


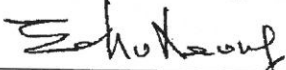
**China Harbour Engineering Company Limited**

Contract No. HY/2010/02

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

**Quarterly EM&A Report for  
June 2014- August 2014**

[01/2015]

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

Version:	Rev. 0	Date: 12 January 2015
----------	--------	-----------------------

**Disclaimer**

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

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

Ref.: HYDHZMBEEM00\_0\_2614L.15

12 January 2015

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 Sir,

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

**Contract No. HY/2010/02 HZMB HKBCF – Reclamation Works  
Quarterly Environmental Monitoring & Audit Report for June 2014 to August 2014**

Reference is made to the Environmental Team's submission of the Quarterly Environmental Monitoring & Audit Report for June 2014 to August 2014 (letter ref: 60249820/C/RMKY15011201 dated 12 January 2015) copied to us by E-mail on 12 January 2015.

We are pleased to inform you that we have no adverse comment on the captioned Quarterly EM&A Report. We write to verify the captioned report in accordance with Condition 5.4 of EP-353/2009/G and Condition 4.4 of EP-354/2009/C (for TM-CLKL Southern Landfall Reclamation only).

ET is reminded to submit the proposed modelling analyses on/before the completion date as stated in this report.

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

Yours sincerely,



Raymond Dai  
Independent Environmental Checker

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

Internal: DY, YH, JM, ENPO Site

Q:\Projects\HYDHZMBEEM00\02\_Proj\_Mgt\02\_Corr\HYDHZMBEEM00\_0\_2614L.15.docx

## TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	3
1 INTRODUCTION	6
1.1 Background	6
1.2 Scope of Report	6
1.3 Project Organization	7
1.4 Summary of Construction Works	8
2 SUMMARY OF EM&A PROGRAMME REQUIREMENTS	9
2.1 Monitoring Parameters	9
2.2 Environmental Quality Performance (Action/Limit Levels)	10
2.3 Environmental Mitigation Measures	10
3 MONITORING RESULTS	11
3.1 Air Quality Monitoring	11
3.2 Noise Monitoring	12
3.3 Water Quality Monitoring	13
3.4 Dolphin Monitoring	17
3.5 Environmental Site Inspection and Audit	18
4 ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS	20
4.1 Summary of Solid and Liquid Waste Management	20
5 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES	21
5.1 Implementation Status of Environmental Mitigation Measures	21
6 SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT	22
6.1 Summary of Exceedances of the Environmental Quality Performance Limit	22
7 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS	23
7.1 Summary of Environmental Complaints, Notification of Summons and Successful Prosecutions	23
8 COMMENTS, RECOMMENDATIONS AND CONCLUSIONS	28
8.1 Comments on mitigation measures	28
8.2 Recommendations on EM&A Programme	29
8.3 Conclusions	30

## List of Tables

Table 1.1	Contact Information of Key Personnel
Table 3.1	Summary of Number of Monitoring Events for 1-hr & 24-hr TSP Concentration
Table 3.2	Summary of Number of Exceedances for 1-hr & 24-hr TSP Monitoring
Table 3.3	Summary of Number of Monitoring Events for Impact Noise
Table 3.4	Summary of Number of Monitoring Exceedances for Impact Noise
Table 3.5	Summary of Water Quality Exceedances in June 2014 – August 2014
Table 3.6	Summary of Key Dolphin Survey Findings in June – August 2014
Table 3.7	Summary of STG and ANI encounter rates in June - August 2014

## Figures

Figure 1	General Project Layout Plan
Figure 2	Impact Air Quality and Noise Monitoring Stations and Wind Station
Figure 3	Impact Water Quality Monitoring Stations
Figure 4	Impact Dolphin Monitoring Line Transect Layout Map
Figure 5	Environmental Complaint Handling Procedure

## List of Appendices

Appendix A	Project Organization for Environmental Works
Appendix B	Three Month Rolling Construction Programmes
Appendix C	Implementation Schedule of Environmental Mitigation Measures (EMIS)
Appendix D	Summary of Action and Limit Levels
Appendix E	Graphical Presentation of Impact Air Quality Monitoring Results
Appendix F	Graphical Presentation of Impact Daytime Construction Noise Monitoring Results
Appendix G	Graphical Presentation of Impact Water Quality Monitoring Results
Appendix H	Impact Dolphin Monitoring Survey Findings and Analysis
Appendix I	Quarterly Summary of Waste Flow Table
Appendix J	Cumulative Statistics on Exceedances, Complaints, Notifications of Summons and Successful Prosecutions
Appendix K	Event Action Plan
Appendix L	Incident Report on Action Level or Limit Level Non-compliance for Impact Dolphin Monitoring

