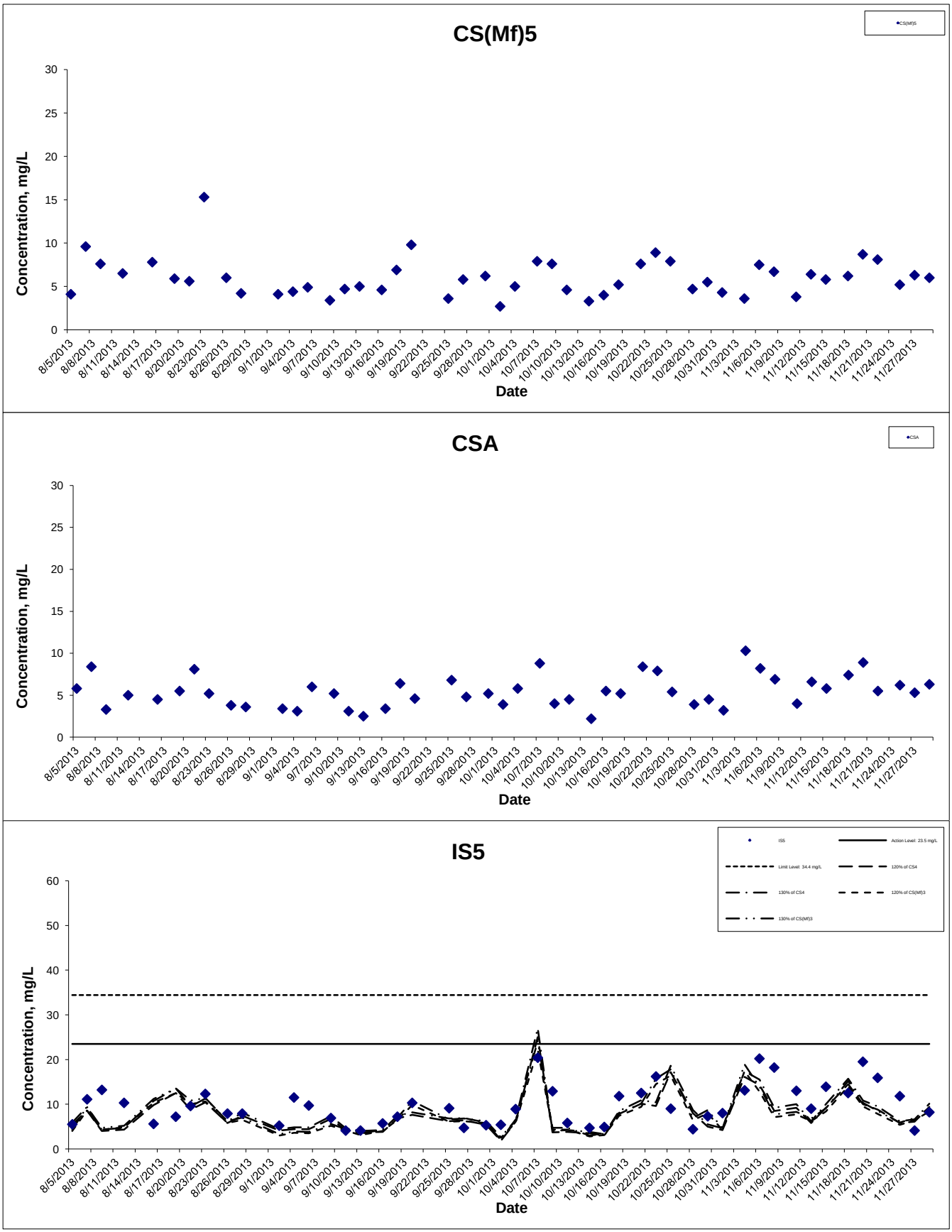

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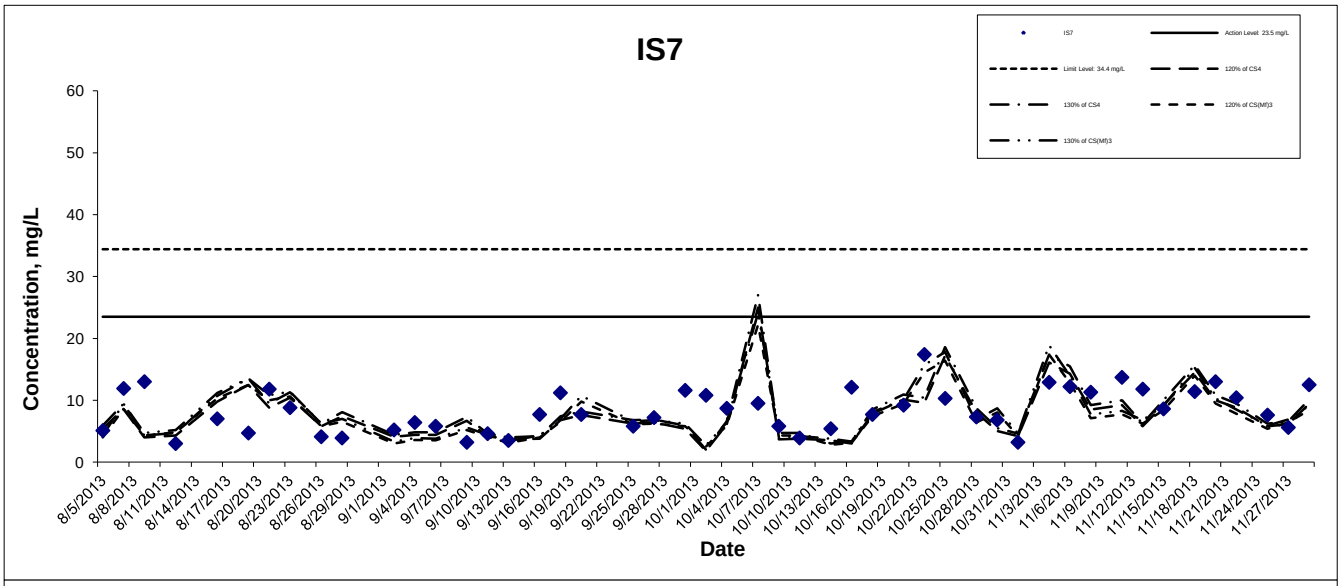
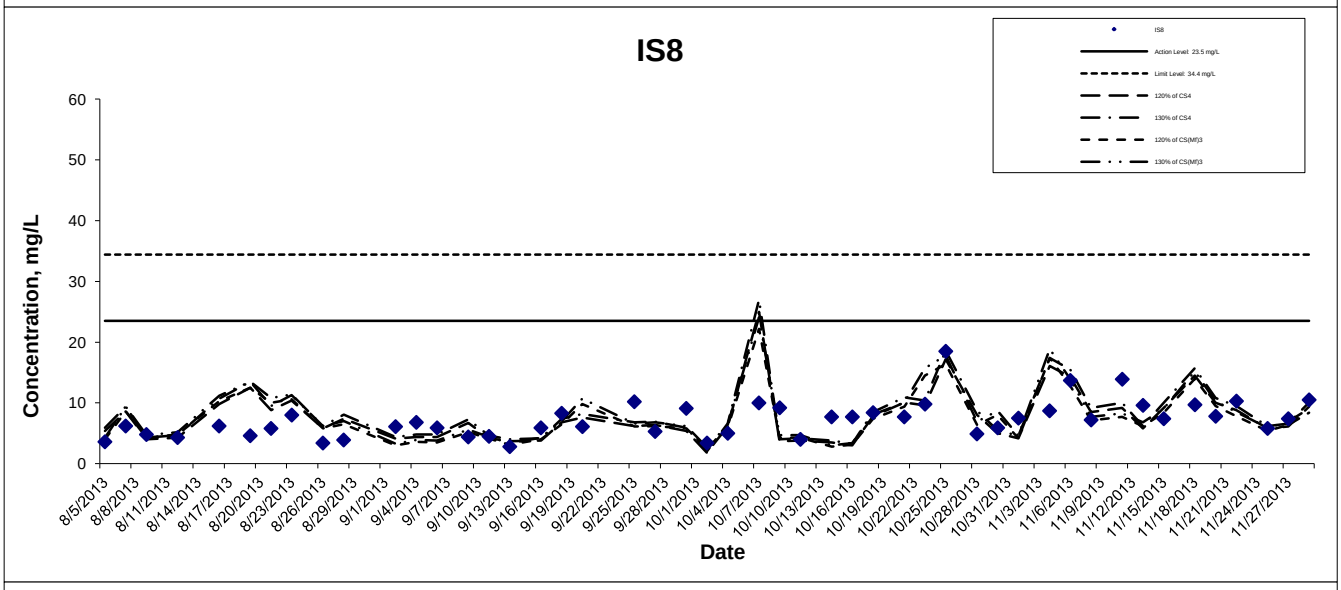
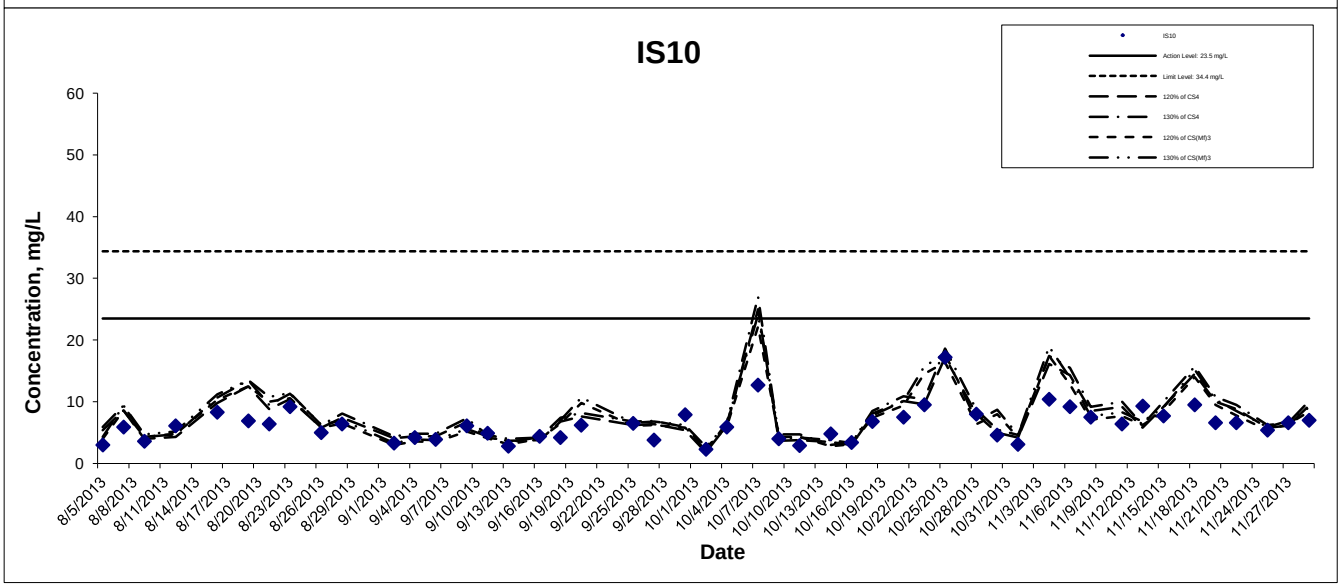
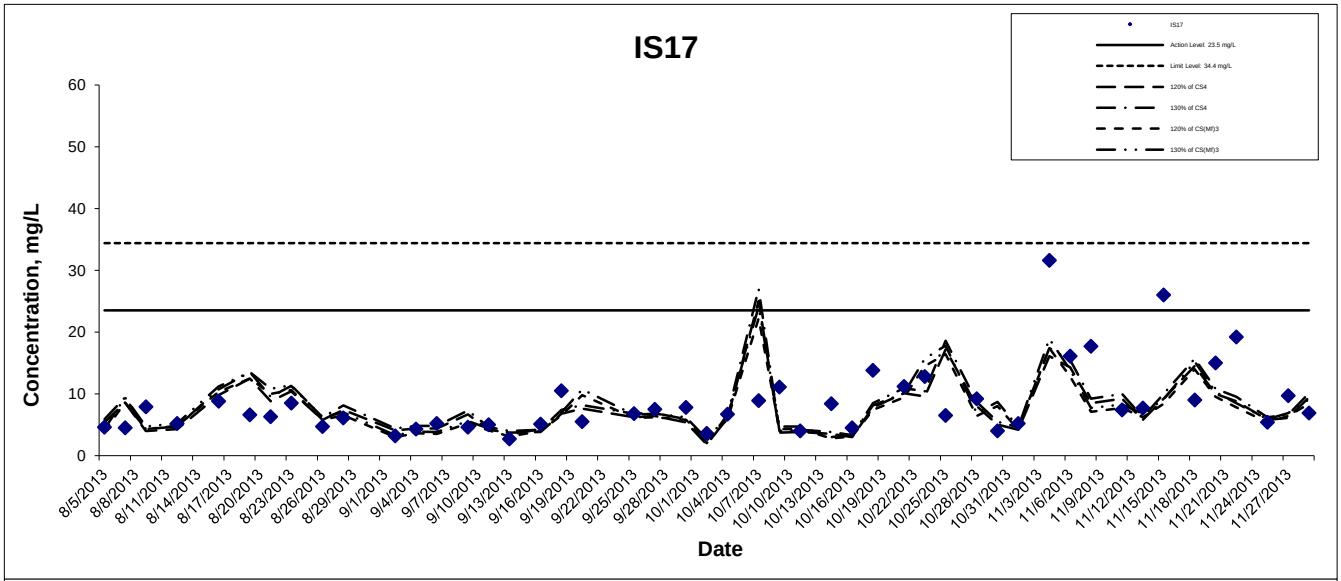
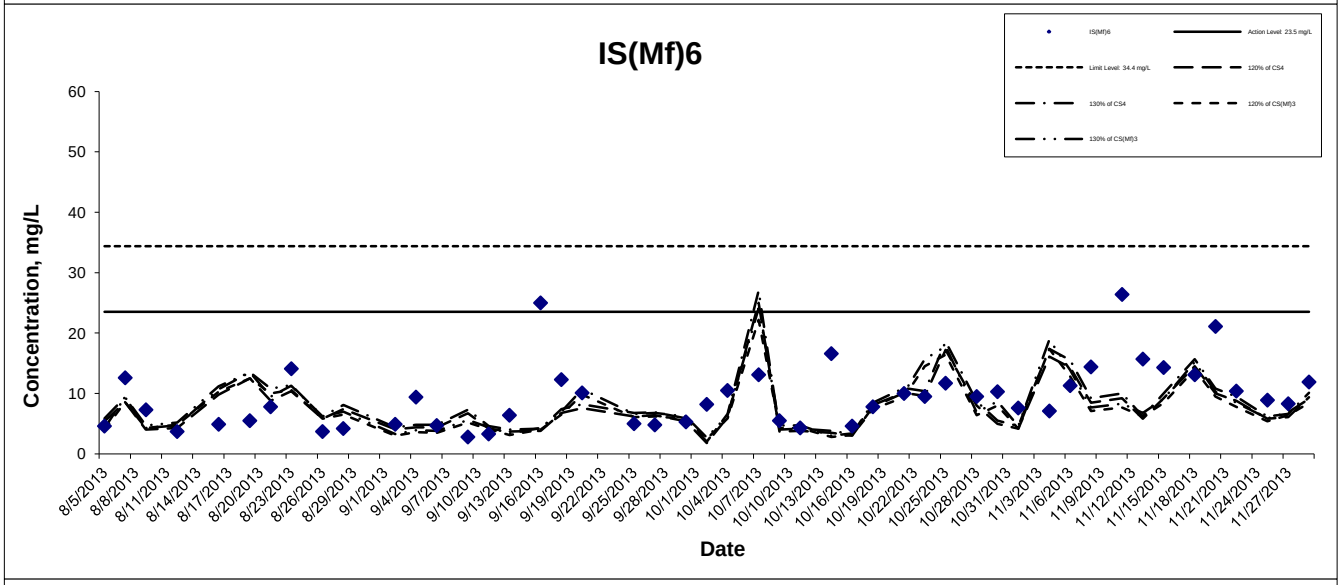


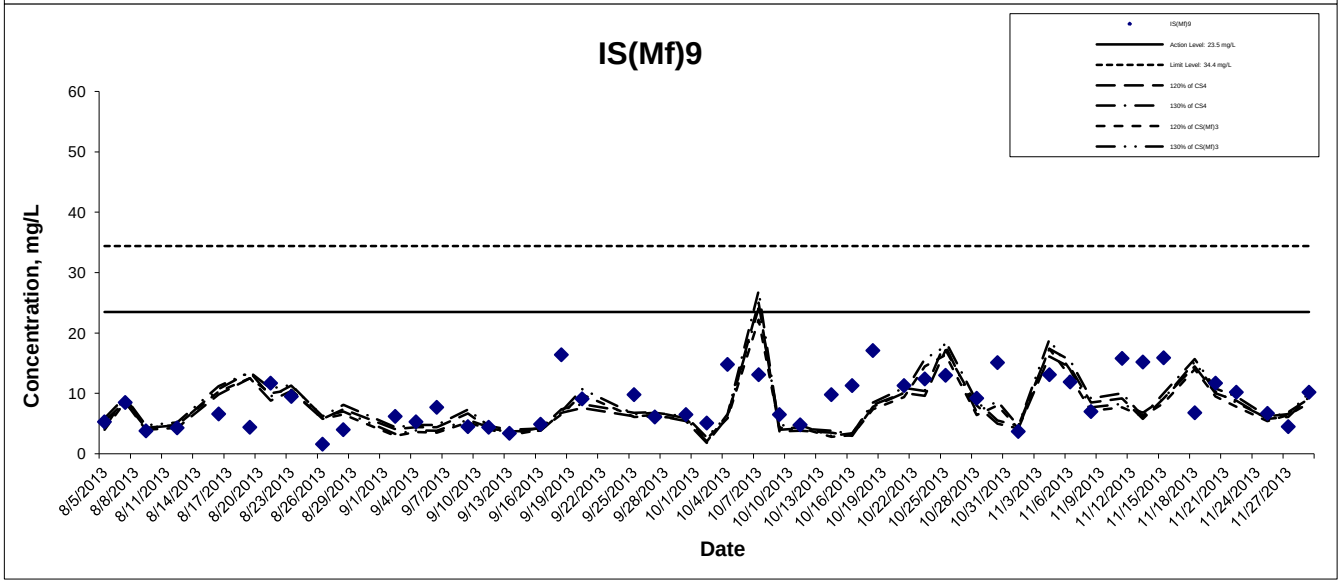




Suspended Solids at Mid-Ebb Tide







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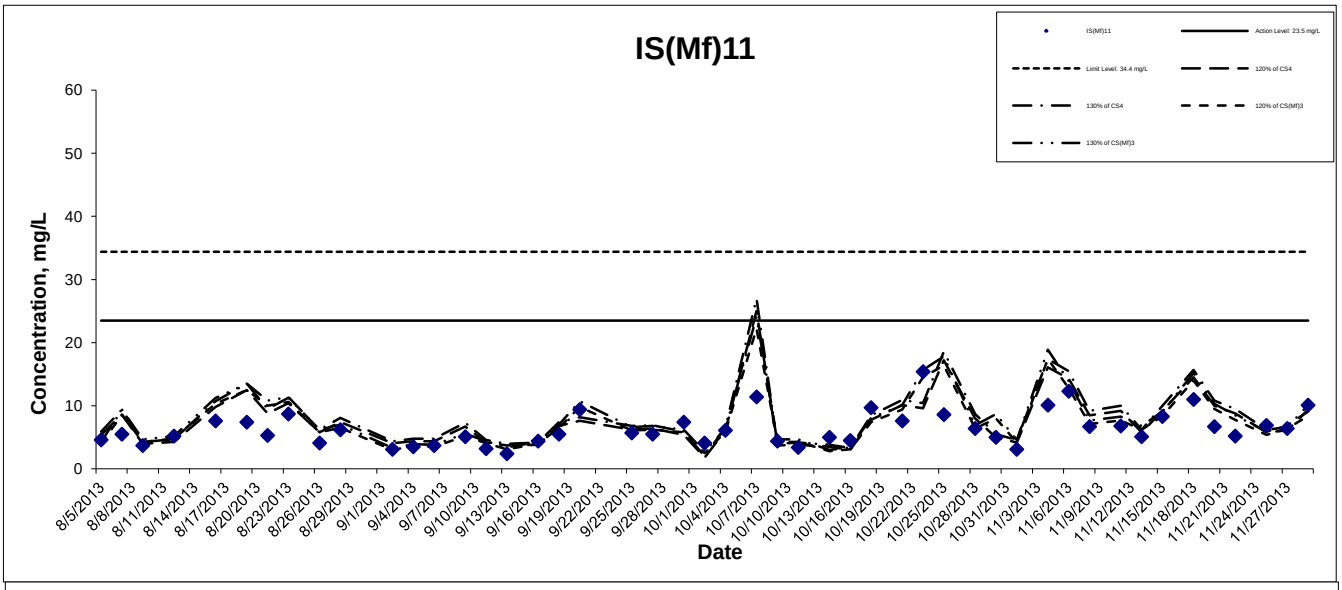
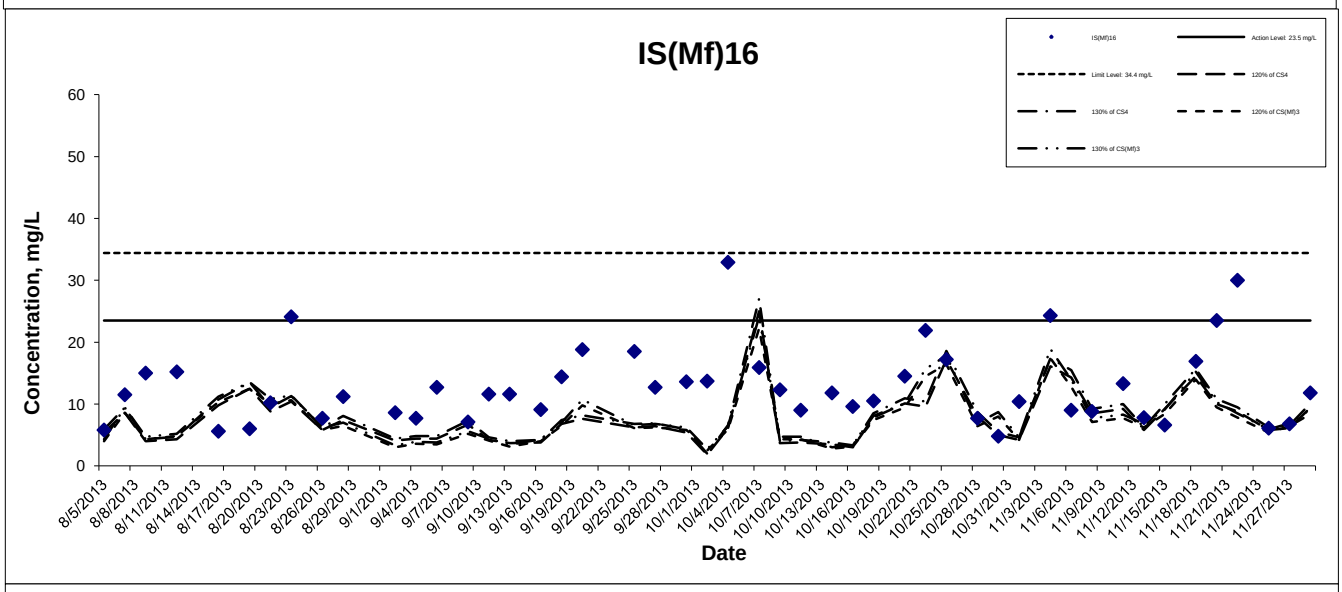
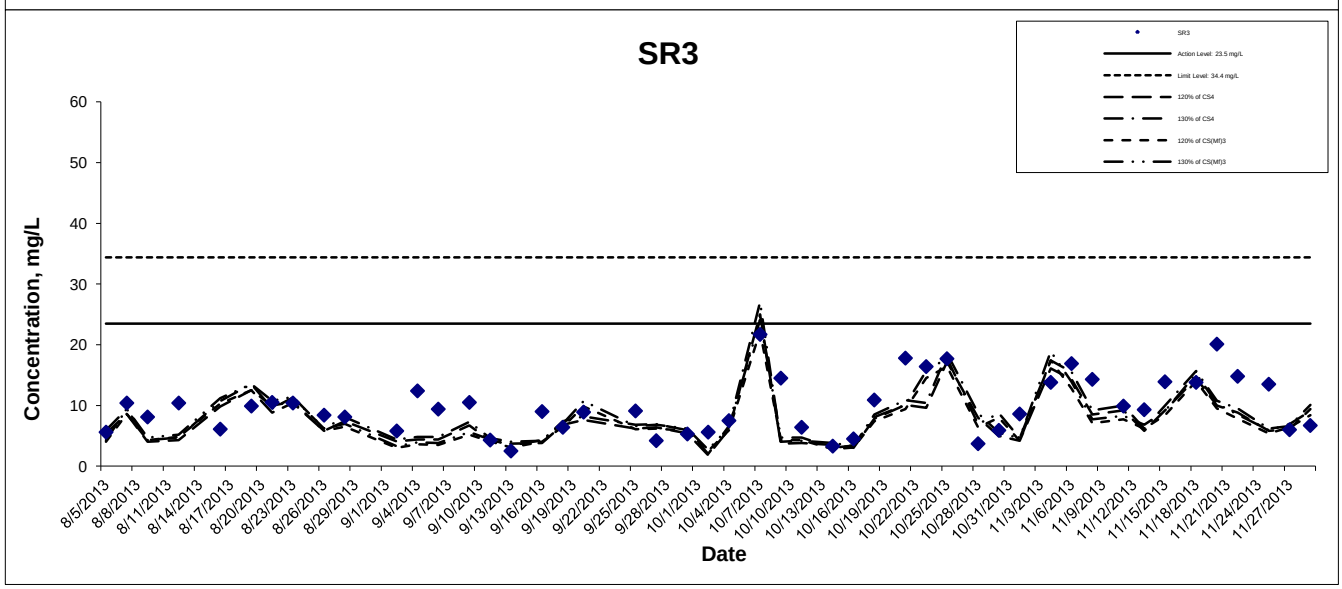
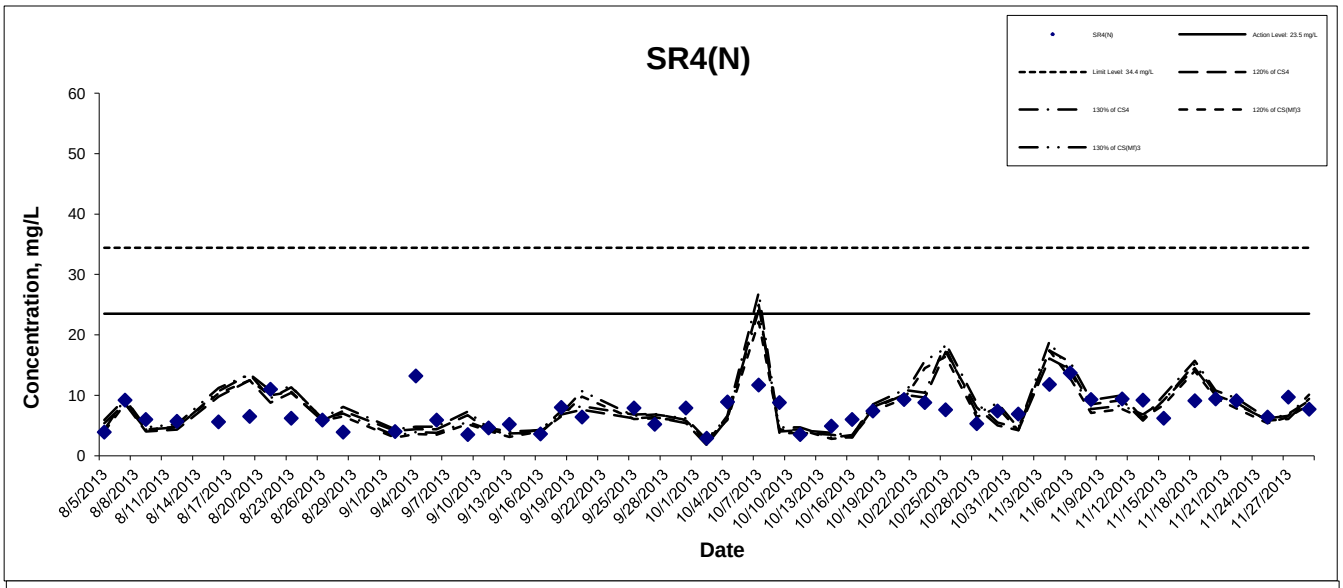
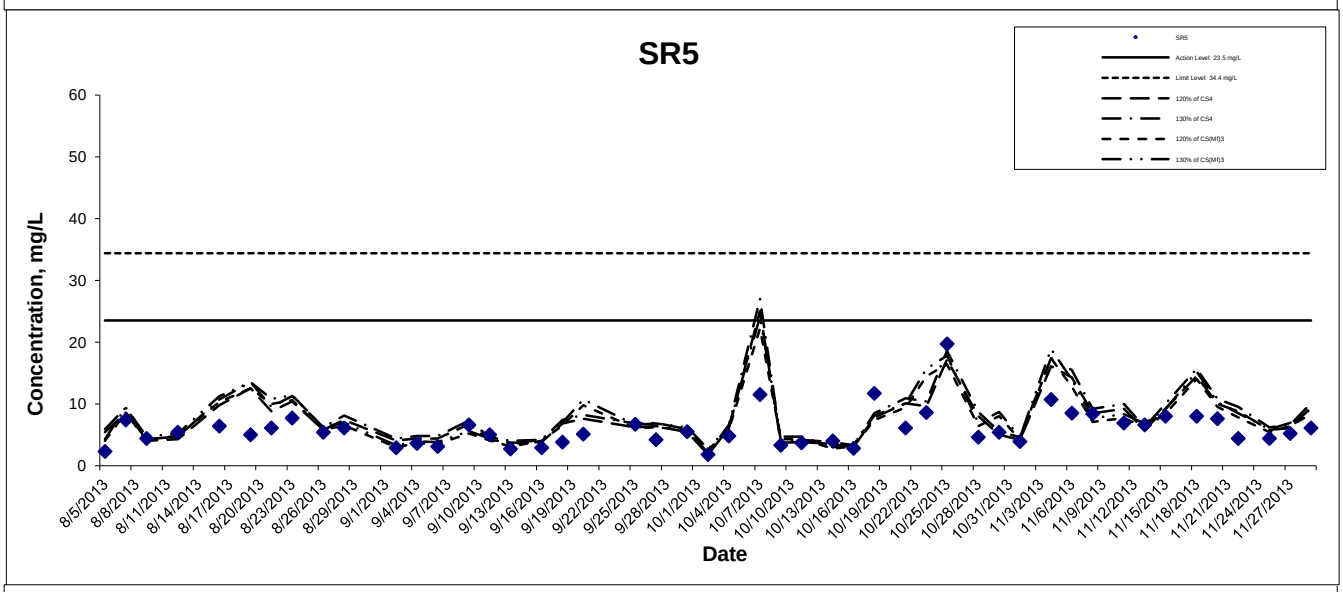


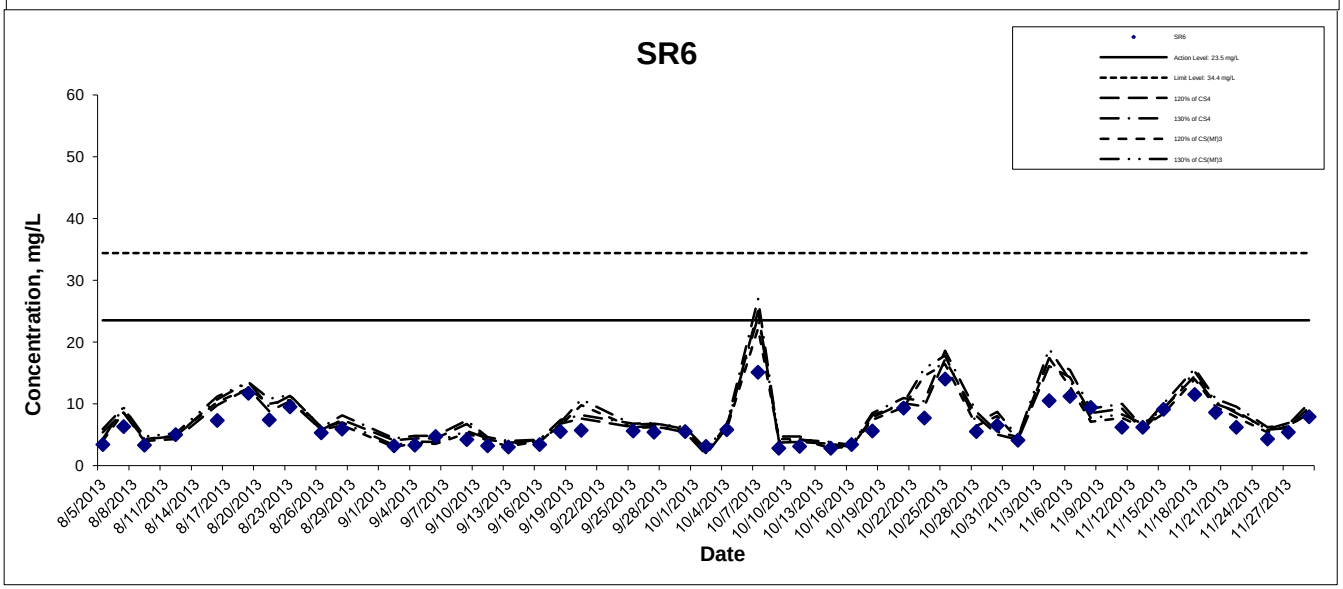




Suspended Solids at Mid-Ebb Tide







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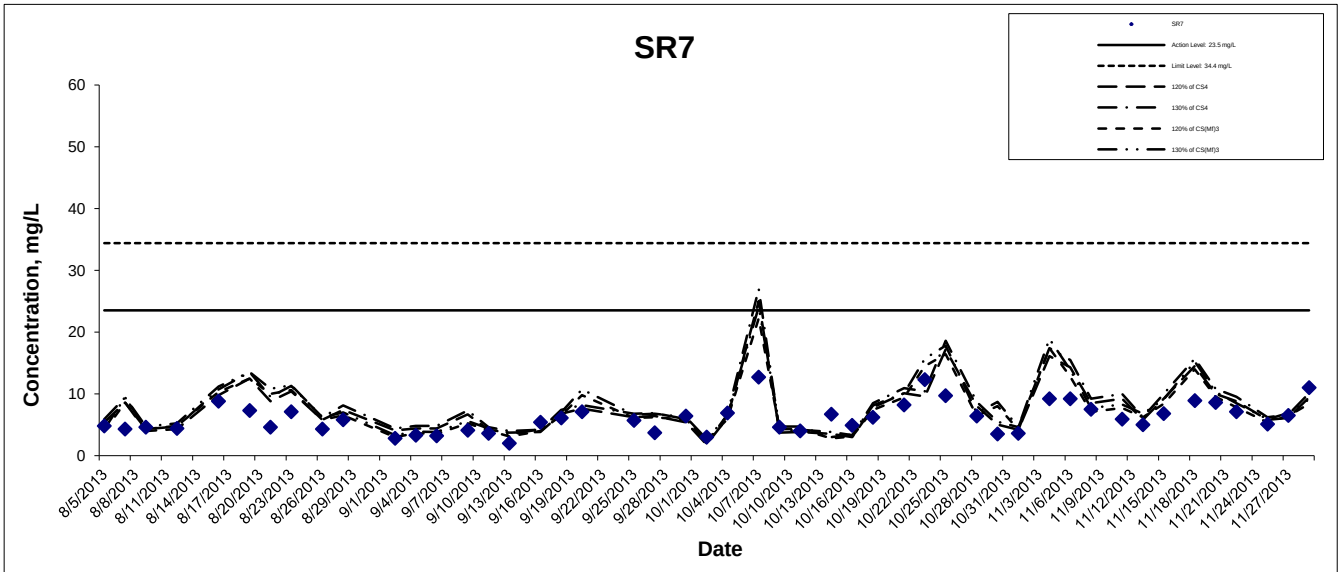

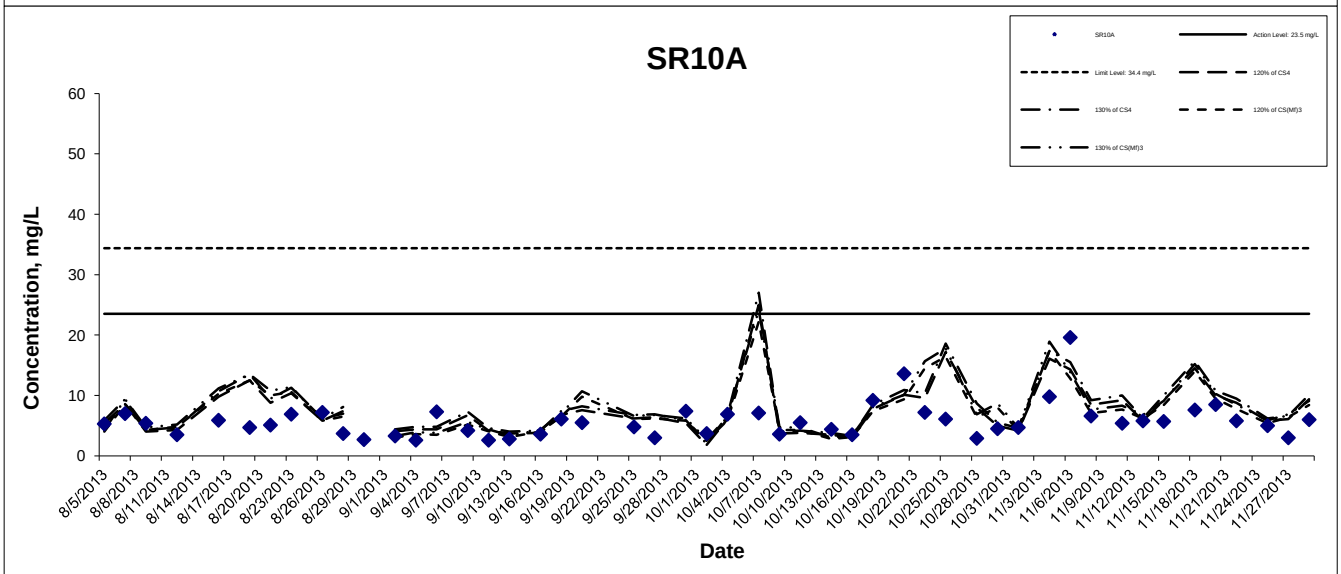

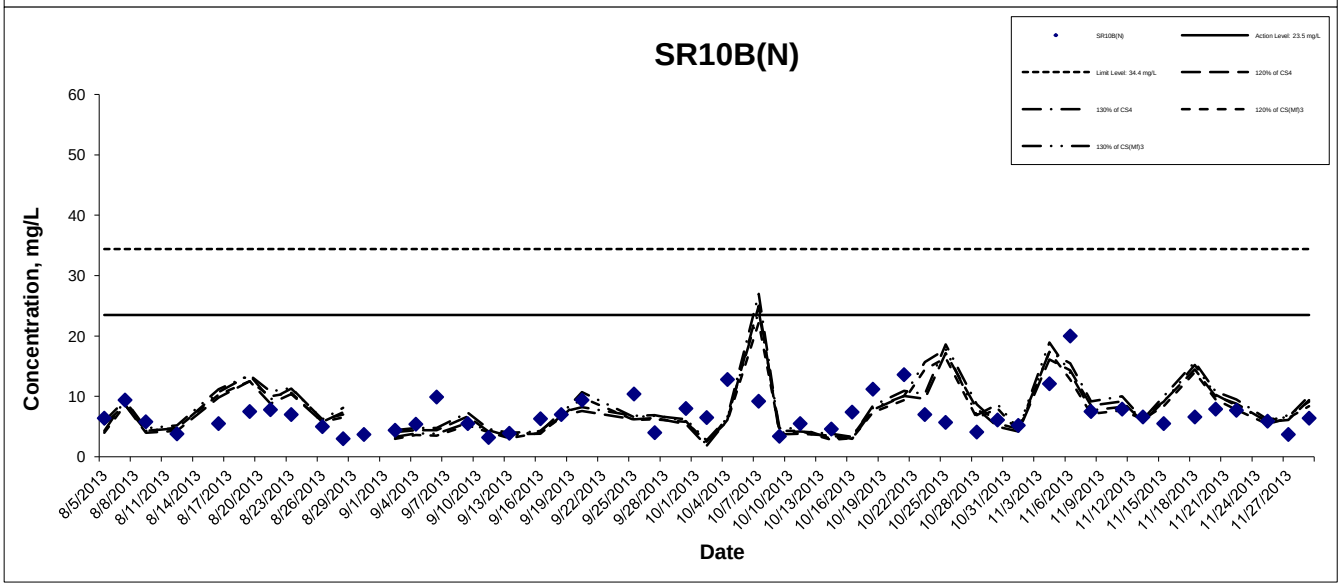

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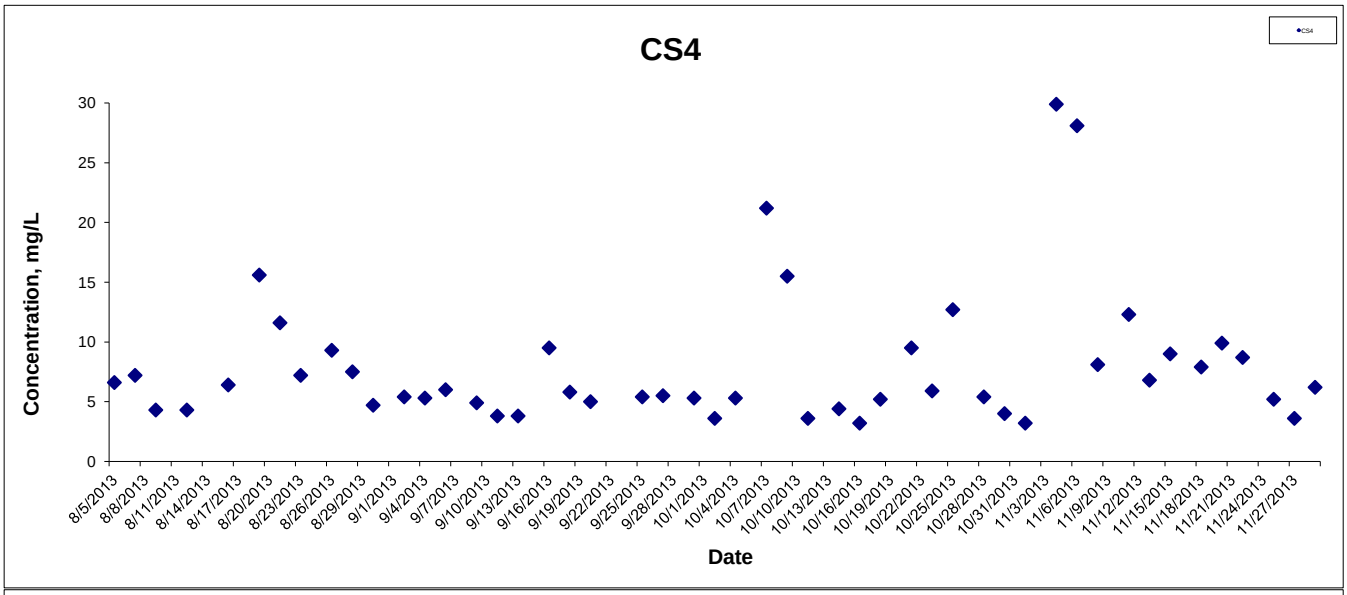

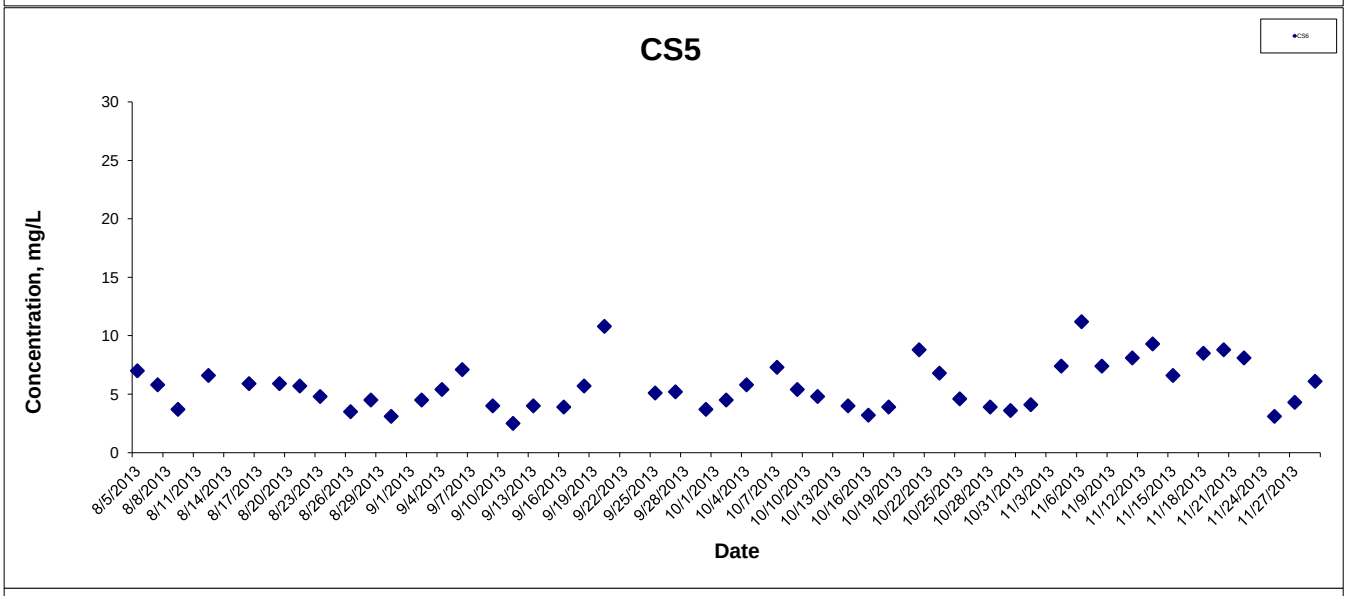

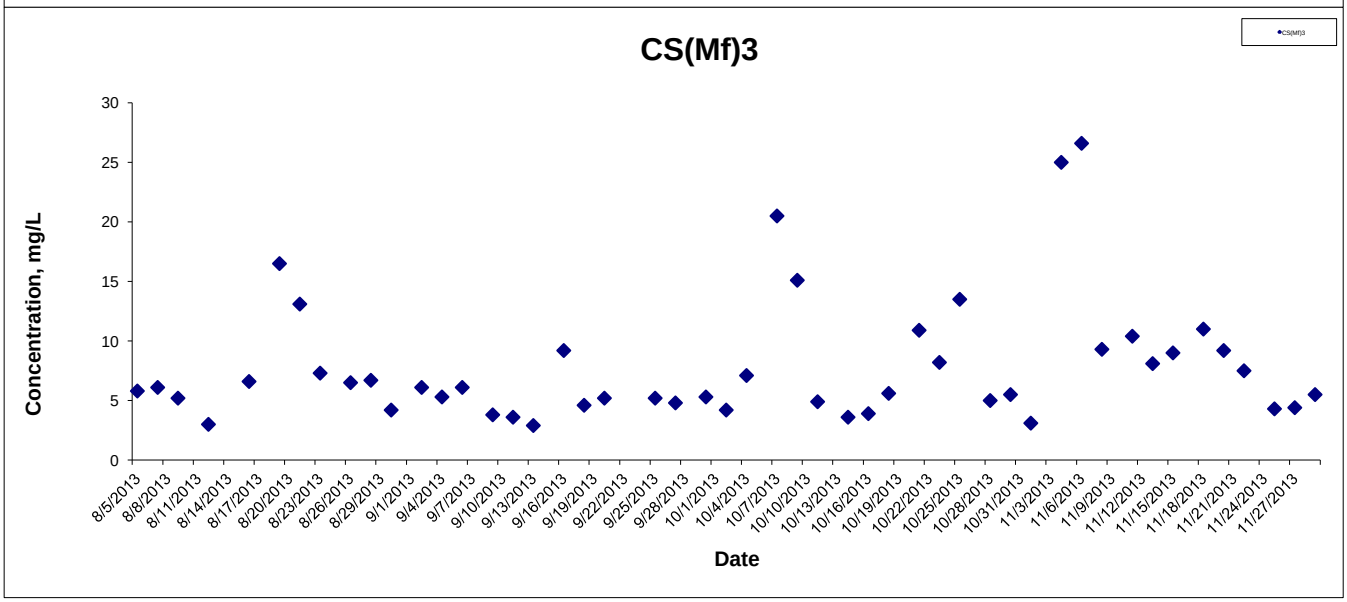

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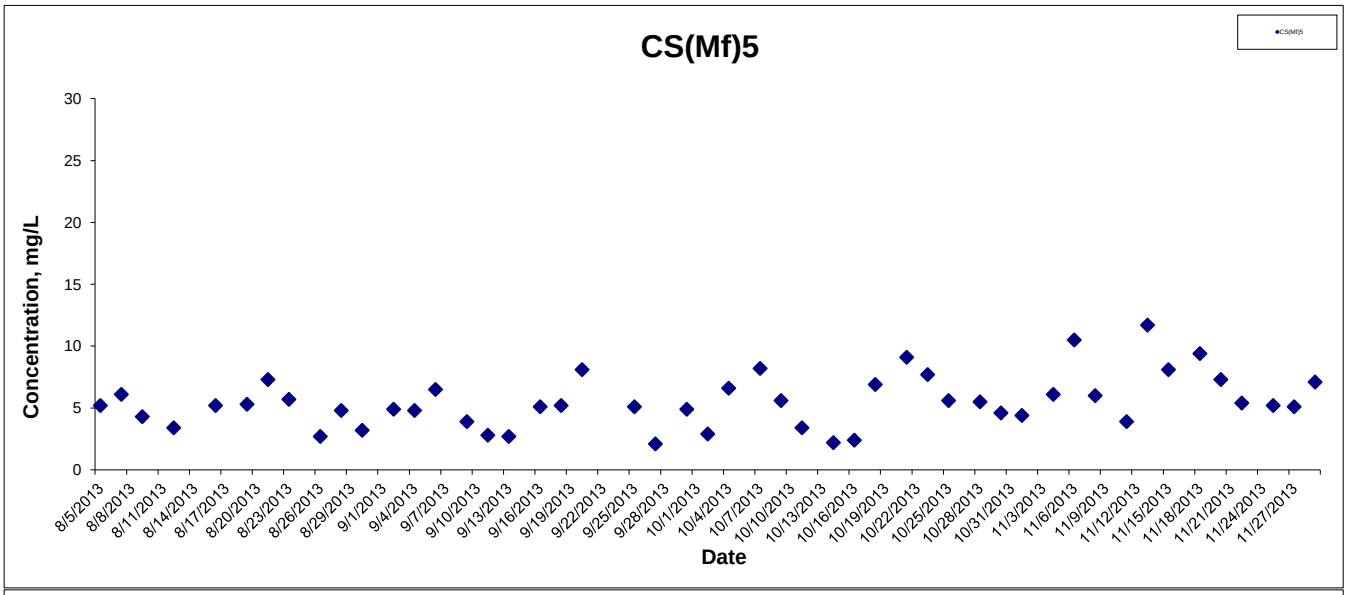