## EXECUTIVE SUMMARY

Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Work (here below, known as “the Project”) mainly comprises reclamation at the northeast of the Hong Kong International Airport of an area of about 130-hectare for the construction of an artificial island for the development of the Hong Kong Boundary Crossing Facilities (HKBCF), and about 19-hectare for the southern landfall of the Tuen Mun - Chek Lap Kok Link (TMCLKL). It is a designated project and is governed by the current permits for the Project, i.e. the amended Environmental Permits (EPs) issued on 06 August 2013 (EP-353/2009/G) and 28 January 2014 (EP-354/2009/B) (for TMCLKL Southern Landfall Reclamation only).

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

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

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

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

The construction phase of the Project under the EPs was commenced on 12 March 2012 and will be tentatively completed by early Year 2016. The EM&A programme, including air quality, noise, water quality and dolphin monitoring and environmental site inspections, was commenced on 12 March 2012.

This report documents the findings of EM&A works conducted in the period between 1 June 2014 and 31 August 2014. 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
- Optimizing rubble mound seawalls
- Conforming sloping seawalls
- Sand blanket laying
- Sand filling
- Rock filling
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Band drain installation
- Backfill cellular structure
- Geotechnical Instrumentation works
- Surcharge laying
- Capping Beams structures
- Construction of temporary jetties for surcharge laying
- Temporary Watermain construction along access at Portion D
- Flat barge of unloading public fill for surcharge laying
- Precast Yard Setup

### **Land-based Works**

- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Maintenance of Temporary Marine Access at Works Area WA2

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

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

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

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

#### **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**

Fourteen (14) Action Level Exceedances were recorded at measured dissolved oxygen (DO) value ( $\text{mg L}^{-1}$ ).

During Mid-ebb tide on 15 August 2014, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10 and SR5 and; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11 and IS10 exceeded the Action Level. During mid-flood tide on 15 August 2014, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5, SR6 and SR7 and; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5 and SR6 exceeded the Action Level.

After investigation, it is unlikely that the DO exceedances are related to the marine construction activities of this Contract.

#### **Breaches of Action and Limit Levels for Impact Dolphin Monitoring**

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

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

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

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

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

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

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

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

Three (3) environmental complaints have been received in reporting quarter.

As informed by the Contractor on 3 July 2014, there was an environmental complaint received on 13 June 14. The complainant who lived at Caribbean Coast complained that there were night time noise and visual impact (strong lighting) from the overnight construction works/plants of HKBCF Island. After investigation, the part of the complaint which is related to visual impact is likely to be related to the construction works of this contract. However, with referred to the available information, it is concluded that the part of the complaint which is related to night time noise is unlikely to be related to this Contract.

As informed by the Contractor on 23 July 14, a complaint has been received from Oriental Daily Newspaper on 22 July 14. In the complaint, Oriental Daily Newspaper stated that Miss Cheung, who is a resident of Miami Beach Towers (Tuen Mun), pointed out that construction was being conducted at the sea area in front of the estate, a lot of sand delivery barges were moored at sea area between Castle Peak Beach (Tuen Mun Typhoon Shelter) and Tuen Mun Ferry Pier. She discovered on several occasions that there were leakage of soil from sand delivery barges causing discoloration of sea water and sometimes, leaking of sand from more than two sand delivery barges at a time was observed. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.

As informed by the Contractor on 22 Aug 2014, EPD referred a complainant to this Contract on 21 August 2014, the complainant raised concern about uncovered sand barges at the sea area outside Melody Garden, Tuen Mun, sand were brought to inside of houses by wind and also causing the vicinity to be covered with sand and dust. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.

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

## 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 tenth 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 June 2014 to 31 August 2014.