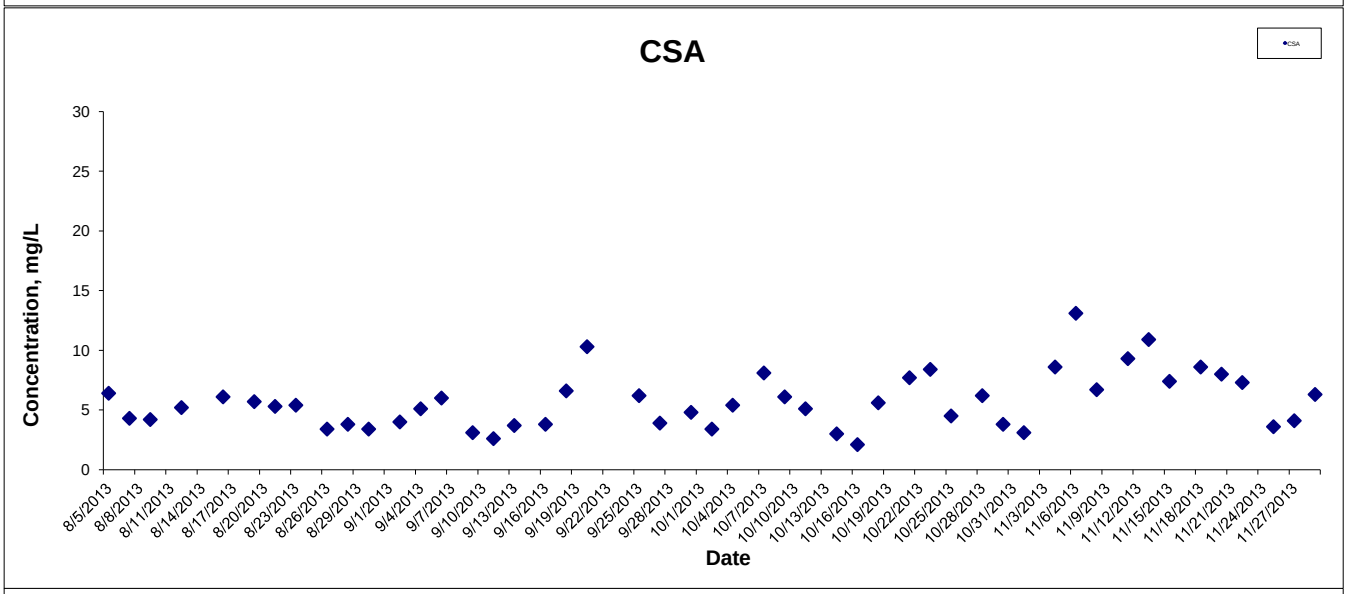

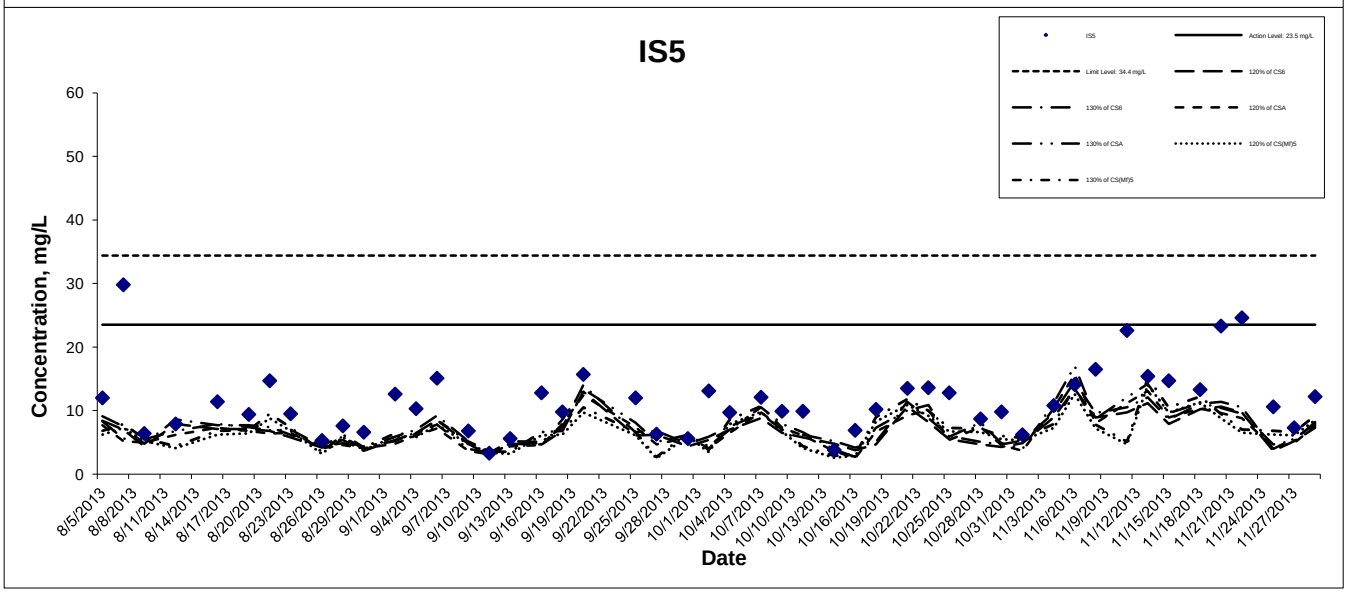

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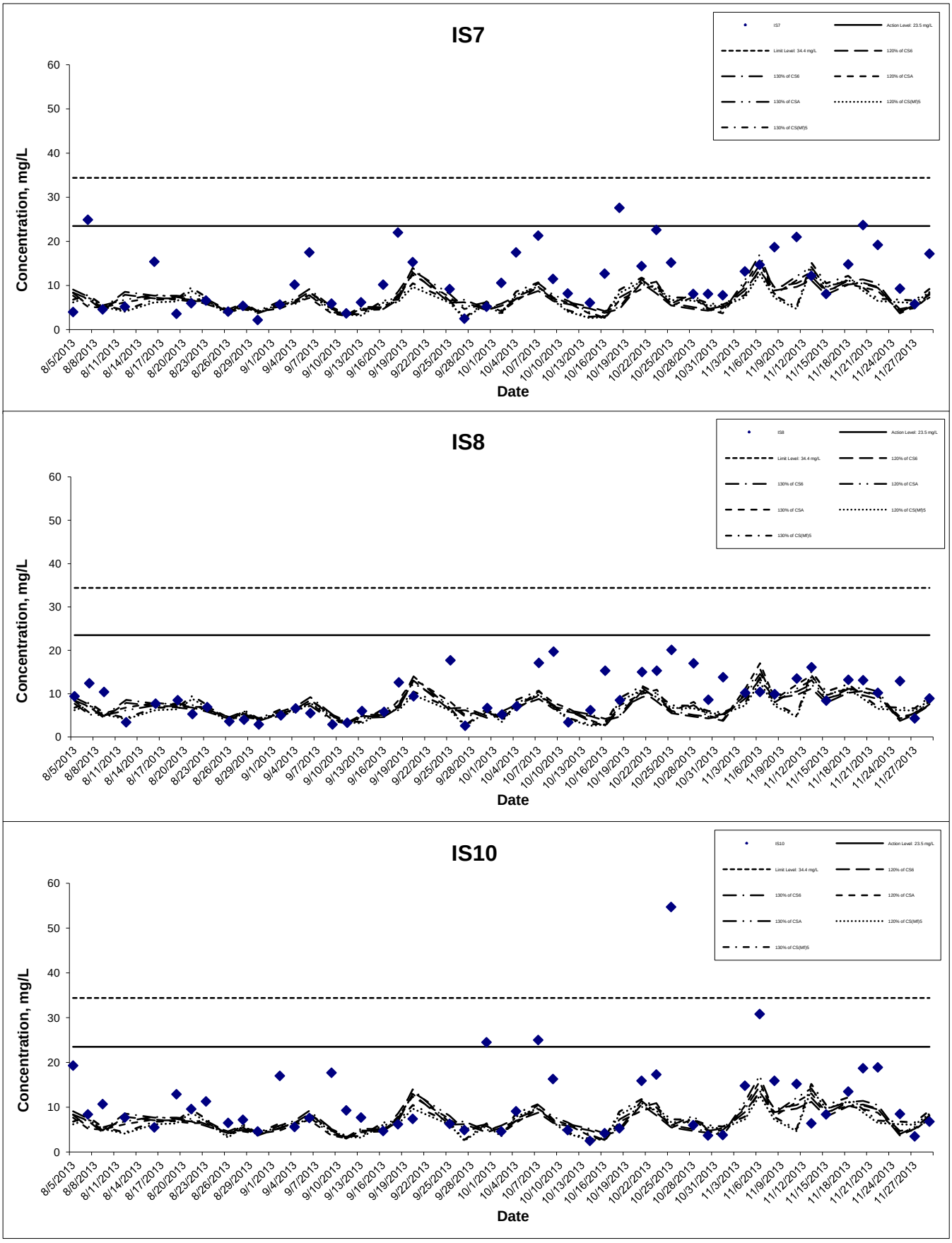

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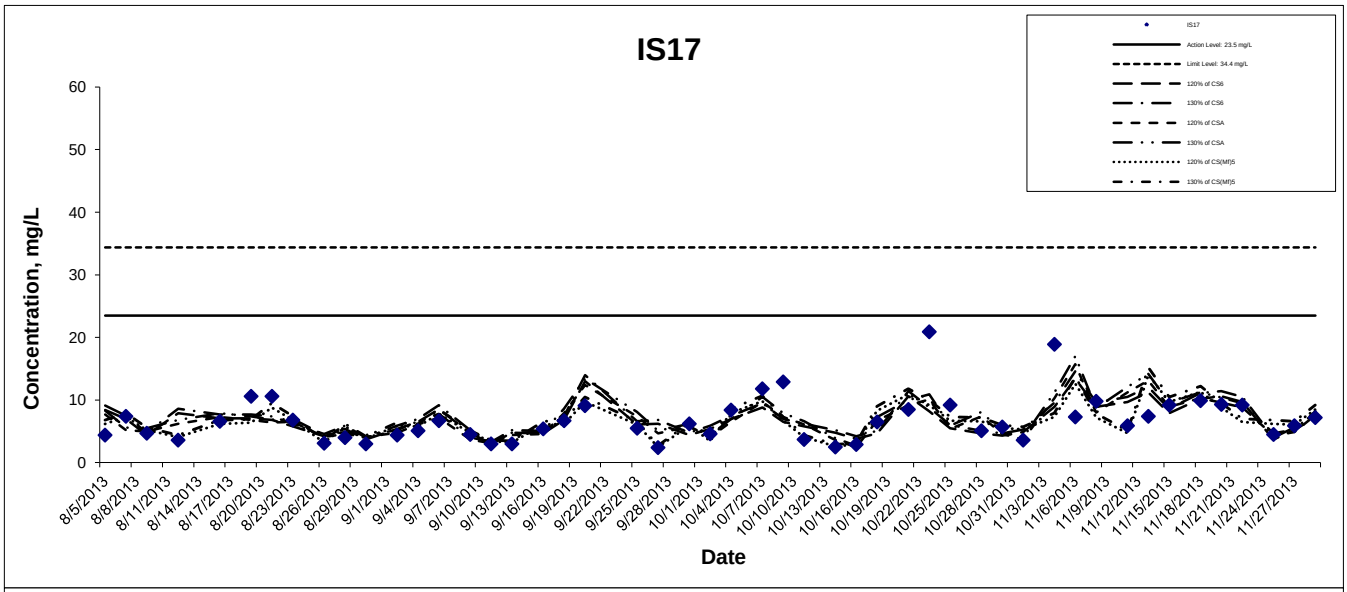

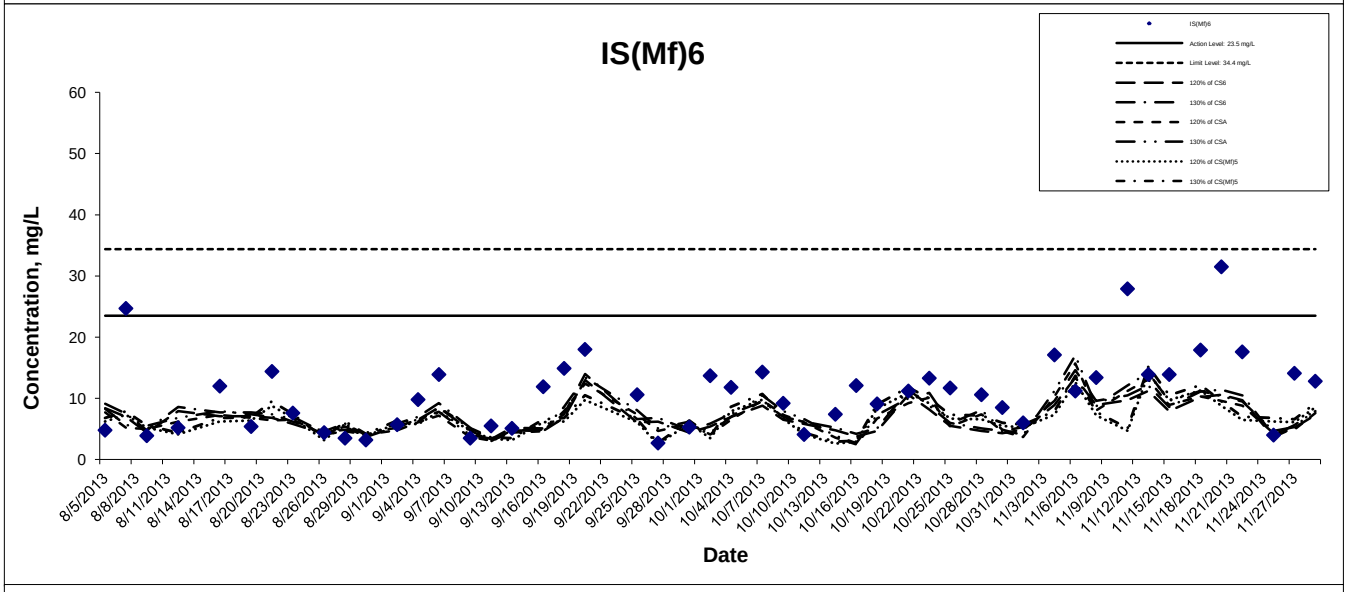

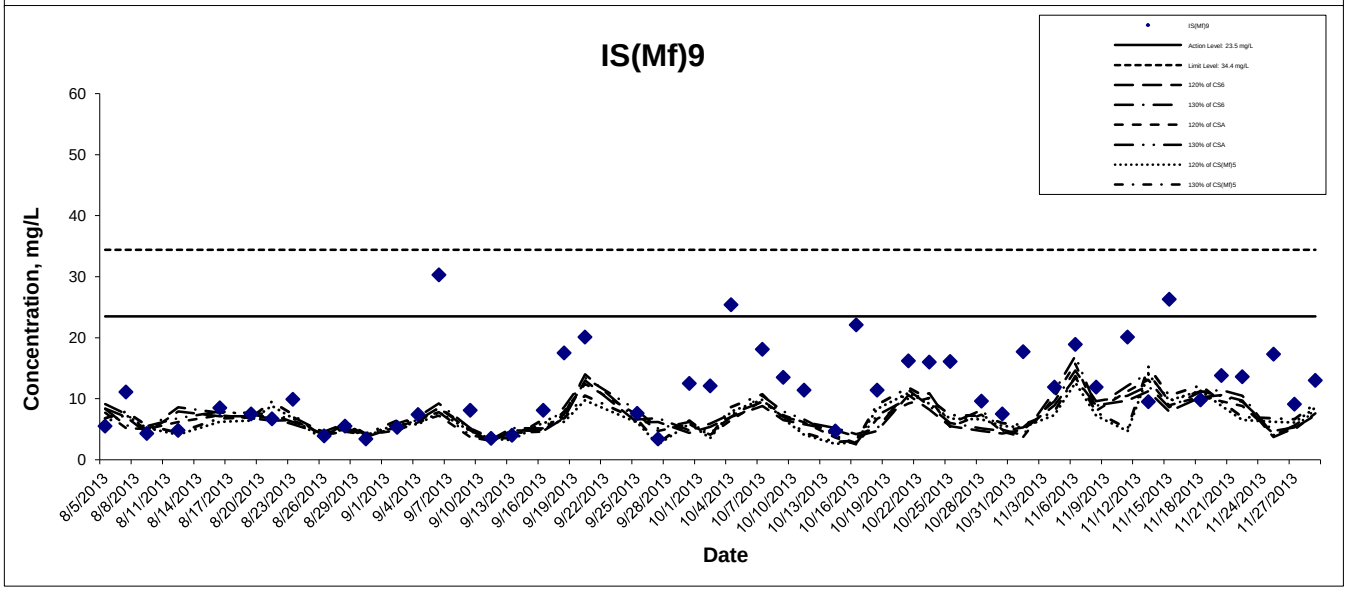

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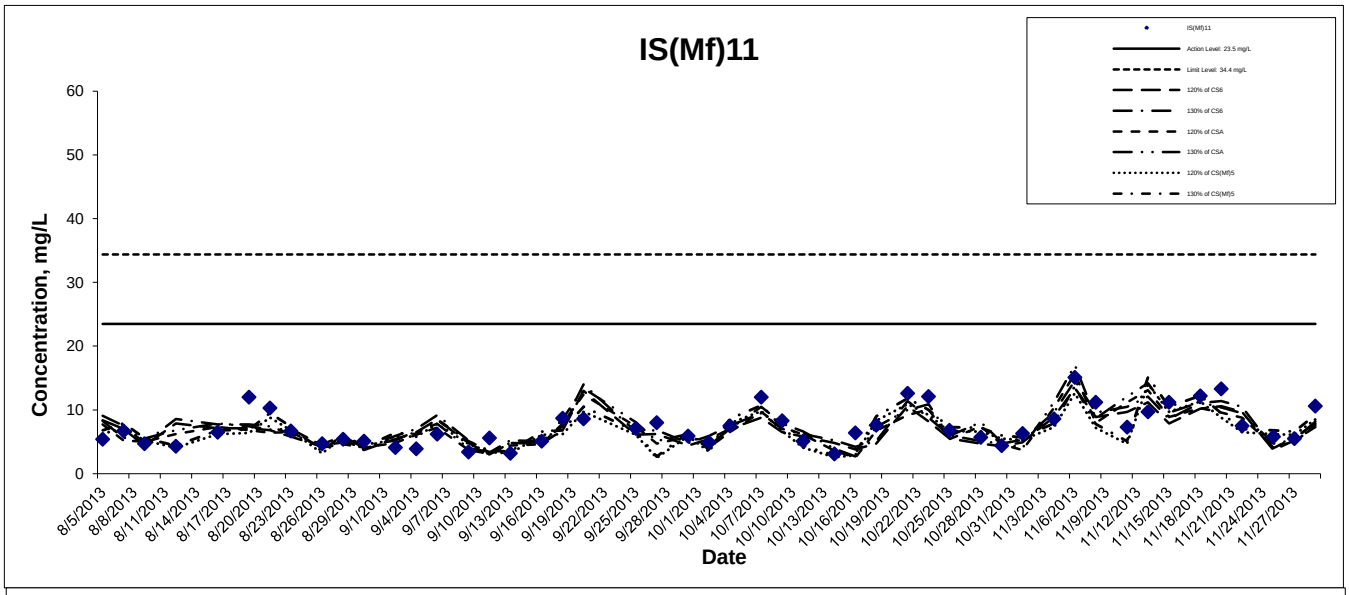

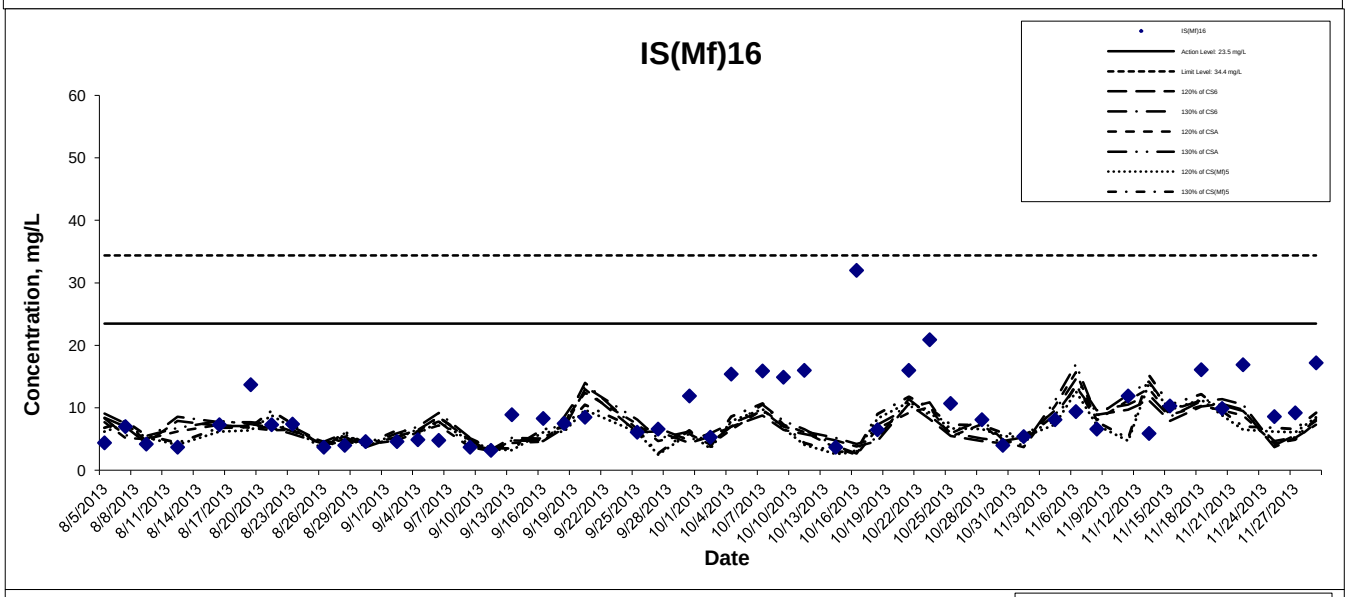

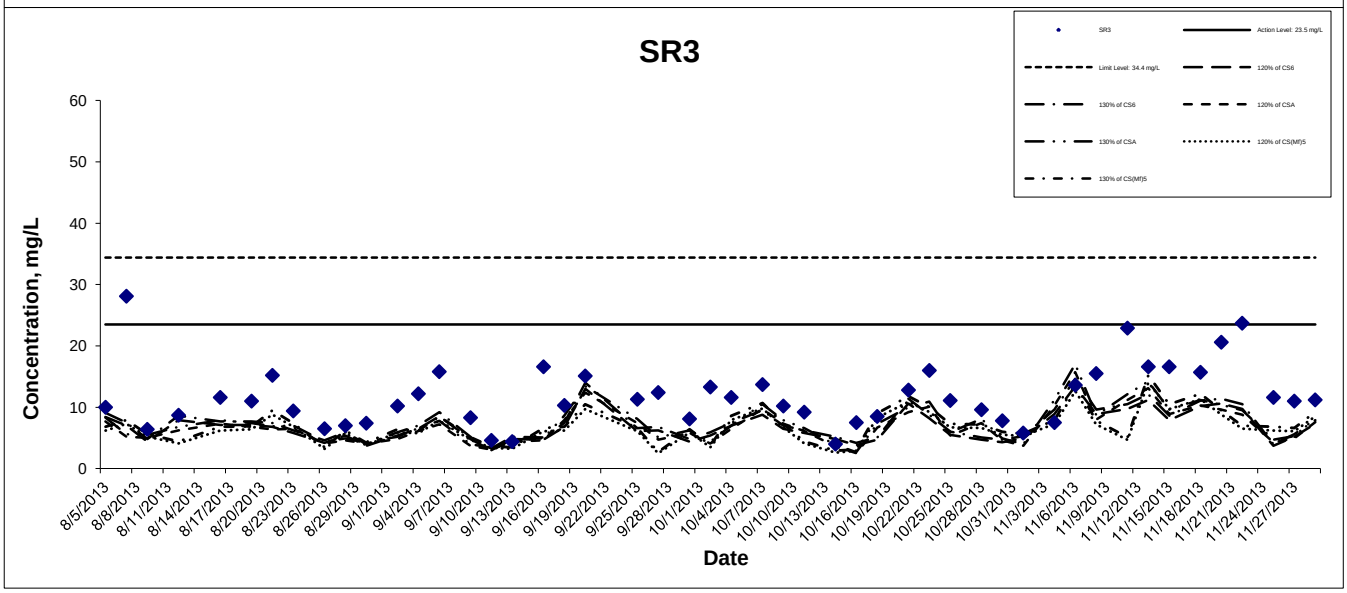

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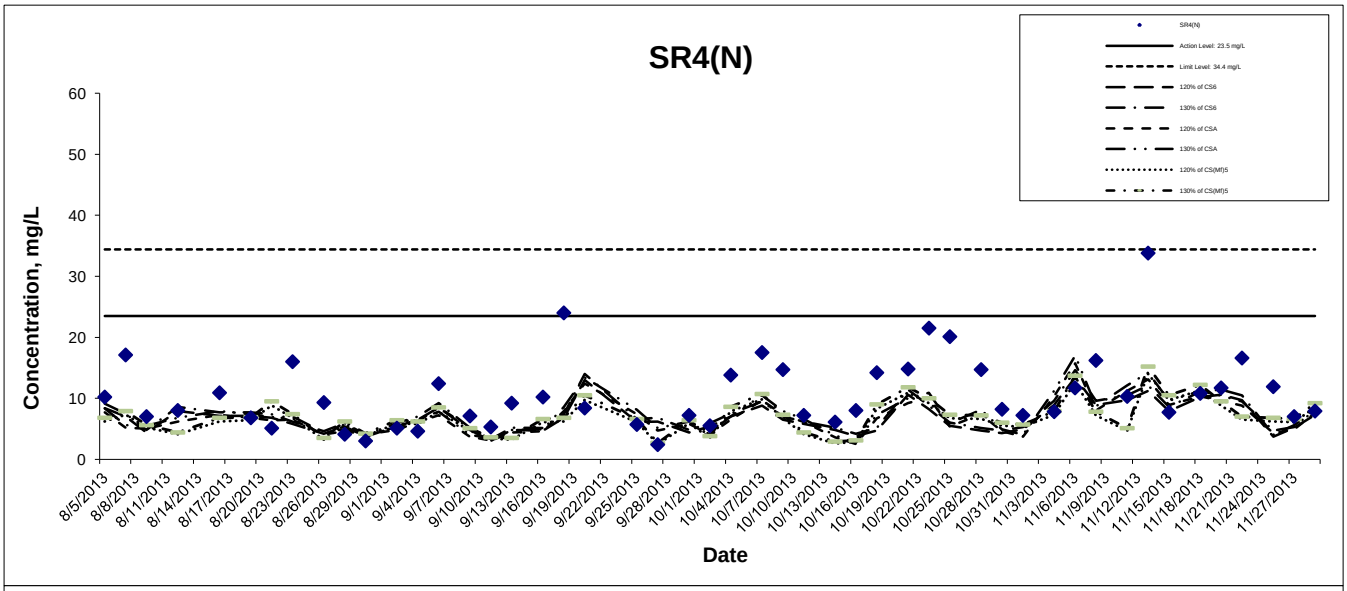

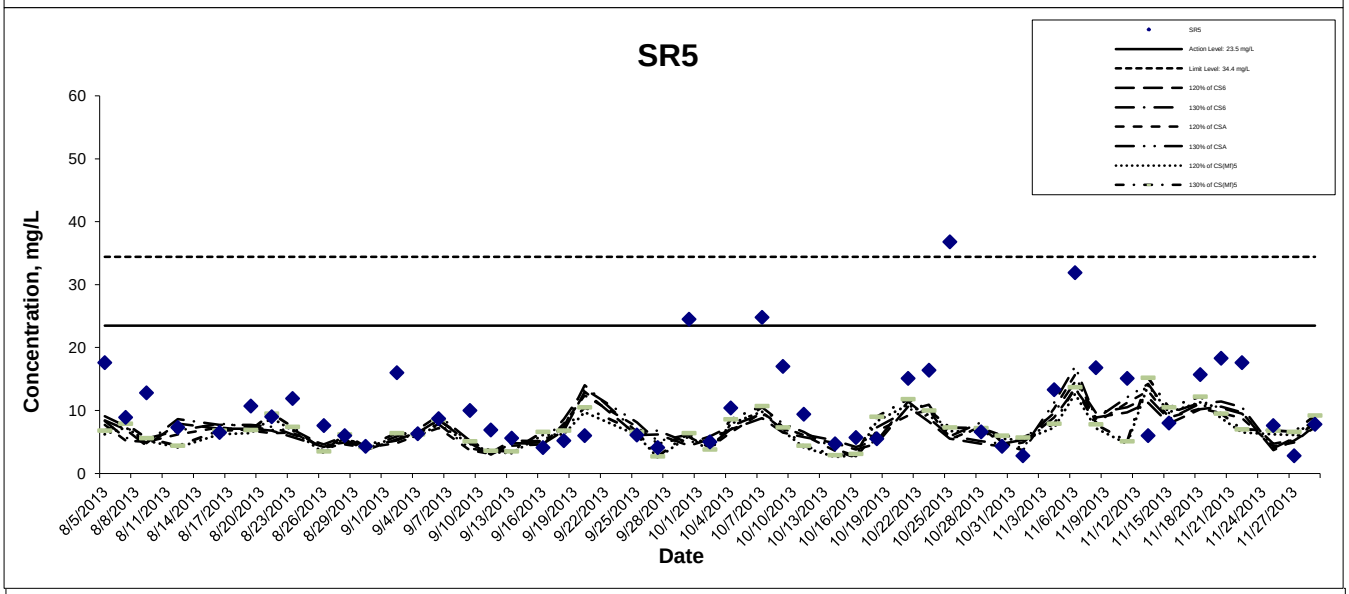

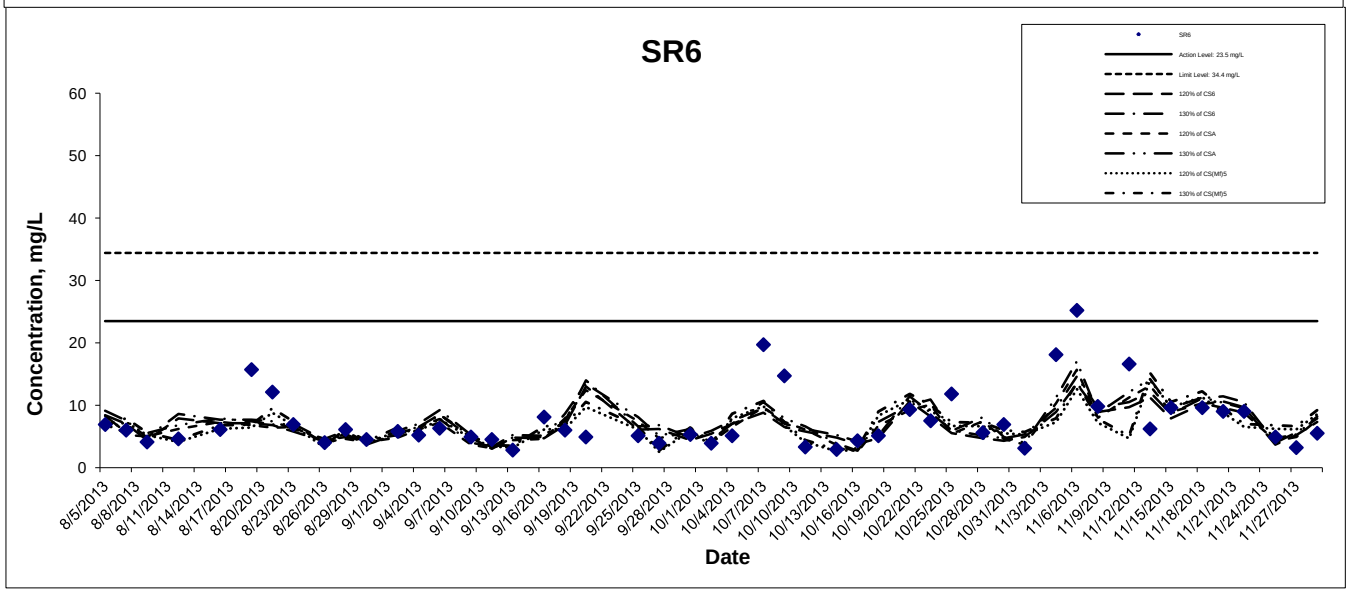

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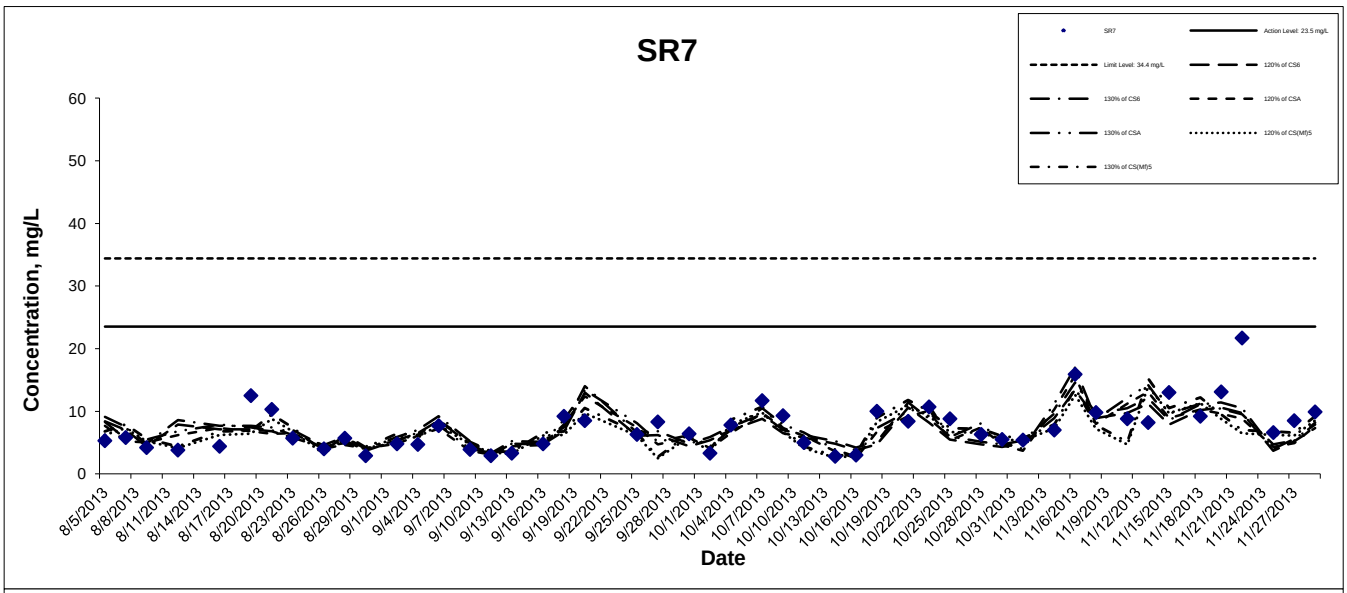

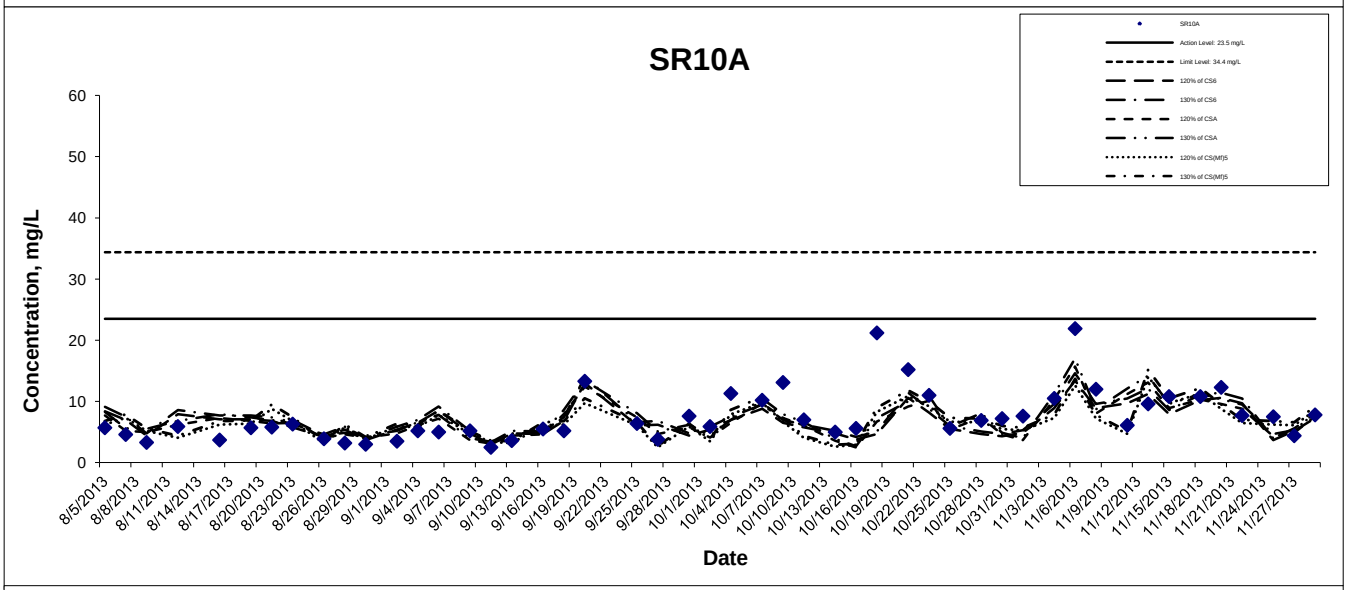

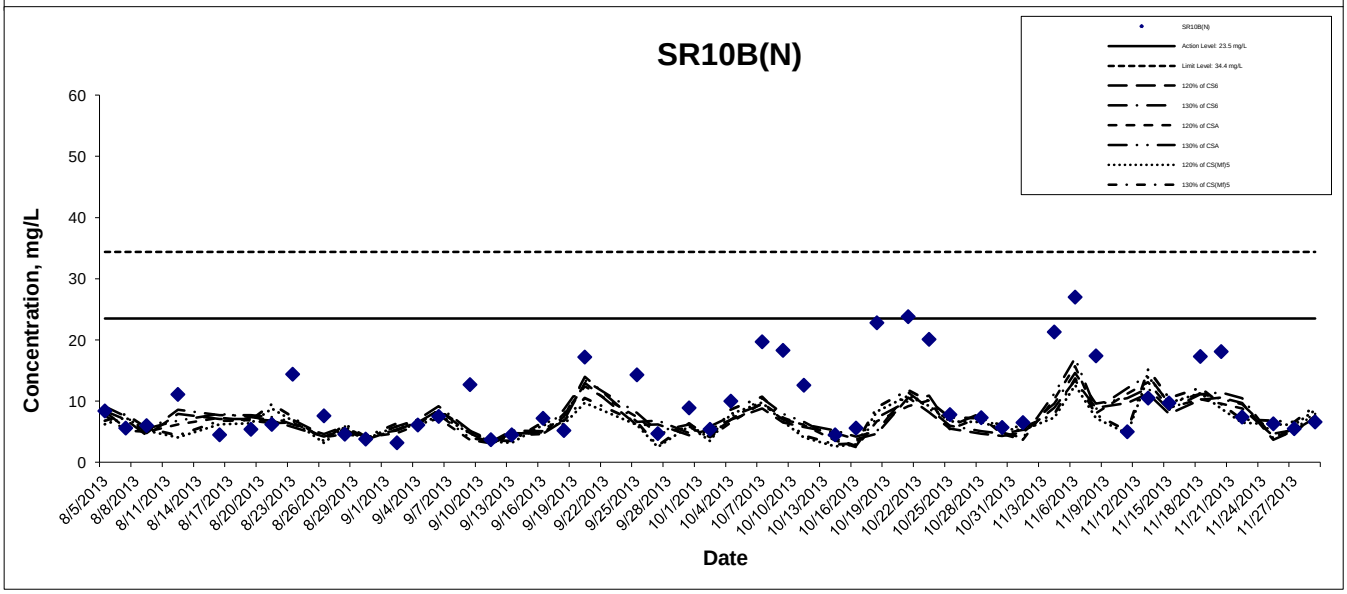

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Hong Kong Boundary Crossing Facilities-Reclamation Works

September – November 2013 Quarterly Report

Dolphin Impact Monitoring

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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).

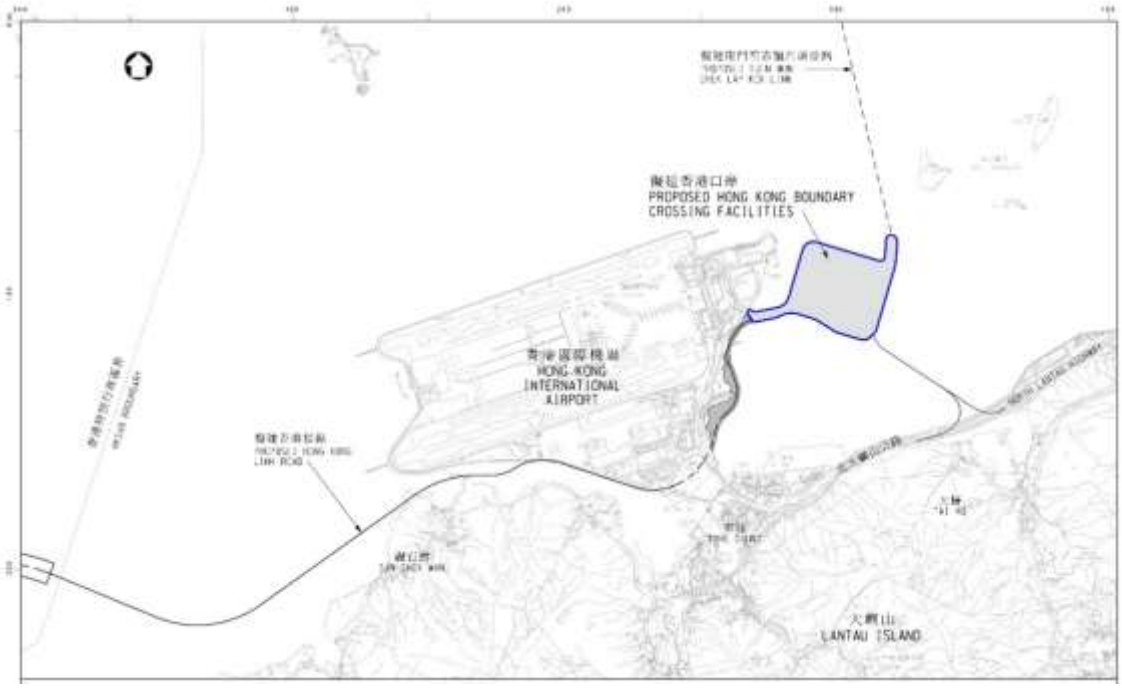

Figure 1. The Hong Kong Boundary Crossing (HKBCF) Reclamation Sites, North Lantau, Hong Kong (http://www.hzmb.hk/eng/img/overview/about_overview03_p01l.jpg**)**

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 seventh quarterly (September – November 2013) 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) and data has been reported monthly throughout the impact monitoring period. For ease of reference, these data have been summarised from that previously reported and encounter rate calculations are provided (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

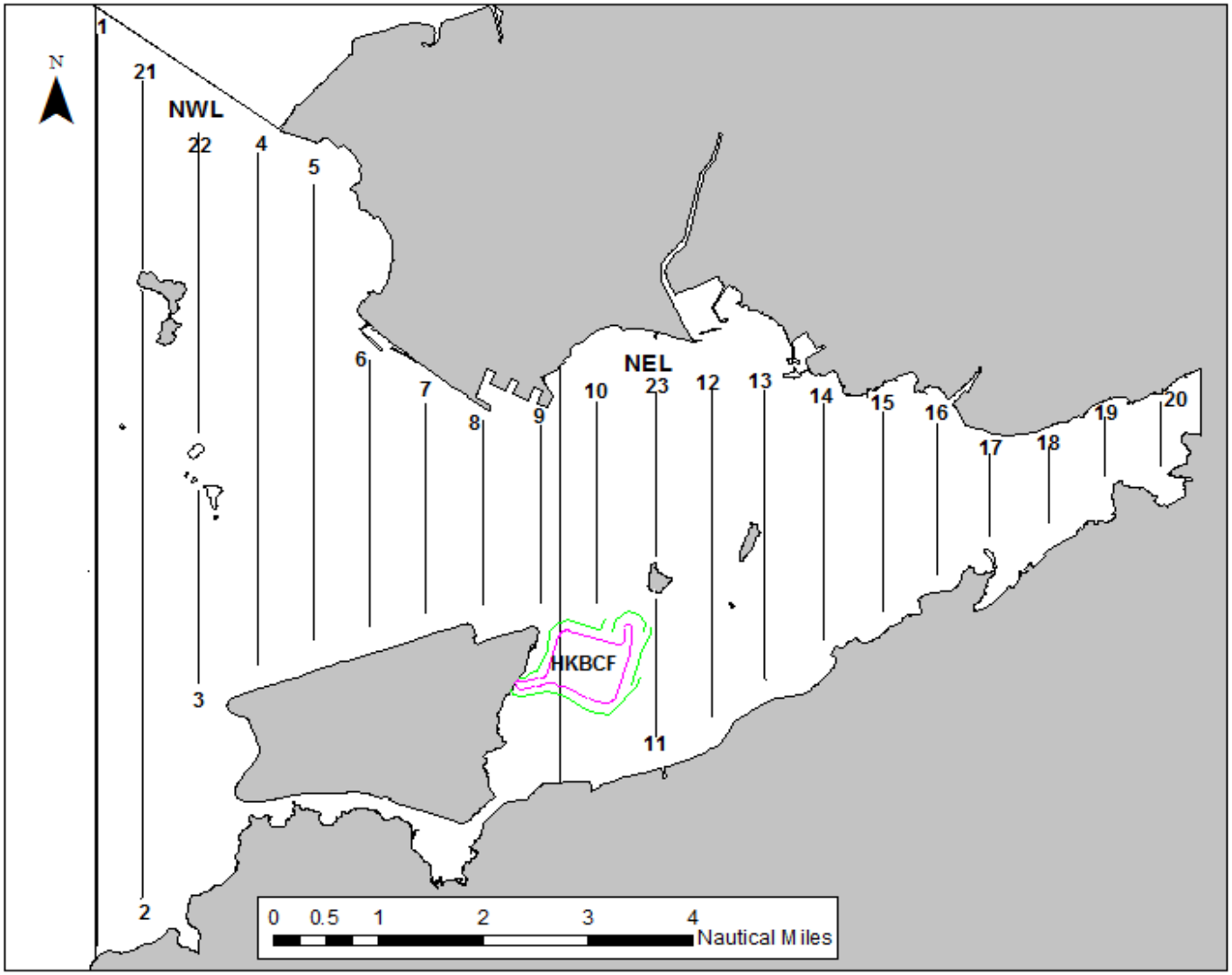

Figure 2 **Location of the Transect Lines for Baseline and Impact Monitoring during HKBCF (modified to accommodate HKBCF)**

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 thirteen (HZMB 054) split across baseline (seven sightings) and impact monitoring (6 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 September – November, 12 vessel surveys were conducted in NEL and NWL survey areas (Annex II). A total of 668.2 km of "on-effort" transect lines were conducted, of which 665.9km were under favourable conditions. Therefore, 99.7% of vessel surveys were conducted under favorable conditions (Annex III). Only those periods of "on-effort" survey conducted under favourable conditions were included in quantitative analyses. During September – November 2013, 42 groups of dolphins, numbering 133 (min 131: max 143[4]) individuals, were sighted from the vessel surveys. Of these, 28 groups were "on-effort" and the remaining 14 "opportunistic" (Annex IV).