### 1.3 Project Organization

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

**Table 1.1 Contact Information of Key Personnel**

Party	Position	Name	Telephone	Fax
<b>Engineer's Representative (ER)</b>  (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
	Environmental Project Office Leader	Y.H. Hui	3465 2868	3465 2899
<b>Contractor</b>  (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	--
<b>ET</b>  (AECOM Asia Company Limited)	ET Leader	Echo Leong	3922 9280	2317 7609

#### 1.4 Summary of Construction Works

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

##### **Land-based Works**

- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Maintenance of Temporary Marine Access at Works Area WA2

1.4.3 The 3-month rolling construction programme of the Project is shown in Appendix B.

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

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

## **2 SUMMARY OF EM&A PROGRAMME REQUIREMENTS**

### **2.1 Monitoring Parameters**

- 2.1.1 The Project Specific EM&A Manual designated 4 air quality monitoring stations, 2 noise monitoring stations, 21 water monitoring stations (9 Impact Stations, 7 Sensitive Receiver Stations and 5 Control/Far Field Stations) to monitor environmental impacts on air quality, noise and water quality respectively. Pre-set and fixed transect line vessel based dolphin survey was required in two AFCD designated areas (Northeast and Northwest Lantau survey areas). The impact dolphin monitoring at each survey area should be conducted twice per month.
- 2.1.2 For impact air quality monitoring, monitoring locations AMS2 (Tung Chung Development Pier) and AMS7 (Hong Kong SkyCity Marriott Hotel) were set up at the proposed locations in accordance with Project Specific EM&A Manual. The conditional omission of Monitoring Station AMS6 was effective since 19 November 2012. For monitoring location AMS3 (Ho Yu College), as proposed in the Project Specific EM&A Manual, approval for carrying out impact monitoring could not be obtained from the principal of the school. Permission on setting up and carrying out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact air quality monitoring was conducted at site boundary of the site office area in Works Area WA2 (AMS3B) respectively. Same baseline and Action Level for air quality, as derived from the baseline monitoring data recorded at Ho Yu College, was adopted for this alternative air quality location.
- 2.1.3 For impact noise monitoring, monitoring locations NMS2 (Seaview Crescent Tower 1) was set up at the proposed locations in accordance with Project Specific EM&A Manual. However, for monitoring location NMS3 (Ho Yu College), as proposed in the Project Specific EM&A Manual, approval for carrying out impact monitoring could not be obtained from the principal of the school. Permission on setting up and carrying out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact noise monitoring was conducted at site boundary of the site office area in Works Area WA2 (NMS3B) respectively. Same baseline noise level, as derived from the baseline monitoring data recorded at Ho Yu College was adopted for this alternative noise monitoring location.
- 2.1.4 In accordance with the Project Specific EM&A Manual, twenty-one stations were designated for impact water quality monitoring. The nine Impact Stations (IS) were chosen on the basis of their proximity to the reclamation and thus the greatest potential for water quality impacts, the seven Sensitive Receiver Stations (SR) were chosen as they are close to the key sensitive receives and the five Control/ Far Field Stations (CS) were chosen to facilitate comparison of the water quality of the IS stations with less influence by the Project/ ambient water quality conditions.
- 2.1.5 Due to safety concern and topographical condition of the original locations of SR4 and SR10B, alternative impact water quality monitoring stations, naming as SR4(N) and SR10B(N), were adopted, which are situated in vicinity of the original impact water quality monitoring stations (SR4 and SR10B) and could be reachable. Same baseline and Action Level for water quality, as derived from the baseline monitoring data recorded, were adopted for these alternative impact water quality monitoring stations.
- 2.1.6 The monitoring locations used during the reporting quarter are depicted in Figures 2, 3 and 4 respectively.
- 2.1.7 The Project Specific EM&A Manual also required environmental site inspections for air quality, noise, water quality, chemical, waste management, marine ecology and landscape and visual impact.

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

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

## **2.3 Environmental Mitigation Measures**

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

### 3 MONITORING RESULTS

#### 3.1 Air Quality Monitoring

- 3.1.1 In accordance with the Project Specific EM&A Manual, impact 1-hour Total Suspended Particulates (TSP) monitoring was conducted for at least three times every 6 days, while impact 24-hour TSP monitoring was carried out for at least once every 6 days at the 4 monitoring stations (AMS2, AMS3B, AMS6 and AMS7).
- 3.1.2 The monitoring locations for impact air quality monitoring are depicted in Figure 2. However, for AMS6 (Dragonair/CNAC (Group) Building), permission on setting up and carrying out impact monitoring works was sought, however, access to the premise has not been granted yet on this report issuing date.
- 3.1.3 The weather was mostly sunny, with occasional cloudy and occasional rainy in the reporting quarter. The major dust source in the reporting quarter included construction activities from the Project, as well as nearby traffic emissions.
- 3.1.4 The number of monitoring events and exceedances recorded in each month of the reporting quarter are presented in Table 3.1 and Table 3.2 respectively.