Of the 42 sightings, 41 groups were located in NWL and 1 in NEL. The baseline report, conducted during September-November 2011, notes a total of 44 groups, 34 of which occurred in NWL and 10 in NEL. For period September – November 2012, a total of 71 groups were sighted, 53 of which were located in NWL and 18 in NEL. There are differences between the number of sightings made during baseline compared to the same period in 2012 and 2013. For NEL, the number of groups almost doubled between baseline (2011) and September – November 2012 and then decreased markedly in September – November 2013. For NWL, both September – November 2012 and 2013 recorded larger numbers of groups when compared to baseline monitoring (Table 2). Maps depicting location of sightings which have not been corrected for effort or survey track length 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; 2012 and 2013

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

* All Surveys conducted once per month

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

Table 3. A Comparison of "On Effort" Sightings Recorded in NEL and NWL Combined During Sep – Nov 2011; 2012 and 2013.

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

3.2. Distribution

During the both the baseline survey and the same period the following year, approximately three quarters of all "on effort" sightings were made in NWL. For the period September – November 2013, however, no "on effort" sightings were made in NEL. The similarity between the 2011 and 2012 periods is noted, however, there is no correction for effort (Table 4). Throughout September – November 2013, the area of most use was the northern section of NWL, within and adjacent to the Shau Chau and Lung Kwu Chau Marine Park (SCLKCMP). A few groups were recorded at the Tai O area and only two groups at the E edge of the airport platform. Only one group was recorded in NEL at the east of the Brothers Islands (Fig. 6). These areas are highlighted consistently throughout AFCD annual monitoring reports as well as during pre construction monitoring. SCLKCMP is frequented all year round by dolphins and is perceived to be critical habitat whereas the use of NEL is regarded as more seasonal, however, the decrease in the number of groups occurring in NEL compared to the same season in previous years is noteworthy.

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

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

3.3. Encounter rate

As the survey periods have different transect lengths, variation in sightings occurrence was quantified by correcting for the different amount of effort (number and 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 and NWL combined, 659.8km and 665.9km of track-line were conducted under favourable conditions during the periods September – November 2012 and 2013, respectively. In NEL, there is a slight increase in encounter rate between baseline and the same period the following year, however, for the period September – November 2013, there is a marked decrease in encounter rate. i.e., 6.3 to 0. For NWL, there is a continuous decline in encounter rate from the baseline period through the same period the next and subsequent years, i.e., 9.5 to 8.7 to 6.3 (Table 5).

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

Monitoring Period	Encounter Rate NEL	Encounter Rate NWL (*)
Sept-Nov 2011 (Baseline Monitoring)	5.4	9.5
Sep – Nov 2012 (HKBCF Third Quarter)	5.9	8.9
Sep – Nov 2013 (HKBCF Seventh Quarter)	0	6.3

The AFCD Annual Reports describe variation in spatial distribution between areas and between seasons in NEL and NWL. For the last sixteen years, 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. The encounter rate for NWL for all three periods (September – November 2011; 2012; 2013) is within the annual limits recorded for this area previously. For NEL, the encounter rates in September – November 2011 and 2012 are within the recorded annual norms for the area, however, the encounter rate of zero for the same period 2013 is not. Historically, there have been both up and down movements within these limits, however, the general trend in yearly encounter rate for dolphins in all areas of Hong Kong is that of significant decline over the last decade and prior to new development projects in the Lantau area (AFCD 2013). The known decline in the population, on top of 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 work at HKBCF extends in addition to new dredging and other projects being initiated in NEL, it is likely that these activities have effected NEL encounter rates.

[5] Updated data set provided April 2013

3.4. Group size

During September – November 2013, group size of all sightings varied from 1 to 12 individuals with an average of 3.2 in NWL and 1 in NEL. For baseline monitoring, the NWL average group size was 4.5 and the NEL average group size was 3.5. For the period September 2012, the NWL average group size was 3.1 and in NEL it was 3.6 (Table 6). NEL shows a decreased number in groups size (although it is noted only one group was sighted in September – November 2013). In NWL, groups sizes between September – November 2012 and 2013 are approximately the same although both are lower than the baseline monitoring. A map depicting group size distribution shows that the two largest groups occurred at SCLKCMP and both of these groups contained calves (Fig. 7).

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

Monitoring Period	Average Group Size (NWL)	Average Group Size (NEL)
Sep - Nov 2011 (Baseline Monitoring)	4.5	3.5
Sep – Nov 2012 (HKBCF First Quarter)	3.1	3.6
Sep – Nov 2013 (HKBCF Seventh Quarter)	3.2	1.0

As encounter rate and group size are both subject to variation, 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). This is important so that project impact can be monitored over relevant time scales. Alternative analyses have been proposed and developed using the first year of impact monitoring data and the methodology is attached (Annex V). Considerable reformatting of baseline data and incorporation of environmental and habitat data from multiple sources is near completion and the models will be run over the next quarterly period [6]

3.5. Habitat use

Quantitative grid analyses indicates that the most often frequented areas in NWL were the SCLKCMP, the western limit of NWL and one area to the north of the Hong Kong International Airport (HKIA) platform. In NEL, no "on effort" sightings occurred therefore no qualitative grid analyses can be conducted (Figs. 8; 9). The grid analyses from this quarter shows a similar distribution in NWL to that published in the AFCD long term monitoring reports and the baseline monitoring report. These areas of high use have been consistent in the long term and continue to be so. The decrease in dolphin sightings between September – November 2013 and the two previous autumn seasons is noted. It is also noted that the areas of DPSE and SPSE which were apparent in summer 2013 are also absent.

3.6. Mother-calf pairs

Seven of the groups sighted contained mother and calf pairs[7]. All groups were sighted in NWL (Fig. 10). Calves comprised 6.7% of all dolphins sighted, much higher than that reported in the last quarterly report (2.5%). Although calf mortality was highlighted in previous seasons, several new born dolphins have been sighted consistently in NWL this quarter.

3.7. Activities

Of the 42 groups sighted (using all sightings), 21 (50%) were engaged in feeding activities; three (7%) were travelling; 11 (26%) were feeding/travelling/surface active; two (5%) were

[6] The provision of data from multiple government agencies and the private sector is acknowledged

[7] Please note: the monthly report for October 2013 erroneously reported no calves were seen during this month. There were four sightings of calves during this month.

milling (other) and it was not possible to define the behavior of five (12%) groups. Feeding was the predominant activity during daylight hours in September – November 2013 with travelling/feeding/surface active (multiple) behaviours being the next most dominant behavioural category (Fig. 11). In NWL, feeding occurred most often at east SCLKCMP and the western limits of NWL. (Fig. 12).

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, however, several well known individuals have been recorded throughout September – November 2013. There are five dolphins which have been sighted more than seven times, all of which are known from the AFCD catalogue (HZMB 002 [WL111]; HZMB 011 [EL01]; HZMB 041 [NL24]; HZMB 044 [NL98]; HZMB054 [CH34]). 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 in 14 different sighting groups. HZMB 041 has been sighted 11 times; HZMB 002 has been sighted ten times, HZMB 044 has been sighted nine times and HZMB 011 has been sighted eight times. Even when pooled with baseline data, the highest number of re-sightings is 14 (HZMB 054) and this does not consider independence of sightings, a critical assumption in kernel analyses. (Annex VI; Table1).

4. CONCLUSION

The data from September – November 2013 shows some consistencies with the results reported in the same period 2011 (baseline) and 2012. Habitat use, encounter rates, group size and behavioural trends all fall within those reported in AFCD Long Term Monitoring reports apart from the use of NEL which has dropped when compared to this season in previous years. It is noted from the previous quarterly report which summaries the summer seasons for the last three years, there was an increase in seasonal usage of NEL. Density distribution maps depicted key areas of frequent use within NWL, in particular, SCLKMP and Tai O. Behavioural patterns were broadly similar, with feeding behavior predominating all months. .

The decrease in encounter rate in NEL is noted although no link can be found between this and specific activities at HKBCF. Although it is likely that the increase in HKBCF activities is having an effect on dolphin encounter rates in NEL (although not in the three months that preceded this quarter), it is also noted that a dredging project was started in November 2013 and new project works also were initiated in NEL during the autumn of 2013. Increased activities in addition to the inherent variation apparent in dolphin distribution and habitat use make it challenging to discern specific sources of impact. A significant decline in dolphin throughout the last ten years prior to construction commencement has also been published by AFCD (2013). It is hoped that the fine scale density surface analysis presently being conducted will allow further light to be shed on the specific areas and environmental variables, including marine construction works, which impacts dolphin distribution throughout NEL and NWL.

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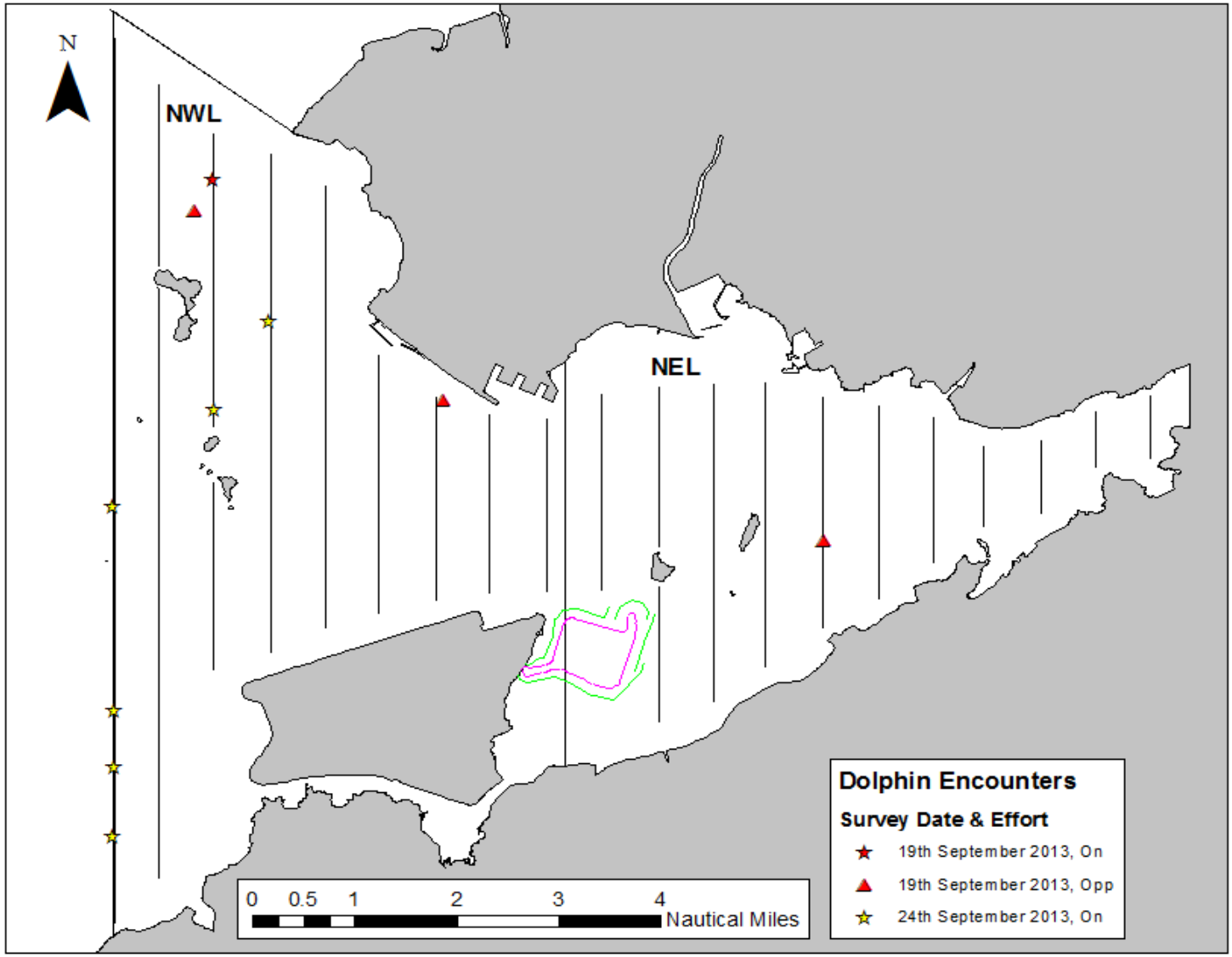

Figure 3 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (September 2013)

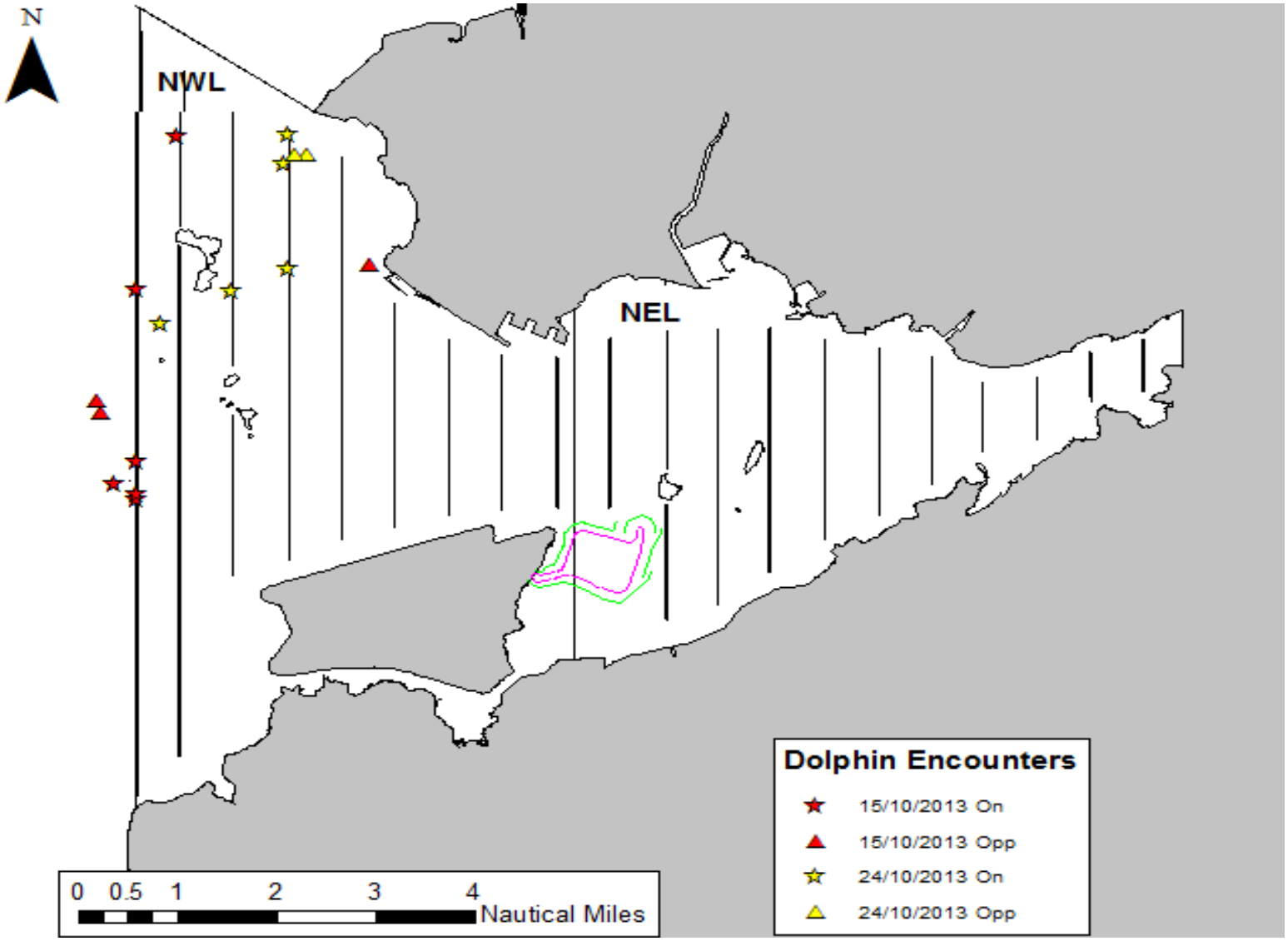

Figure 4 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (October 2013)

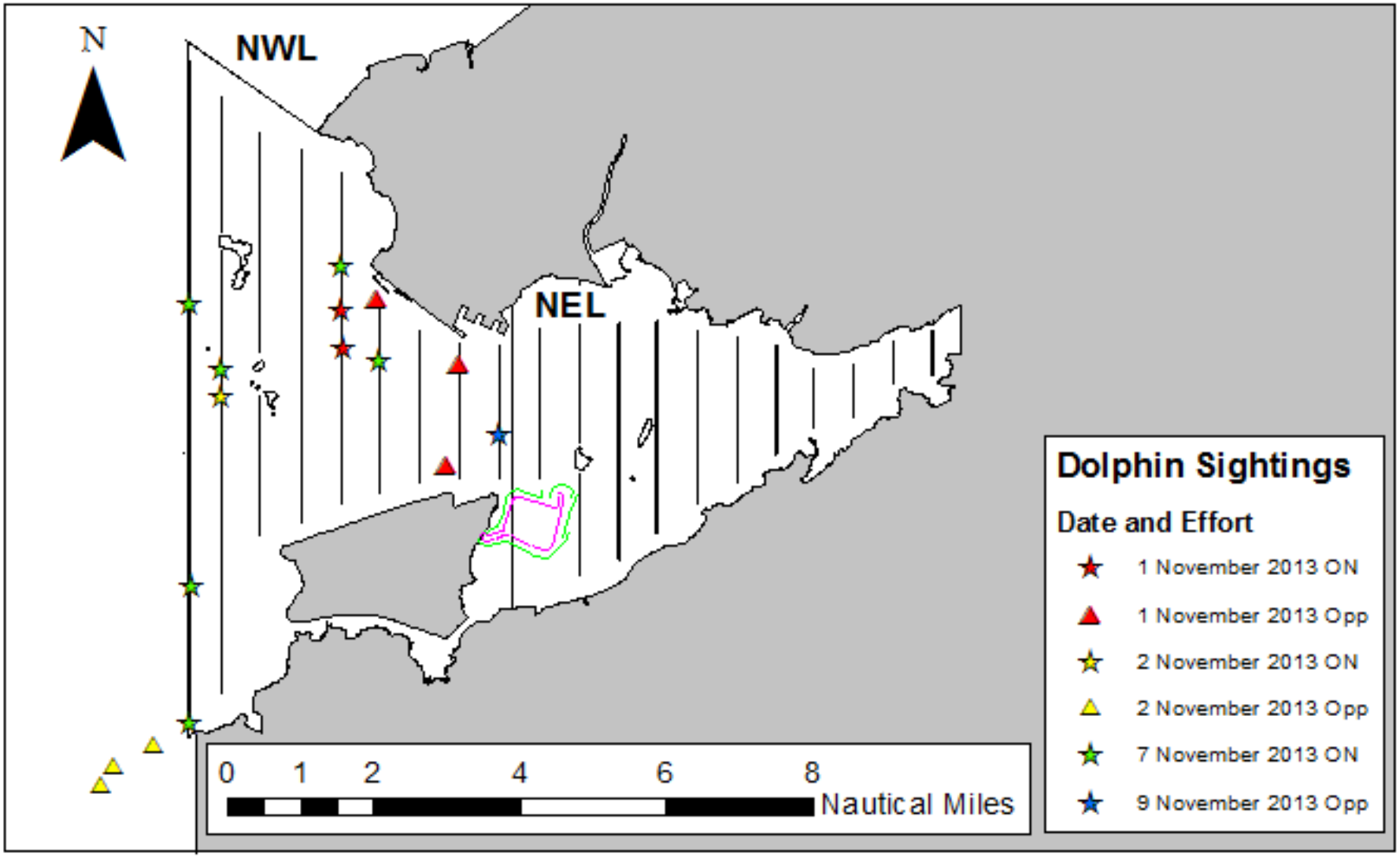

Figure 5 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (November 2013)

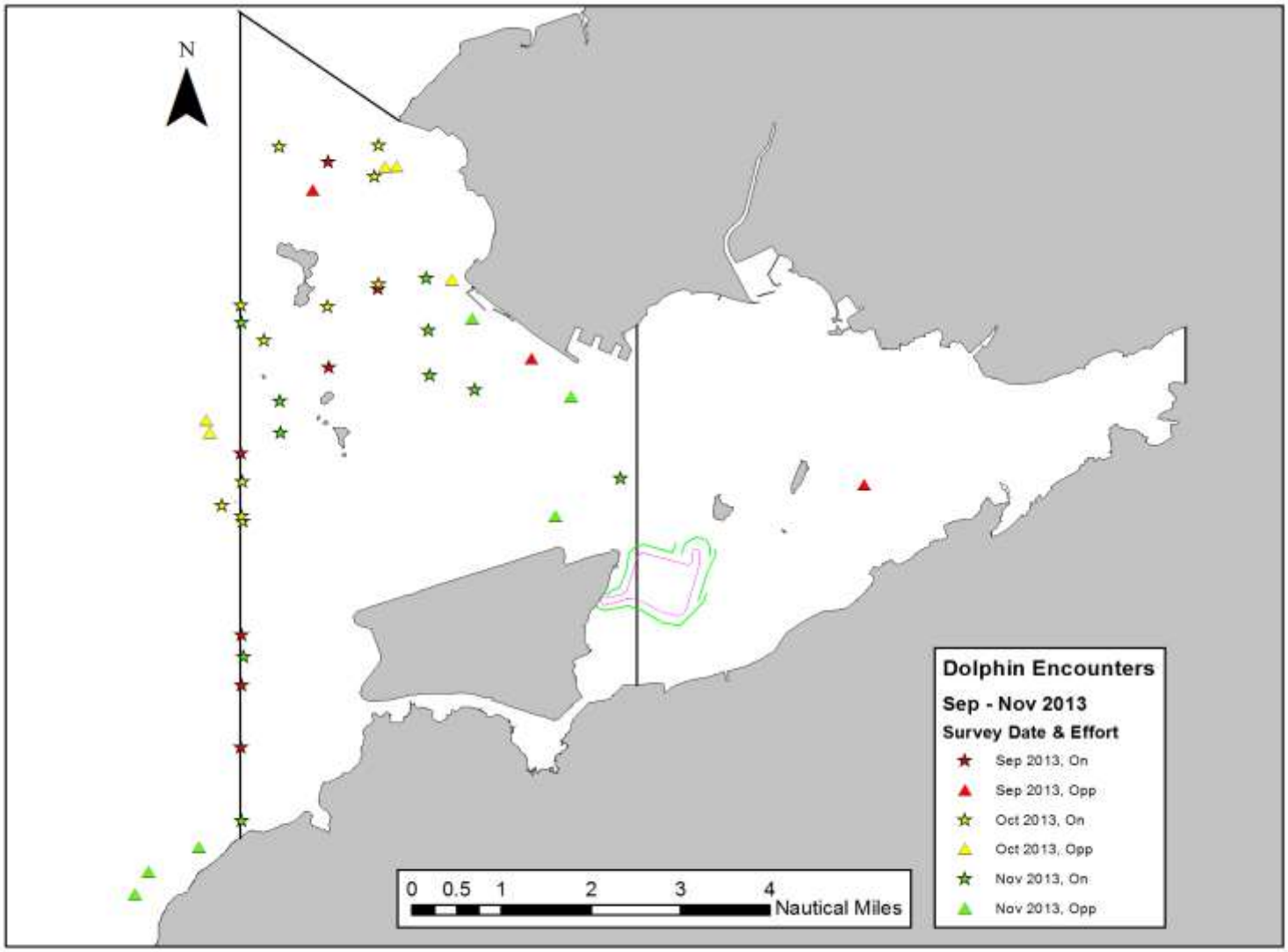

Figure 6. Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (September – November 2013)

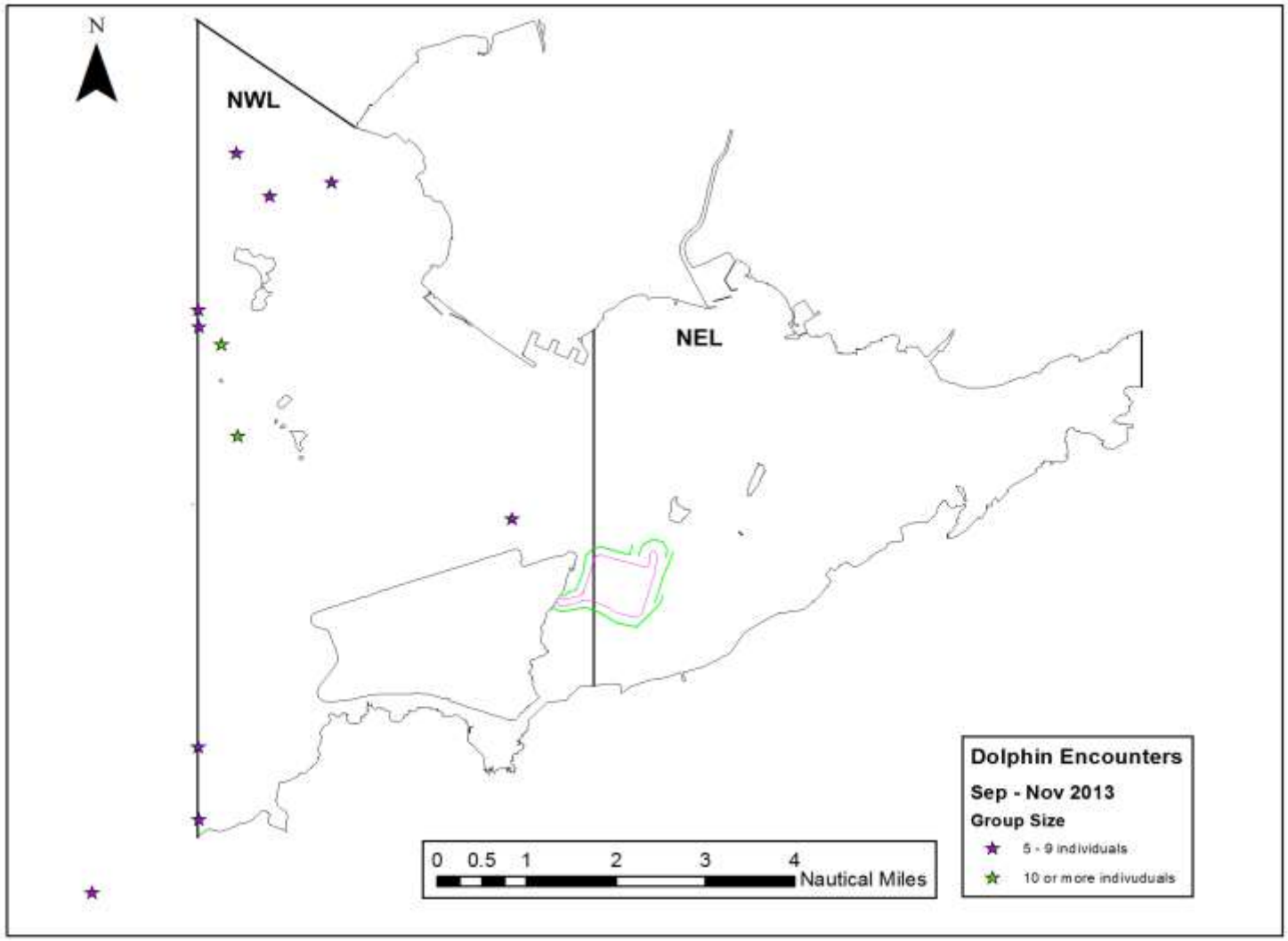

Figure 7. The Location of Dolphin Groups Numbering 5 and Above Individuals (September – November 2013)

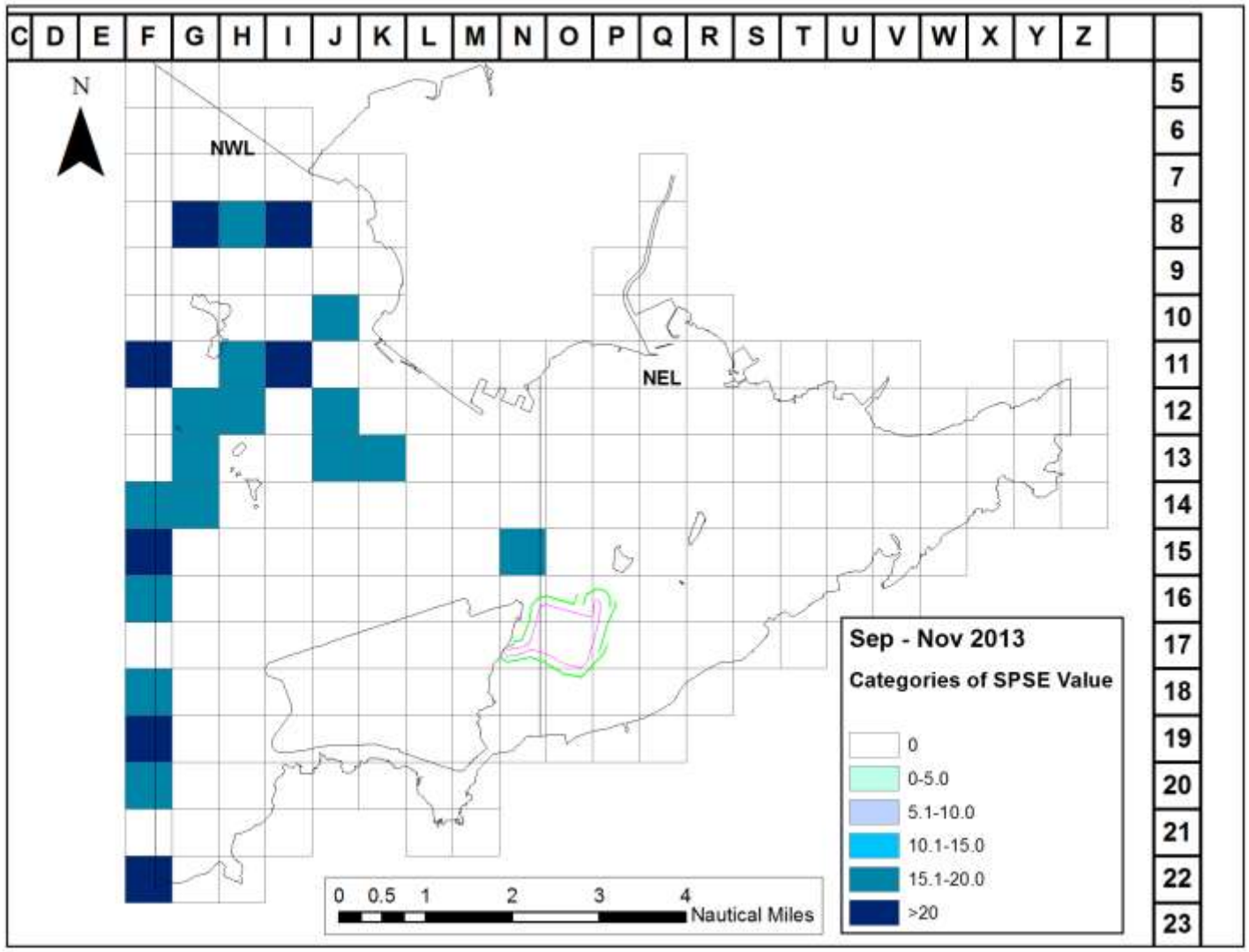

Figure 8. Sighting density SPSE (number of on-effort sightings per 100 units of survey effort) for September – November 2013.

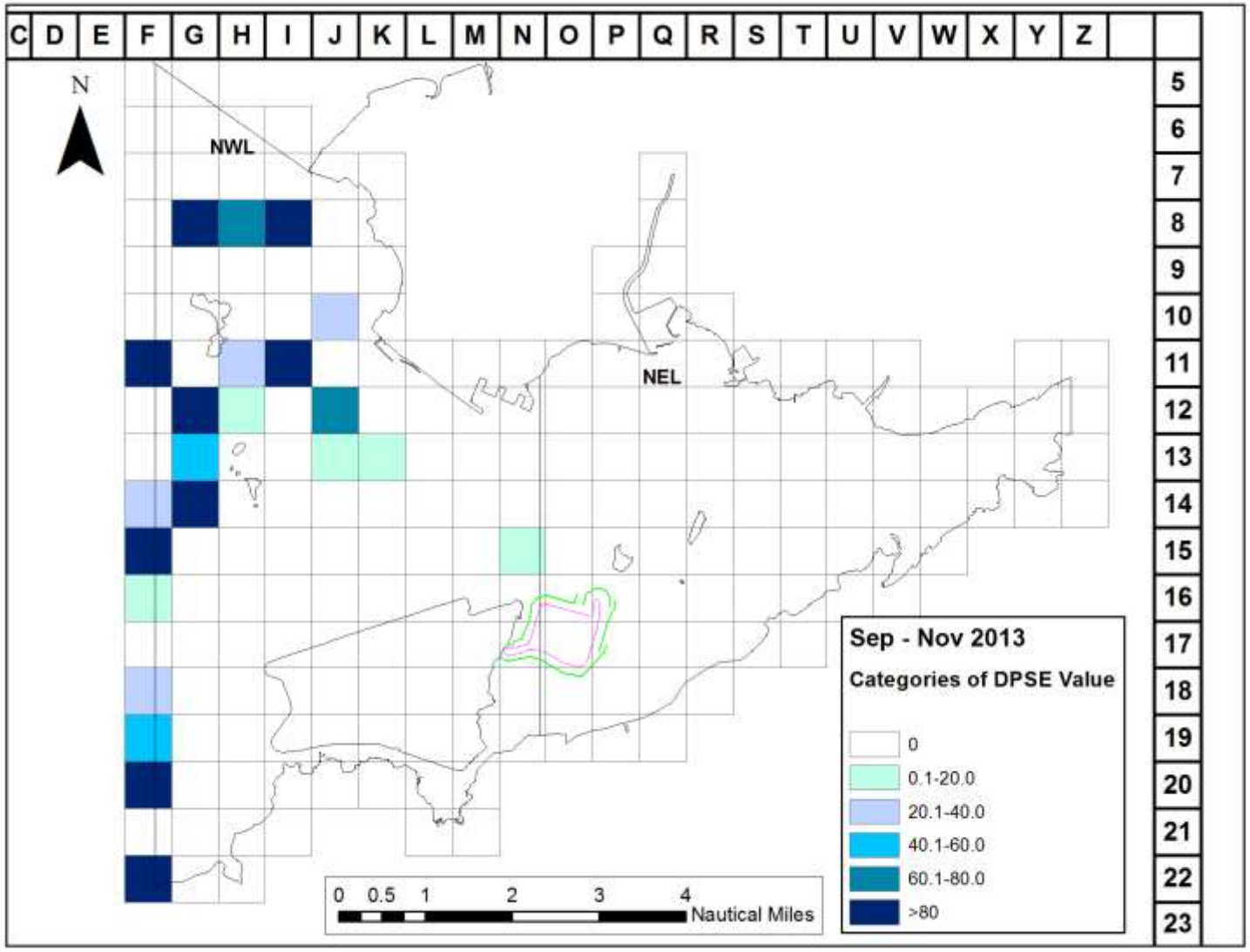

Figure 9. Dolphin density DPSE (number of dolphins per 100 units of survey effort) for September – November 2013.

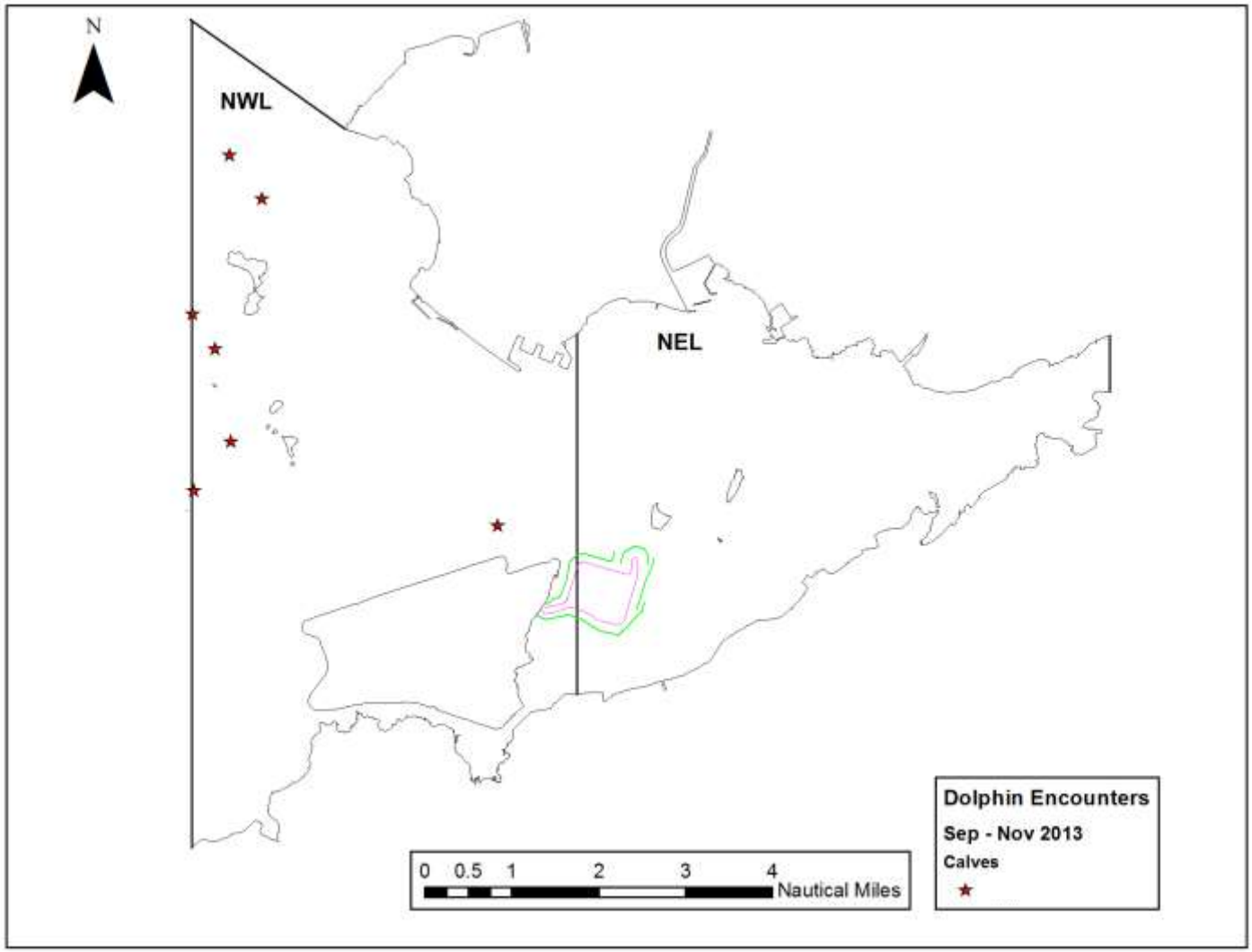

Figure 10. Location of groups containing mother and calf pairs during September – November 2013.

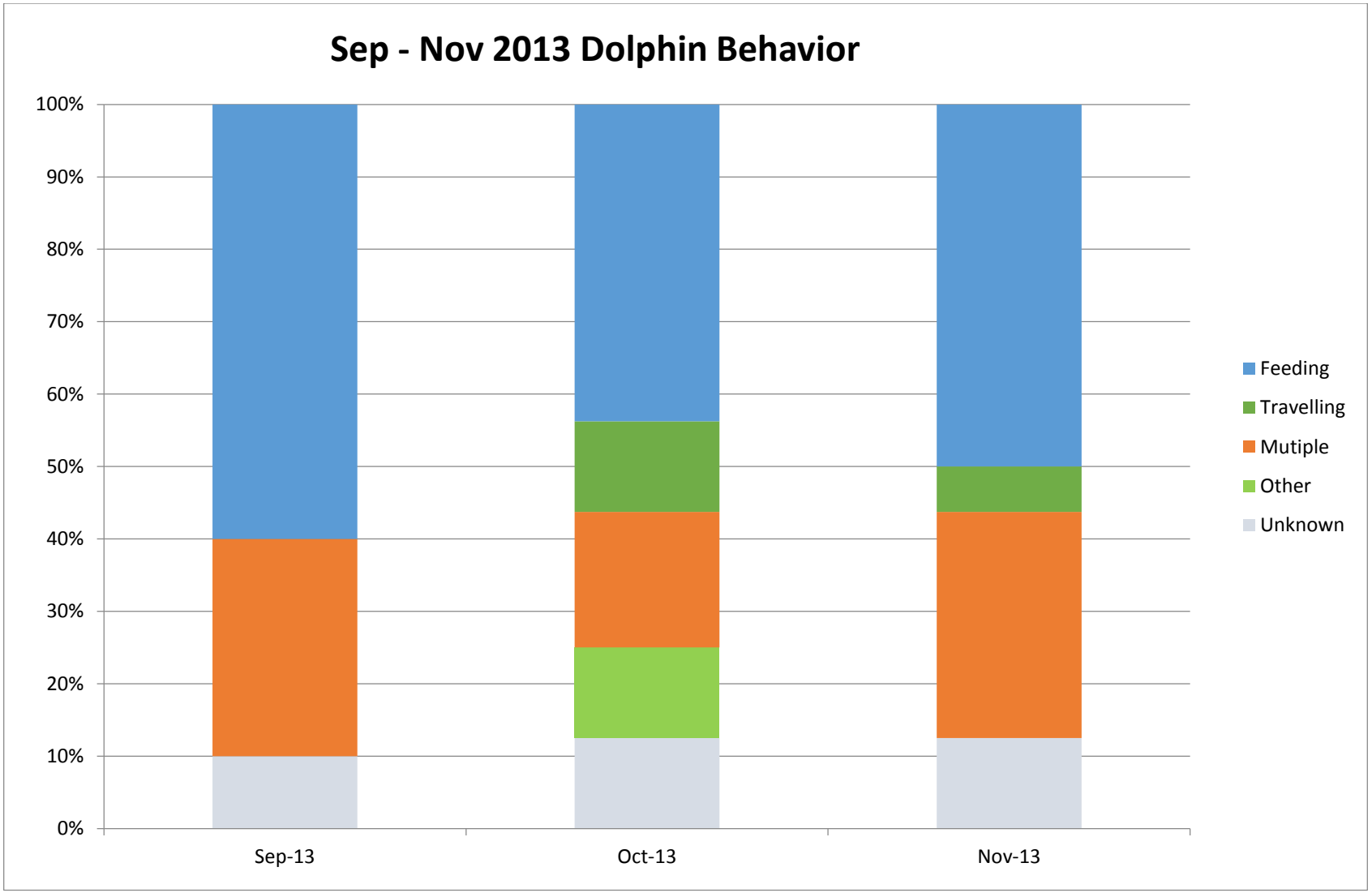

Figure 11. Activity Budget for Dolphin Behaviour September – November 2013.

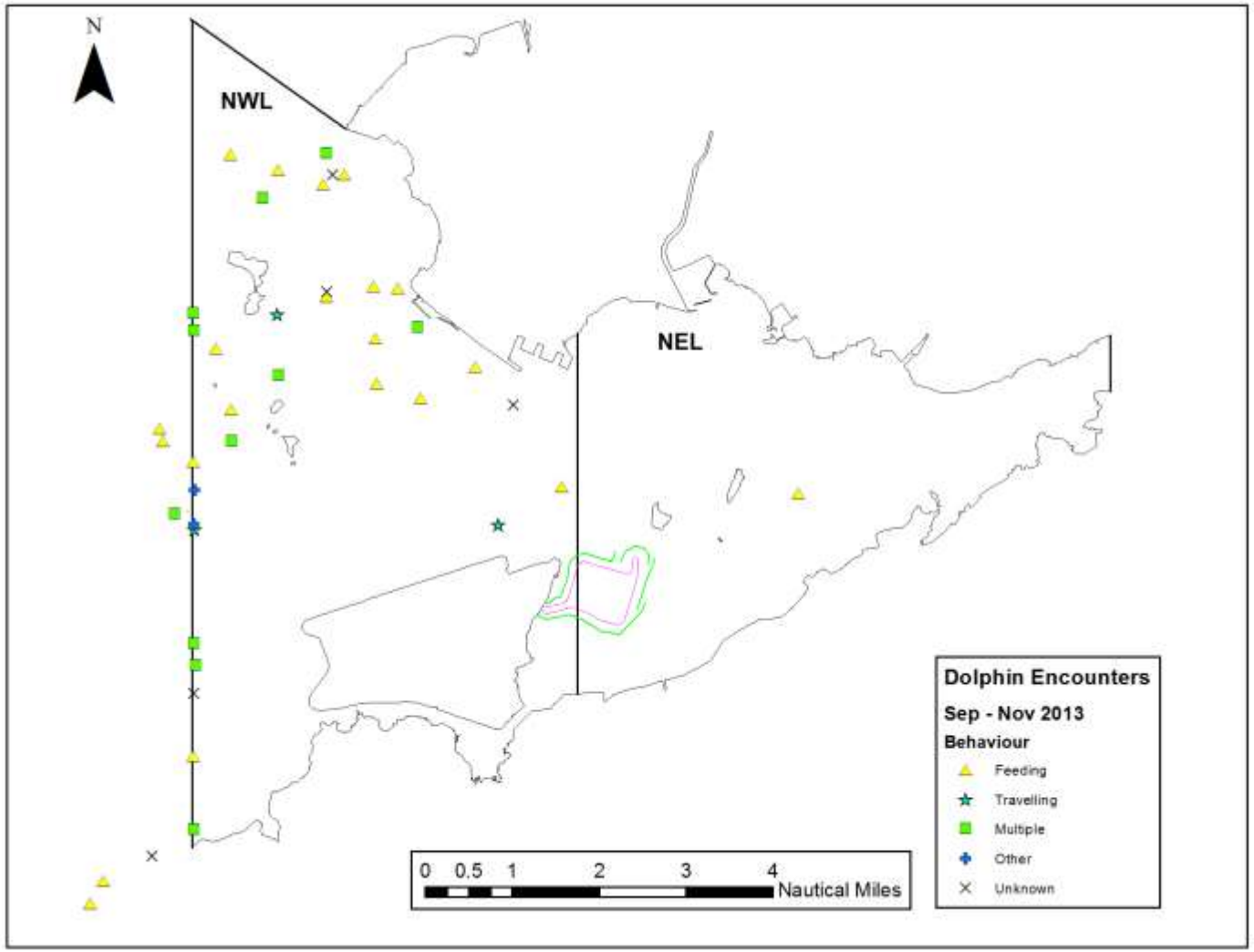

Figure 12. The Location of Different Behavioural Activities June to August 2103

Annex I Summary of Data from the Baseline Monitoring and September – November 2012 and September – November 2013 (this study) and Calculated Encounter Rates