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

Monitoring Parameter	Location	No. of monitoring events		
		June 14	July 14	August 14
1-hr TSP	AMS2	15	18	15
	AMS3B	15	18	15
	AMS7	15	18	15
24-hr TSP	AMS2	5	6	5
	AMS3B	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		
			June 14	July 14	August 14
1-hr TSP	AMS2	Action	0	0	0
		Limit	0	0	0
	AMS3B	Action	0	0	0
		Limit	0	0	0
	AMS7	Action	0	0	0
		Limit	0	0	0
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	
24-hr TSP	AMS2	Action	0	0	0
		Limit	0	0	0
	AMS3B	Action	0	0	0
		Limit	0	0	0
	AMS7	Action	0	0	0
		Limit	0	0	0
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	

- 3.1.5 All 1-Hour TSP and 24Hr TSP results were below the Action and Limit Level in the reporting month.
- 3.1.6 The event action plan is annexed in Appendix K.
- 3.1.7 Meteorological information collected from the wind station during the monitoring periods on the monitoring dates, as shown in Figure 2, including wind speed and wind direction, is annexed in Appendix H of monthly EM&A report June, July and August 2014 respectively.

**3.2 Noise Monitoring**

- 3.2.1 Impact noise monitoring was conducted at the 2 monitoring stations (NMS2 and NMS3B) for at least once per week during 07:00 – 19:00 in the reporting quarter.
- 3.2.2 The monitoring locations used during the reporting quarter are depicted in Figure 2.
- 3.2.3 No Action or Limit Level Exceedance of construction noise was recorded in the reporting quarter.
- 3.2.4 Major noise sources during the noise monitoring included construction activities of the Project and nearby traffic noise.
- 3.2.5 The number of impact noise monitoring events and exceedances are summarized in Table 3.3 and Table 3.4 respectively

**Table 3.3 Summary of Number of Monitoring Events for Impact Noise**

Monitoring Parameter	Location	No. of monitoring events		
		June 14	July 14	August 14
	NMS2	4	5	4
	NMS3B	4	5	4

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

Monitoring Parameter	Location	Level of Exceedance	Level of Exceedance		
			June 14	July 14	August 14
	NMS2	Action	0	0	0
		Limit	0	0	0
	NMS3B	Action	0	0	0
		Limit	0	0	0
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

- 3.2.6 The graphical plots of the trends of the monitoring results are provided in Appendix F. No specific trend of the monitoring results or existence of persistent pollution source was noted.
- 3.2.7 The event action plan is annexed in Appendix K.

### 3.3 Water Quality Monitoring

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

3.3.2 Fourteen (14) Action Level Exceedances were recorded at measured dissolved oxygen (DO) value (mg L<sup>-1</sup>) During ebb tide on 15 August 2014, surface and middle DO in mg L<sup>-1</sup> recorded at IS(Mf)11, IS10 and SR5; bottom DO in mg L<sup>-1</sup> recorded at IS(Mf)11 and IS10 exceeded the Action Level. During flood tide on 15 August 2014, surface and middle DO in mg L<sup>-1</sup> recorded at IS(Mf)11, IS10, SR5, SR6 and SR7; bottom DO in mg L<sup>-1</sup> recorded at IS(Mf)11, IS10, SR5 and SR6 exceeded the Action Level.