Date	Area	Groups	Trackline (KM)	Encounter rate
Sept – Nov 2011 (Baseline Monitoring)	**NEL**	10	175.7	5.4
Sept – Nov 2011 (Baseline Monitoring)	**NWL**	34	359.0	9.5
Sept-Nov 2012 (Third Quarter)	**NEL**	13	221	5.9
Sept-Nov 2012 (Third Quarter)	**NWL**	39	438.8	8.9
Sept-Nov 2013 (Seventh Quarter)	**NEL**	0	220.7	0
Sept-Nov 2013 (Seventh Quarter)	**NWL**	28	445.2	6.3

Annex II. Impact Monitoring Survey Schedule and Details (September – November 2013)

Date	Location	No. Sightings "on effort"	No. Sightings "opportunistic"	Total km "on effort"
17/09/2013	NE Lantau	0	0	33.5
19/09/2013	NW & NE Lantau	1	3	77.5
24/09/2013	NW Lantau	6	0	63.4
25/09/2013	NW & NE Lantau	0	0	47.6
15/10/2013	NW Lantau	6	3	59.7
17/10/2013	NW & NE Lantau	0	0	52.1
24/10/2013	NW Lantau	5	2	58.7
28/10/2013	NW & NE Lantau	0	0	51.8
01/11/2013	NE and NW Lantau	2	3	59.5
02/11/2013	NWL	1	3	52.2
07/11/2013	NWL	6	0	64.7
09/11/2013	NE and NW Lantau	1	0	47.5
	Total	**28**	**14**	**668.2**

All effort in all sea states is listed

Annex III. Impact Monitoring Survey Effort Summary (September – November 2013)

Date	Area	Beaufort	Effort (km)	Season	Vessel	Type
17/9/2013	NEL	1	9.2	AUTUMN	HKDW	IMPACT
17/9/2013	NEL	2	15.6	AUTUMN	HKDW	IMPACT
17/9/2013	NEL	3	7.7	AUTUMN	HKDW	IMPACT
17/9/2013	NEL	4	1	AUTUMN	HKDW	IMPACT
19/9/2013	NEL	2	3.5	AUTUMN	HKDW	IMPACT
19/9/2013	NWL	1	10.6	AUTUMN	HKDW	IMPACT
19/9/2013	NWL	2	44.7	AUTUMN	HKDW	IMPACT
19/9/2013	NWL	3	18.7	AUTUMN	HKDW	IMPACT
24/9/2013	NWL	1	23.6	AUTUMN	HKDW	IMPACT
24/9/2013	NWL	2	19.4	AUTUMN	HKDW	IMPACT
24/9/2013	NWL	3	20.4	AUTUMN	HKDW	IMPACT
25/9/2013	NWL	1	7.6	AUTUMN	HKDW	IMPACT
25/9/2013	NWL	2	2.7	AUTUMN	HKDW	IMPACT
25/9/2013	NEL	1	20.3	AUTUMN	HKDW	IMPACT
25/9/2013	NEL	2	17	AUTUMN	HKDW	IMPACT
15/10/2013	NWL	1	35.8	AUTUMN	HKDW	IMPACT
15/10/2013	NWL	2	23.9	AUTUMN	HKDW	IMPACT
17/10/2013	NWL	1	1.1	AUTUMN	HKDW	IMPACT
17/10/2013	NWL	2	7.4	AUTUMN	HKDW	IMPACT
17/10/2013	NWL	3	6	AUTUMN	HKDW	IMPACT
17/10/2013	NEL	1	9.2	AUTUMN	HKDW	IMPACT
17/10/2013	NEL	2	20.5	AUTUMN	HKDW	IMPACT
17/10/2013	NEL	3	7.9	AUTUMN	HKDW	IMPACT
24/10/2013	NWL	1	12.2	AUTUMN	HKDW	IMPACT
24/10/2013	NWL	2	32.7	AUTUMN	HKDW	IMPACT
24/10/2013	NWL	3	13.7	AUTUMN	HKDW	IMPACT
24/10/2013	NWL	4	0.1	AUTUMN	HKDW	IMPACT
28/10/2013	NWL	1	4.9	AUTUMN	HKDW	IMPACT
28/10/2013	NWL	2	10.2	AUTUMN	HKDW	IMPACT
28/10/2013	NEL	1	14.6	AUTUMN	HKDW	IMPACT
28/10/2013	NEL	2	10.7	AUTUMN	HKDW	IMPACT
28/10/2013	NEL	3	11.4	AUTUMN	HKDW	IMPACT
11/1/2013	NEL	1	35.4	AUTUMN	HKDW	IMPACT
11/1/2013	NWL	1	14.6	AUTUMN	HKDW	IMPACT
11/1/2013	NWL	2	9.5	AUTUMN	HKDW	IMPACT

Annex III. Impact Monitoring Survey Effort Summary (September – November 2013) (con)

Date	Area	Beaufort	Effort (km)	Season	Vessel	Type
11/2/2013	NWL	2	26.7	AUTUMN	HKDW	IMPACT
11/2/2013	NWL	3	24.3	AUTUMN	HKDW	IMPACT
11/2/2013	NWL	4	1.2	AUTUMN	HKDW	IMPACT
11/7/2013	NWL	1	43.4	AUTUMN	HKDW	IMPACT
11/7/2013	NWL	2	21.3	AUTUMN	HKDW	IMPACT
11/9/2013	NEL	1	10	AUTUMN	HKDW	IMPACT
11/9/2013	NEL	2	21.2	AUTUMN	HKDW	IMPACT
11/9/2013	NEL	3	6.5	AUTUMN	HKDW	IMPACT
11/9/2013	NWL	1	3.7	AUTUMN	HKDW	IMPACT
11/9/2013	NWL	2	6.1	AUTUMN	HKDW	IMPACT

Annex IV. Impact Monitoring Sighting Database (September – November 2013)

Project	Contract	Date	Sighting No.	Time	Group Size	Area	Beaufort	PSD	Effort	Type	Latitude	Longitude	Season	Boat Assoc
HKBCF	HY/2010/02	9/19/2013	791	9:42	1	NEL	1	NA	Opp	Impact	22.33573	113.9952	Autumn	No
HKBCF	HY/2010/02	9/19/2013	792	11:31	1	NWL	2	NA	Opp	Impact	22.35992	113.9283	Autumn	No
HKBCF	HY/2010/02	9/19/2013	794	14:13	4	NWL	2	94	On	Impact	22.39786	113.8874	Autumn	No
HKBCF	HY/2010/02	9/19/2013	795	14:31	6	NWL	2	NA	Opp	Impact	22.39240	113.8843	Autumn	No
HKBCF	HY/2010/02	9/24/2013	798	9:19	5	NWL	1	243	On	Impact	22.28493	113.8701	Autumn	No
HKBCF	HY/2010/02	9/24/2013	799	10:02	1	NWL	1	279	On	Impact	22.29694	113.8703	Autumn	No
HKBCF	HY/2010/02	9/24/2013	800	10:15	2	NWL	1	30	On	Impact	22.30655	113.8702	Autumn	No
HKBCF	HY/2010/02	9/24/2013	802	10:42	2	NWL	2	78	On	Impact	22.34161	113.8700	Autumn	No
HKBCF	HY/2010/02	9/24/2013	803	13:33	1	NWL	1	221	On	Impact	22.35825	113.8877	Autumn	No
HKBCF	HY/2010/02	9/24/2013	804	14:41	4	NWL	3	85	On	Impact	22.37340	113.8975	Autumn	No
HKBCF	HY/2010/02	10/15/2013	812	9:48	2	NWL	2	365	On	Impact	22.33154	113.8662	Autumn	No
HKBCF	HY/2010/02	10/15/2013	813	9:51	1	NWL	2	347	On	Impact	22.32847	113.8704	Autumn	No
HKBCF	HY/2010/02	10/15/2013	814	9:53	1	NWL	2	7	On	Impact	22.32959	113.8702	Autumn	No
HKBCF	HY/2010/02	10/15/2013	815	10:11	3	NWL	1	61	On	Impact	22.33614	113.8703	Autumn	No
HKBCF	HY/2010/02	10/15/2013	817	10:43	1	NWL	1	NA	Opp	Impact	22.34800	113.8630	Autumn	No
HKBCF	HY/2010/02	10/15/2013	818	10:44	1	NWL	1	NA	Opp	Impact	22.34564	113.8637	Autumn	No
HKBCF	HY/2010/02	10/15/2013	819	11:15	6	NWL	1	64	On	Impact	22.37013	113.8700	Autumn	No
HKBCF	HY/2010/02	10/15/2013	820	12:15	8	NWL	1	50	On	Impact	22.40074	113.8776	Autumn	No
HKBCF	HY/2010/02	10/15/2013	821	16:33	3	NWL	2	NA	Opp	Impact	22.37510	113.9123	Autumn	No
HKBCF	HY/2010/02	10/24/2013	827	11:00	12	NWL	1	441	On	Impact	22.36340	113.8746	Autumn	No
HKBCF	HY/2010/02	10/24/2013	829	13:24	2	NWL	2	58	On	Impact	22.36996	113.8874	Autumn	No
HKBCF	HY/2010/02	10/24/2013	830	14:04	3	NWL	2	10	On	Impact	22.40109	113.8975	Autumn	No
HKBCF	HY/2010/02	10/24/2013	831	14:34	5	NWL	1	848	On	Impact	22.39506	113.8968	Autumn	No
HKBCF	HY/2010/02	10/24/2013	832	15:07	2	NWL	1	NA	Opp	Impact	22.39703	113.9011	Autumn	No
HKBCF	HY/2010/02	10/24/2013	833	15:11	2	NWL	1	NA	Opp	Impact	22.39688	113.8988	Autumn	No
HKBCF	HY/2010/02	10/24/2013	834	15:21	1	NWL	1	69	On	Impact	22.37427	113.8976	Autumn	No

Annex IV. Impact Monitoring Sighting Database (September – November) (con)

Project	Contract	Date	Sighting No.	Time	Group Size	Area	Beaufort	PSD	Effort	Type	Latitude	Longitude	Season	Boat Assoc
HKBCF	HY/2010/02	11/1/2013	837	13:34	2	NWL	1	NA	Opp	Impact	22.35255	113.9363	Autumn	No
HKBCF	HY/2010/02	11/1/2013	838	14:25	1	NWL	2	NA	Opp	Impact	22.36760	113.9164	Autumn	No
HKBCF	HY/2010/02	11/1/2013	839	15:26	4	NWL	1	112	On	Impact	22.36538	113.9076	Autumn	No
HKBCF	HY/2010/02	11/1/2013	841	16:17	1	NWL	2	173	On	Impact	22.35673	113.9079	Autumn	No
HKBCF	HY/2010/02	11/1/2013	842	17:08	5	NWL	2	NA	Opp	Impact	22.32953	113.9332	Autumn	No
HKBCF	HY/2010/02	11/2/2013	845	11:44	11	NWL	2	594	On	Impact	22.34556	113.8780	Autumn	No
HKBCF	HY/2010/02	11/2/2013	847	14:38	2	NWL	3	NA	Opp	Impact	22.26560	113.8617	Autumn	No
HKBCF	HY/2010/02	11/2/2013	849	15:01	5	NWL	3	NA	Opp	Impact	22.25650	113.8488	Autumn	No
HKBCF	HY/2010/02	11/2/2013	850	15:43	1	NWL	3	NA	Opp	Impact	22.26079	113.8516	Autumn	No
HKBCF	HY/2010/02	11/7/2013	853	9:08	6	NWL	1	141	On	Impact	22.27083	113.8703	Autumn	No
HKBCF	HY/2010/02	11/7/2013	854	9:46	2	NWL	1	109	On	Impact	22.30234	113.8706	Autumn	No
HKBCF	HY/2010/02	11/7/2013	855	10:38	6	NWL	2	76	On	Impact	22.36685	113.8701	Autumn	No
HKBCF	HY/2010/02	11/7/2013	856	12:13	3	NWL	1	169	On	Impact	22.35167	113.8778	Autumn	No
HKBCF	HY/2010/02	11/7/2013	857	15:31	2	NWL	2	65	On	Impact	22.37546	113.9072	Autumn	No
HKBCF	HY/2010/02	11/7/2013	858	16:31	1	NWL	1	13	On	Impact	22.35391	113.9170	Autumn	No
HKBCF	HY/2010/02	11/9/2013	860	10:49	1	NWL	2	24	On	Impact	22.33698	113.9463	Autumn	No

Annex V

METHODS PROPOSAL FOR DENSITY SURFACE MODELLING AND POWER ANALYSES RELATED TO THE HONG KONG-ZHUHAI-MACAO BRIDGE (HZMB)

OVERVIEW

This document outlines the proposed statistical analysis of data concerning the Chinese White Dolphin (CWD) found in and around the HZMB area. The proposal involves the analysis of baseline monitoring data and data collected during and post construction.

This proposal outlines statistical analyses for comparing differences in dolphin densities between baseline and impact monitoring - as per Section 9.5.3 of the Contract Specific EM & A Manual.

This document also serves a form of Statistical Analysis Plan (SAP) that permits vetting of the statistical methods. The technical details necessarily pre-suppose familiarity with statistical models, in particular Generalized Linear Models (GLMs) or Generalized Additive Models (GAMs).

ASSESSING THE DISTRIBUTION OF DOLPHINS IN THE SURVEYED AREA

The distribution of dolphins through space and time will be described by statistical models fitted to dolphin observation data. Relevant drivers of dolphin distributions, such as oceanographic features, will also be included in the modelling process. The modelling methods employed will be appropriate for the problem, representing the most recent developments in this area and currently accepted UK standards for species distribution modelling for the purposes of Environmental Impact Assessments. The methods are described briefly here.

FLEXIBLE MODELLING OF ANIMAL DISTRIBUTIONS

In many surveyed sites, the way the animals distribute themselves can vary a great deal. For example, some areas (e.g. close to the coast) may require a very flexible modelling surface which can potentially change quickly with local features, while areas with deeper water may exhibit less local variability and require less flexibility.

It is important to target model flexibility to ensure important local features are not missed and 'smoothed-out', such as areas in and around a potentially impacted site, and to ensure the spatial range of any local effects that do exist are not exaggerated. For instance, 'smoothing-out' local features will result in under-reporting of any impacts in and around the site(s) of interest and also result in extending the range of the impact into areas which are, in truth, unaffected.

Targeting model flexibility also helps ensure that some areas of the surface are not unduly variable, and therefore natural fluctuations in dolphin numbers are not mistaken for genuine changes in the underlying system. This is particularly relevant in impact studies where it is important not to falsely attribute natural variability in animal numbers to an impact effect.

The methods we propose to use for the HZMB data are 'spatially-adaptive' and allow model flexibility to be targeted. Additionally, these methods are developed with impact assessment in mind, to allow a particular focus on special areas of interest e.g. in and around the potentially impacted site. The

methods proposed for the analysis reflect the most recent research in this area[8]. They were recently presented as an invited talk for the UK government and industry 'Sharing Good Practice' event for Scottish Natural Heritage (November, 2011)[9] and are currently being used to analyse an extensive international data set collected over 30 years as a part of the recent Joint Cetacean Protocol Project (JCP, commissioned by the UK government; JNCC)[10]. These methods have also been used successfully to model many renewable projects for a variety of large UK and international companies with stakes in renewables (Forewind, Centrica plc, Royal Haskoning), including one of the world's largest offshore wind farms[11].

As an example of modelling output, 'difference-maps' illustrating where statistically significant changes/redistribution of animals across a surveyed area can be supplied with reference to an impact site (Figure 1). This allows any differences over time to be geo-referenced, helping the end-user to exercise judgement about whether differences are both significant and related to the speculative impact. Maps of this nature will be extended to the current region (Figure 2).

INCLUSION OF COVARIATE DATA

Any readily available data that might be useful in the prediction of dolphin distributions can and should be considered for selection in these models. The utility of these covariates for predicting dolphin distributions can then be determined during the modelling phase. The covariates might include oceanographic features such as tidal flows and bathymetry, whose temporal & spatial resolution can be variable e.g. daily/ weekly /monthly. The finest available resolutions will be considered as a starting point; however the most sensible resolutions are also determined during the modelling process. For example, some covariate data may need to be coarsened to match the resolution of the dolphin observation data.

Covariates for consideration

The following outlines the available covariates for *a priori* consideration in the models, with justification. These may not be represented in the final model, subject to model selection results.

- Time of day, day-of-year, month, year: These temporal measures will all be included as potential covariates in the model to capture patterns of dolphin distribution not evident in other covariates. For example, month has a tendency to capture seasonal variations in animal distributions; the time of day may capture diurnal patterns beyond tidal patterns.

- Tidal state: marine animals typically show patterns of activity associated with tidal cycles. This can be due to changes in water depth, tidal flows, prey movements, etc. Suitable summaries of the tidal state will be considered in the pool of covariates.

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[8] Scott Hayward, L. A. S. , Mackenzie ,M. L. , Donovan, C R , Walker, C. & Ashe, E. (2013), Complex Region Spatial Smoother (Cress). Journal of Computational and Graphical Statistics. In press

[9] http://www.snh.gov.uk/docs/a609642.pdf

[10] Paxton, C., Mackenzie, M. L., Burt, L., Rexstad, E. & Thomas, L. (2011) Phase II Data Analysis Of Joint Cetacean Protocol Data Resource, Http://Jncc.Defra.Gov.Uk/Pdf/Jcp_Phase_II_Report.Pdf

[11] Comparing Pre- and Post-Construction Distributions of Long-Tailed Ducks Clangula Hyemalis in and Around the Nysted Offshore Wind Farm, Denmark : A Quasi-Designed Experiment Accounting for Imperfect Detection, Local Surface Features and Autocorrelation. Http://Hdl.Handle.Net/10023/2008

- Salinity/Turbidity/DO & DO saturation/pH: while these may not be directly influential on dolphins, they may present as proxies for prey distributions or habitats which influence dolphin distributions.

- Depth: this frequently serves as a strong predictor of the distributions of marine animal distributions. There are many potential reasons for this e.g. in the case of diving animals this indicates the accessibility of the sea floor. It is also a strong indicator of particular prey species and is often indicative of the proximity of land masses.

- Water temperature: as above, this is frequently a strong predictor of marine animal distributions, whether as a direct driver on the animals or via its effects on productivity and prey distributions.

- Suspended solids: given the nature of the construction activities, patterns in animal distributions relating to solids in the water column will be of clear interest.

- Details of construction activities per day: These are essential, as they will provide the basis of variables that code for potential construction–related impacts. These will be translated into an appropriate small set of categorical variables and potentially durations, depending on the available information.

Data resolution

The maximum native resolution will be used in the first instance where possible to retain the maximum information. The resolutions need not be matched either in time or space and can be post-processed where needed. The resolutions of the covariate data identified above are:

- Native resolutions of the data….

The resolution of the data may be coarsened in some cases. This cannot be determined with certainty prior to analysis of the data, but the following scenarios are common based on previous work in this area:

- Dolphin observation data is frequently very spatially and temporally sparse i.e. dominated by zero observations. The data may be condensed to quarter-hour to hour temporal resolution and some 100s of metre spatial resolution.

- All subsequent covariate data will be formatted to match the dolphin observation data. For example, near-continuous time covariates, such as tide height, will be condensed to match the temporal resolution of the observations data.

MODEL STRUCTURE/EQUATIONS

To avoid unnecessary assumptions, the models proposed are:

- adaptive in their systematic form,
- have a range of potential error distributions,
- can accommodate various types of non-independence in the errors.

The modelling process will involve the selection of model terms, optimisation of covariate-response functions and selection of models for stochastic components.

Hence, the specific model equation cannot be known with certainty prior to analysis. This is common to any modelling process that involves optimisation of complexity e.g. regression with model selection, GAMs with optimised smoothing terms. However the broad model structure can be considered, being a type of GAM fitted with GEEs.

Generalized Additive Models (GAMs)

Broadly we seek to estimate *f*, where the response is in some way functionally related to a set of covariates $x_1, \cdots x_j$:

$$g(\mu) = f(x_1, x_2, \cdots, x_j)$$

The actual observed response will consist of some inexplicable noise, modelled by some error distribution. The approach is similar to GLMs, so the mean response μ is modelled on the scale of a link-function $g(\cdot)$, with errors e being governed by probability density functions of the exponential family e.g. Gaussian, Gamma, Poisson or quasi- variants. In the current context, μ may be the expected numbers or densities of dolphins, with the x being relevant covariates including spatial coordinates.

GLMs approximate the link-scale *f* with a simple linear form, $\boldsymbol{X\beta}$, where $\boldsymbol{X}$ is the matrix of measured covariates and $\boldsymbol{\beta}$ the associated parameters to be estimated. GAMs differ by seeking to approximate *f* as a linear combination of smooths on the link-scale, whose individual forms are estimated from the data. As an indication:

$$g(\mu) = \beta_0 + s_1(x_1) + \cdots s_j(x_j) + s_{j+1}(\boldsymbol{x}_m) + \cdots + s_k(\boldsymbol{x}_n)$$

Where we can have a range of marginal/single-covariate smooth terms $s_j(x_j)$, and multidimensional smooth terms $s(\boldsymbol{x})$, for groups of covariates $\boldsymbol{x}$, as required. The smooth terms may be very smooth, i.e. linear terms, meaning that GLMs are a special case. Categorical variables can be included as per ordinary GLMs, not included as smooths *per se*, but via dummy variables.

The fitting of this model operates under assumed error distributions, such as found in GLMs. The smooths themselves can be created in a variety of ways, with splines being commonplace. The complexity of the smooth terms is either set in advance or estimated. The various smooth terms to be included in the model will be subject to selection methods i.e. parsimonious models are selected with insignificant terms dropped.

GAMs are a well-established flexible modelling tool with extensive theoretical treatment – for example refer to Hastie & Tibshirani (1989) or Wood (2006).

ACCOUNTING FOR CORRELATED DATA/ERRORS

The models we propose to use for this analysis are designed for data collected across space and time, which is true of the type of survey data considered here. This methodology allows for reliable geo-referenced confidence intervals across the fitted surface - which can be interpreted as best and worst case scenarios for any changes over time. Specifically, the modelling framework involves Generalized Estimating Equations (GEEs[12]) to account for the spatio-temporal autocorrelation.

Most basic statistical modelling methods operate under the simple assumption of independence of errors. However many data collection scenarios will impose some correlation in the errors for these models, due to sampling in a patterned way through space and/or repeated measures on areas through time. The usual consequence of ignoring this correlation when fitting models, is that the variance estimates will be incorrect (typically too small as positive correlation is most common). This has a multitude of inferential consequences – in particular, covariates will be incorrectly determined as significance/insignificant. Generally the complexity of the models is incorrectly determined.

There are a variety of modelling methods to account for this, whereby the correlation structure of the errors is also specified and estimated. We favour here the use of GEEs, which produce empirical adjustments to the variance estimates and are robust to initial misspecification of the error correlation structure.

Any analysis applied to this type of data that does not account for correlated errors will provide spurious results. Most basic statistical tools operate under this assumption of the independence of errors, which while providing simple analyses, produces indefensible results.

MODEL ASSUMPTIONS

The model and fitting method indicated in section 0 are a form of Generalized Additive Model, fitted using Generalized Estimating Equations. These have been chosen to avoid unreasonable or unnecessary assumptions.

Assumptions of the systematic component

As indicated in section 0, the systematic component of the model consists of adaptive spline models for continuous covariates, or factors for categorical covariates. For the spatial component, the function used is a geodesic smoother with adaptive selection of knots and basis functions, as described in Scott-Hayward *et al* (2013). For the modelling of individual continuous covariates these are splines with adaptive knot selection, as described in Walker *et al* (2011). The range of functions that can be approximated by this scheme is very rich.

Common to other regression methods, it is assumed that important predictors are included in the model. However this is mitigated against, in part, by the inclusion of a spatial smoothing term. Un-

[12] Hardin, J. W. and Hilbe, J., Generalized Estimating Equations. 2003. Chapman & Hall/CRC Press.

measured covariates may be represented in by proxy, if they have spatial structure themselves. Failing to include important drivers in the model may produce models with poor predictive power.

The assumptions regarding the systematic component are minimal:

- Due to the adaptive model specification, relatively little is assumed for the functional form of the relationship between the response and continuous covariates, beyond continuity and smoothness.

- The level of complexity is correctly determined i.e. under- and over- fitting are to be avoided, which covariates are important and to be included, the level of smoothing applied. These are determined by various information criteria (AIC, QIC, BIC) and/or cross-validation.

- It is assumed that the covariates are not excessively correlated with one another. These are checked as a matter of course, so high collinearity will be mitigated against.

Assumptions of the stochastic component

Common to GLMs, the models here permit a range of error distributions. The exact distribution assumed is determined during analysis, however the nature of the response suggests quasi-Poisson. The parameter estimates are therefore from maximising either likelihoods or quasi-likelihoods.

Taken collectively, the assumptions implied from our treatment of errors are minimal:

- We do not assume independence of errors, which is *a priori* unlikely. The fitting of GEEs is known to be robust to the choice of working correlation structure, so while this is assumed to be correctly specified, it is not largely influential on the results.

- We do assume that the choice of error distribution is correct, however there is a wide range of distributions to choose between and the choice is scrutinised.

DETERMINATION OF IMPACT

Definition of impact

Impact here is restricted to statistically significant differences in dolphin abundance or spatial distribution that are attributable to construction activities. Other definitions based on the magnitude of effect can be employed if such criteria exist. The models described here provide estimates of the size of effect, along with confidence intervals – these permit alternative impact assessments.

Impact will be sought via statistical models by:

- Statistically significant changes in the absolute or relative abundance of dolphins within the study area, when comparing pre- to post-development data. This is after account has been taken of important covariates.

- Statistically significant changes in the distribution of animals over the study area when comparing pre- to post-development data - again after the effect of important covariates has been accounted for. The model contains a spatial smoothing component, providing estimated surfaces and confidence intervals for the dolphin distributions through time, with other covariates partialled.

Changes in dolphin distributions which are strongly associated with the areas of highest development activity will provide evidence of impact.

It is difficult to determine with certainty that a statistically significant change is due only to development activities. Any change in conditions coincident in time with the development, that is not included as a covariate in the model, serves as an alternative explanation. For example, a disease that is coincident with the development phase.

However, significant distributional changes that are coincident both temporally and spatially with the development will provide a compelling case. For example, if there is a significant shift in distribution around the development site at the same time as development, after other important covariates are accounted for.

Impact hypotheses

The nature of the questions, data and the statistical methods necessitated by these, precludes simple *a priori* hypotheses as might be presented for simple, inappropriate analysis. However some formalisation can be attempted.

- The null hypothesis is one of no impact on the dolphin distribution, or abundance, attributable to development activities.

- The alternative hypothesis is one of some impact on the dolphin distribution, or abundances, due to development activities.

The impact here is determined by statistically significant parameters, or changes parameters, that compare the pre- to post-development states. The models are subject to selection in light of the data, so their specific form cannot be known *a priori*.

Nonetheless, a simple variable can be included in the model, along with the model-selected covariates, that codes for different development states e.g. before/during/after. Significant changes in the general dolphin abundance will be detectible from tests and confidence intervals on these parameters.

Relatedly, the spatial smoothing method has a set of parameters that relate to locally restricted abundances. Tests and confidence intervals for these parameters over the development phases will also identify spatially explicit shifts in dolphin abundances.

More generally, parametric bootstraps will be employed to provide empirical confidence intervals for abundances and their spatial distribution, for the distinct development phases. Any shifts in abundance and distribution over these phases, that are not explicable by natural variation and other covariates, will suggest impacts.

AN ASSESSMENT OF THE POWER OF THE SURVEY (AND DATA) AT DETECTING CHANGE

As a part of this work, the power of the monitoring regime to detect real change in dolphin numbers can also be quantified, under a range of scenarios agreed with the client. For example, this might consist of determining the power to detect a general decline in animal numbers ranging over 5%-50% and/or a spatially restricted decline about the point source.

The power analysis will be carried out using a simulation based approach which includes relevant complexities in the data to ensure realistic results. Specifically, the simulations for power analysis are bespoke to quantify the power in detecting an 'impact' while addressing the following important features of the survey data:

a) Non-linear relationships.
b) Correlated and/or over dispersed observations.
c) Spatially explicit impact/changes.

Briefly, the simulation-based power analysis works as follows:

- A model for the species distribution, including any environmental covariates, is constructed.
- This model, that has been developed on historical data, is assumed to hold true for the future monitoring periods, but with some general reduction in relative animal abundance (e.g. attributable to a specific impact).
- Simulated data is generated from this process with noise consistent with the historical recordings.
- The current modelling process is applied to the multiple sets of simulation data, but additionally estimating an impact effect.
- Various sizes/types of impact are simulated, and detection of a statistically significant effect is sought from the models under scenarios of interest, for example under differing intensities of monitoring.

The inherent noise in the system may mean small installation effects might be difficult to detect over small time-periods, but these effects will become more detectable with more data. Large effects should be detectible sooner. The simulation process described allows quantification of the probability of detecting an effect, for various effect sizes and periods of additional monitoring.

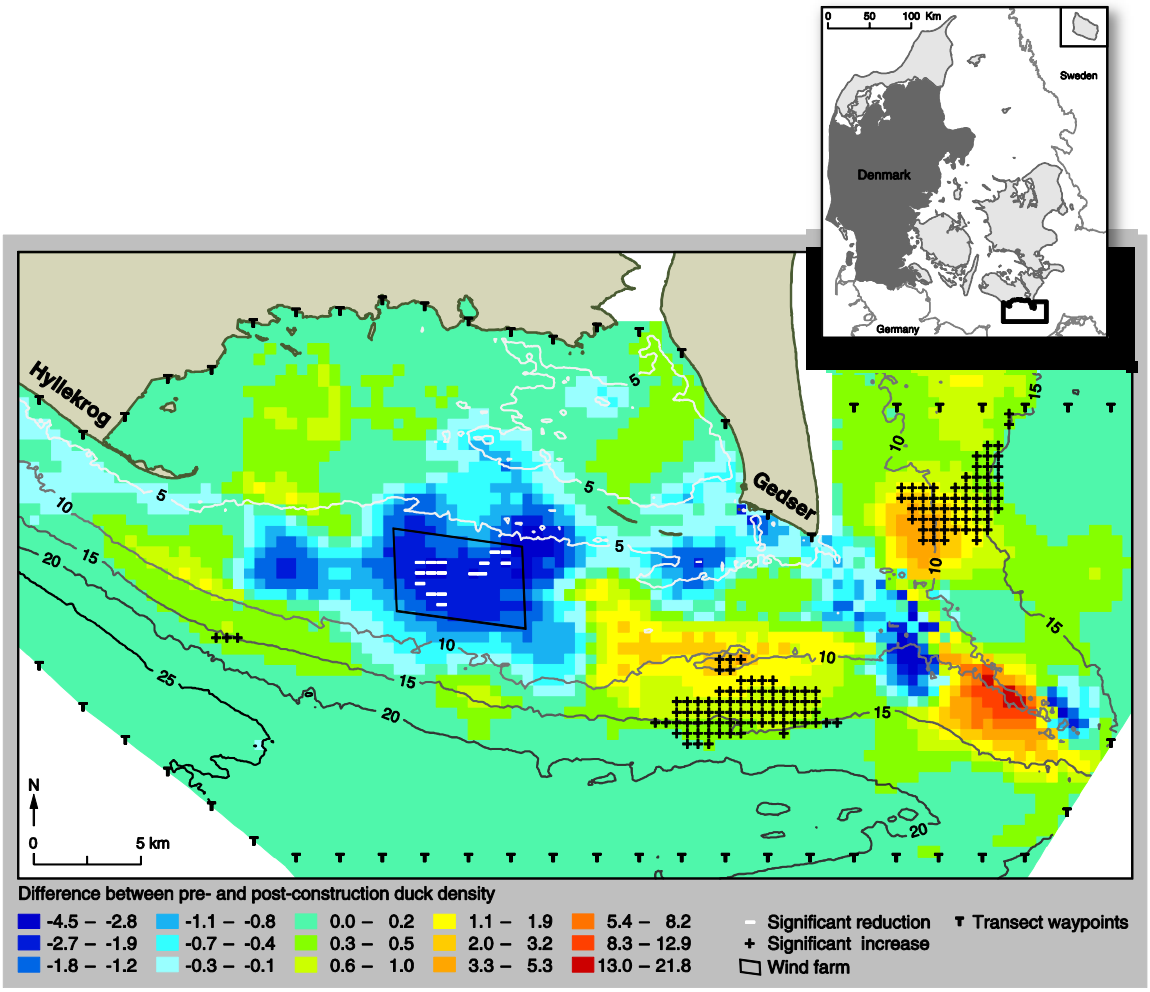

Figure 1: An example output showing the significant decreases (white horizontal lines) and significant increases (solid black crosses) post impact. In this particular case, the scale moves from a deep blue colour (which indicates a decrease in number) to a red colour (which indicates an increase in number) and the animals have moved out along the 10-15m contour in depth, post impact.

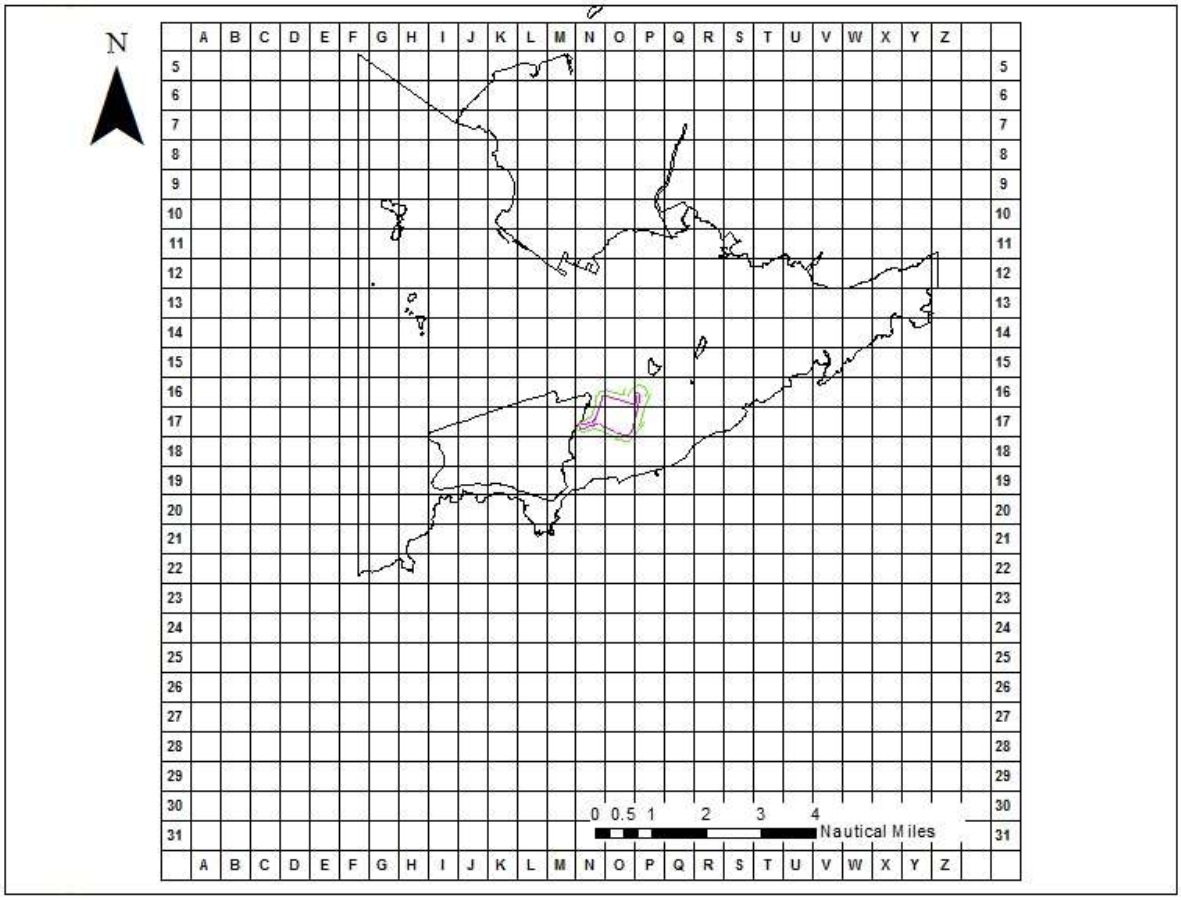

Figure 2: the region over which the methods will be applied, ultimately providing a model surface and infrerence similat to Figure 1. Model predictions can be provided on a range of resolutions.

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Annex VI

March 2012– November 2013

(and Baseline September – November 2011)

Photo Identification Information

Table 1. Sightings of Individually Identified Chinese White Dolphin (*Sousa chinensis*) between March 2012 – November 2013 and during the Baseline Survey (September - November 2011)

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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 094		2013-06-26 2013-06-25 2013-03-18	703 698 601	NWL NWL NWL
HZMB 093		2013-05-24 2013-02-21	657 587	NWL NWL
HZMB 092		2013-02-21 2013-02-15	589 581	NWL NWL
HZMB 091		2013-02-15	579	NWL
HZMB 090		2013-06-25 2013-06-13 2013-02-15	697 682 579	NWL NWL 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 2013-02-15 2011-10-10	642 579 Baseline	NWL NWL NWL
HZMB 085		2013-06-26 2013-02-15	703 579	NWL NWL
HZMB 084		2013-02-14	575	NWL
HZMB 083	NL136	2013-03-28 2013-02-15 2013-01-28 2012-01-28	607 579 568 564	NWL NWL NWL NWL
HZMB 082		2013-02-21 2013-02-15 2013-01-28	587 579 563	NWL NWL NWL
HZMB 081		2013-01-28 2013-01-28	559 557	NWL NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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		2013-07-08	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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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 060		2012-09-18	447	NWL
HZMB 059		2013-02-21	591	NWL
		2012-09-18	445	NWL
HZMB 057		2012-09-18	440	NWL
HZMB 056		2012-09-18	442	NWL
		2012-09-05	433	NEL
HZMB 055		2012-09-04	425	NWL

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 055		2012-09-04	425	NWL
HZMB 054	CH34	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
		2012-09-18	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		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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 046		2012-09-03	412	NWL
HZMB 045		2013-06-13	682	NWL
		2013-02-15	579	NWL
		2012-11-01	495	NWL
HZMB 044	NL98	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	2012-11-01	495	NWL
		2011-11-07	Baseline	NWL
HZMB 041	NL24	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		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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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		2013-02-15	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		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		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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 020		2012-07-10	330	NWL
HZMB 019		2012-07-10	330	NWL
HZMB 018		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	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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
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	2014-10-15	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

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 002	WL111	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

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

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

HZMB 002 2012-06-12_10-29-16

HZMB 002 2012-07-12_13-58-22_04

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

HZMB 003 2013-04-29_11-24-53

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_11-21-16_02

HZMB 006 2012-06-12_10-41-00_02

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

HZMB 007 2013-04-29_11-45-01_02

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

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

HZMB 011 2013-02-21_16-56-38_02

HZMB 011 2013-05-29_12-43-48_02

HZMB 012 2013-07-24_11-05-47_01

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

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

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

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

HZMB 016 2012-06-12_10-24-34_02

HZMB 016 2012-06-12_10-30-52_01

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

HZMB 018 2013-02-21_17-10-34

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 2013-04-01_10-38-58

HZMB 022 WL_2013-04-29_11-33-24_02

HZMB 023 2013-02-21_13-23-54

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

HZMB 024 2012-06-14_13-09-40_04

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

HZMB 025 2012-12-06_11-44-34

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

HZMB 026 2012-07-16_14-02-34

HZMB 026 2013-05-09_09-46-55

HZMB 027 2012-06-14_13-33-40

HZMB 027 2012-07-16_13-54-40_04

HZMB 028 2013-04-01_16-02-43_02

HZMB 028 2013-04-01_16-15-16_01

HZMB 029 2012-08-25_11-57-08_01

HZMB 030 2012-08-25_11-57-04_03

HZMB 031 2012-08-25_11-58-40_01

HZMB 034 2012-07-11_12-44-32_01

HZMB 034 2013-02-21_16-49-34_02

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

HZMB 035 2013-02-15_15-03-24_03

HZMB 036 2012-11-01_11-37-20_01

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

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

HZMB 040 2013-02-21_13-19-31_02

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

HZMB 041 2013-05-09_12-03-33_01

HZMB 041 GA_2013-04-01_12-34-20

HZMB 042 2012-06-15_13-57-32_04

HZMB 042 2012-06-15_14-06-56_04

HZMB 043 2012-09-03_08-54-50_02

HZMB 044 2013-05-09_12-04-04_02

HZMB 044 GA_2013-04-01_14-34-02

HZMB 045 2012-06-15_13-53-00

HZMB 045 2013-02-15_14-58-16_01

HZMB 046 2012-09-03_10-21-44_03

HZMB 047 2012-07-17_12-21-34

HZMB 047 2012-07-17_12-22-54_02

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

HZMB 049 2013-06-14_10-25-43_03

HZMB 049 2013-06-14_10-26-45_03

HZMB 050 2013-02-15_14-59-04_03

HZMB 050 2013-04-29_10-57-13_01

HZMB 051 2013-01-28_10-57-38

HZMB 051 2013-02-15_15-56-54_04

HZMB 052 2012-09-04_10-33-08

HZMB 053 2012-09-04_11-08-56_01

HZMB 054 2012-07-16_13-59-44_03

HZMB 054 2012-09-05_11-06-42_04

HZMB 055 2012-09-04_11-21-04_01

HZMB 056 2012-09-05_12-09-44_02

HZMB 057 2012-09-18_08-44-30

HZMB 060 2012-09-18_14-57-50_01

HZMB 063 2012-10-12_14-54-50_03

HZMB 064 2012-10-12_14-54-48_01

HZMB 066 2012-07-16_13-58-32_05

HZMB 066 2012-10-12_14-54-12

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

HZMB 068 2012-07-17_12-22-52_01

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

HZMB 069 2012-10-24_14-37-06

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

HZMB 071 2013-04-29_11-32-37

HZMB 071 WL_2013-04-29_11-25-40_01

HZMB 072 2012-10-24_14-37-52_03

HZMB 072 2013-05-31_11-51-11 _01

HZMB 073 2013-02-21_17-29-23_02

HZMB 073 GA_2013-04-01_12-40-40_01

HZMB 074 2013-05-09_11-57-02

HZMB 074 WL_2013-04-29_11-23-02_02

HZMB 075 2012-12-06_11-40-11_01

HZMB 076 2012-06-12_10-30-52

HZMB 076 2012-12-11_13-11-24_01

HZMB 077 2012-12-11_13-02-24

HZMB 077 2013-07-08_09-45-55 CROP

HZMB 078 2013-02-15_15-03-16_03

HZMB 078 2013-02-15_15-03-28_03

HZMB 079 WL_2013-01-28_09-38-49

HZMB 080 WL_2013-01-28_09-46-26_01

HZMB 081 2013-01-28_10-04-13_01

HZMB 082 2013-01-28_12-59-32_01

HZMB 082 WL 2013-02-15_14-57-44_02

HZMB 083 2013-02-15_15-00-38_03

HZMB 084 2013-02-14_15-54-46

HZMB 085 2013-02-15_14-45-40_02

HZMB 085 2013-05-29_12-44-11 _02

HZMB 086 2012-07-12_13-39-18_01

HZMB 086 2013-05-09_09-39-50_01

HZMB 087 2013-02-15_14-58-54_04

HZMB 087 2013-02-15_15-00-34_05

HZMB 088 2013-02-15_14-57-08_02

HZMB 089 2013-02-15_15-00-46_01

HZMB 090 2013-02-15_14-58-22_02

HZMB 091 2013-02-15_15-02-52_01

HZMB 092 2013-02-21_13-28-55

HZMB 092 2013-05-29_14-16-23

HZMB 093 2013-05-24_13-47-19_01

HZMB 094 2013-03-18_14-11-49

HZMB 094 2013-05-29_12-43-45_01

HZMB 095 2013-06-13_13-39-12_03

HZMB 096 GA_2013-04-01_12-54-16

HZMB 097 2013-05-09_12-00-05_01

HZMB 097 2013-05-09_12-04-09

HZMB 098 2013-04-29_10-57-14_03

HZMB 098 WL_2013-07-12_10-08-01_01

HZMB 099 2013-06-13_10-00-39_01

HZMB 100 2013-07-08_09-34-44 _03

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

HZMB 102 2013-07-08_09-43-13

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

HZMB 104 2013-07-08_14-00-59 _01

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

China Harbour Engineering Company Limited

Monthly Summary Waste Flow Table for November / 2013 (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-13	0.0000	0.0000	0.0000	0.0000	0.0000	100.2272	0.0000	0.0000	0.0000	1.4000	0.0325
Feb-13	0.0000	0.0000	0.0000	0.0000	0.0000	49.3183	0.0000	0.0000	0.0000	0.2000	0.0195
Mar-13	0.0000	0.0000	0.0000	0.0000	0.0000	121.1545	0.0000	0.0000	0.0000	2.0000	0.0130
Apr-13	0.0000	0.0000	0.0000	0.0000	0.0000	197.7428	0.0000	0.0000	0.0000	0.0000	0.0260
May-13	0.0000	0.0000	0.0000	0.0000	0.0000	360.3733	0.0000	0.0000	0.0000	1.2000	0.0130
Jun-13	0.0000	0.0000	0.0000	0.0000	0.0000	415.9366	0.0000	0.0000	0.0000	0.0000	0.0130
Sub-total	0.0000	0.0000	0.0000	0.0000	0.0000	1244.7528	0.0000	0.0000	0.0000	4.8000	0.1170
Jul-13	0.0000	0.0000	0.0000	0.0000	0.0000	397.7040	0.0000	0.0000	0.5501	4.0000	0.0260
Aug-13	0.0000	0.0000	0.0000	0.0000	0.0000	447.7517	0.0000	0.0040	0.0000	1.6000	0.0325
Sep-13	0.0000	0.0000	0.0000	0.0000	0.0000	565.0243	0.0140	0.1400	0.0000	1.2000	0.0260
Oct-13	0.0000	0.0000	0.0000	0.0000	0.0000	800.3190	0.0000	0.1960	0.0000	0.0000	0.0325
Nov-13	0.0000	0.0000	0.0000	0.0000	0.0000	797.2930	0.0000	0.1960	0.0000	0.0000	0.0195
Dec-13											
Total	0.0000	0.0000	0.0000	0.0000	0.0000	4252.8448	0.0140	0.5360	0.5501	11.6000	0.2535

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 month	Total no. recorded since project commencement
1-Hour TSP	Action	-	-
	Limit	-	-
24-Hour TSP	Action	-	-
	Limit	-	-
Noise	Action	-	-
	Limit	-	-
Water Quality	Action	-	-
	Limit	-	-
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	26 Sept 13	One (1) complaint was logged by the Contractor regarding the leakage from work barges causing water pollution near Tuen Mun Richland Garden received on 26 Sept 13. With refer to the available information such as photo record of the incident cannot indicate that the leakage from work barges was caused by the vessel of this Contract and the complaint could not be concluded as project related.	Closed	1	9

	1 Nov 13	As informed by the Contractor on 5 Nov 13, a noise complaint received on 14 Sept 13 was referred to the Contractor of HKBCF on 1 Nov 13. The captioned complaint involves noise generated by a tug boat operating near a pier at Tung Chung around 05:55am-06:45am on 14 Sept 13. After investigation, the complaint is considered not likely to be related to the construction works.	Closed	2	10
	11 Nov 13	As informed by the Contractor, complaint received from Penta-Ocean – Gitanes Joint Venture (CV/2012/03) mentioned that the formation works of the Contaminated Mud Pit CMP1 to the South of the Brothers (CMP1 of SB) which has been completed in mid-August 2013 and the pit has been commissioned for receiving contaminated marine mud from other projects starting from 16 August 2013. However, it was recently observed that some of the project vessels of HY/2010/02 had berthed within the said pit and those anchorages would likely cause disruption to the underlying contaminated mud and thus induce unfavourable contamination impact to the surrounding marine environment. In this regard, they reminded the contractor to avoid berthing of their vessels within the boundary of CMP1 of SB thereafter for the sake of environmental	Closed	3	11

		concern. After investigation, the complaint is considered not likely to be related to the construction works.			
Notification of summons	-	-	-	-	1
Successful Prosecutions	-	-	-	-	-

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.