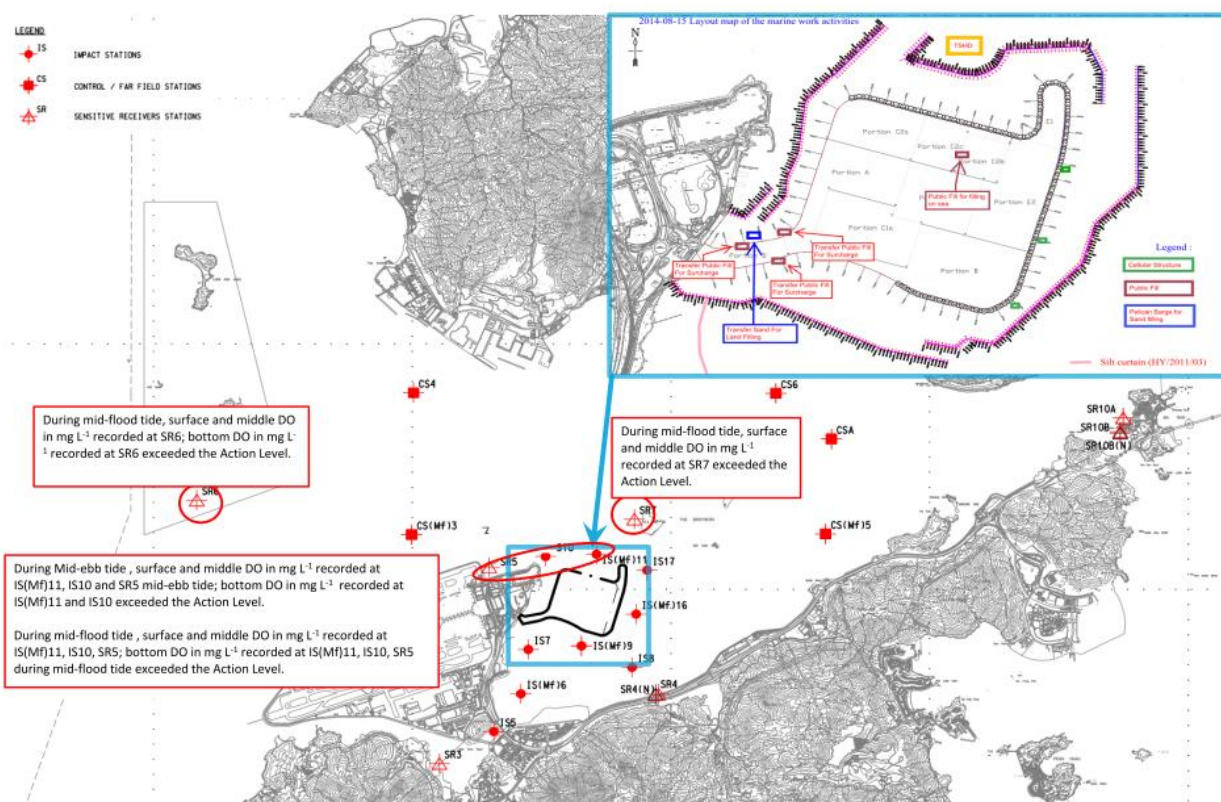
**Table 3.5 Summary of Water Quality Exceedances in June 2014 – August 2014**

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
IS5	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)6	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS7	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)9	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	(1) 15 Aug ust 14	(1) 15 August 14	(1) 15 Aug ust 14	(1) 15 August 14	0	0	0	0	2	2
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)11	Action	(1) 15 Aug ust 14	(1) 15 August 14	(1) 15 Aug ust 14	(1) 15 August 14	0	0	0	0	2	2
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)16	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS17	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR3	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR4(N)	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR5	Action	(1) 15 Aug ust 14	(1) 15 August 14	0	(1) 15 August 14	0	0	0	0	1	2
	Limit	0	0	0	0	0	0	0	0	0	0
SR6	Action	0	(1) 15 August 14	0	(1) 15 August 14	0	0	0	0	0	2
	Limit	0	0	0	0	0	0	0	0	0	0
SR7	Action	0	(1) 15 August 14	0	0	0	0	0	0	0	1
	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	Action	0	0	0	0	0	0	0	0	0	0

Station (N)	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
	Limit	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Action</b>	3	5	2	4	0	0	0	0	14	
	<b>Limit</b>	0	0	0	0	0	0	0	0	0	

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

3.3.3 Fourteen (14) Action Level Exceedances were recorded at measured dissolved oxygen (DO) value ( $\text{mg L}^{-1}$ ) on 15 August 2014. During Mid-ebb tide on, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10 and SR5; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11 and IS10 exceeded the Action Level. During mid-flood tide on 15 August 2014, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5, SR6 and SR7; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5 and SR6 exceeded the Action Level.



3.3.3.1 For marine works, marine filling was conducted at portion C2b during flood and ebb tide at area behind cellular structures on 15 Aug 2014. Also refer to above layout map.

3.3.3.2 Exceedance was not due to marine based construction works of the Project because:

3.3.3.3 With reference to the silt curtain checking record defects was observed at north parts of the perimeter silt curtain and at southwest entrance of the perimeter silt curtain.

3.3.3.4 As informed by the Contractor, filling was conducted on 13, 15 and 18 August 2014 at Portion C2b, but with referred to monitoring record and photo record attached, no sediment plume has been observed to flow from the inside of the perimeter silt curtain to the outside of the perimeter silt curtain and no discoloration of sea water has been observed. Please refer to the photo attached for reference of the sea condition during ebb tide and flood tide on 15 August 2014.



- 3.3.3.5 Photo record of sea condition taken during ebb tide at north of HKBCF Reclamation Works near IS(Mf)11, IS10 and SR5 on 15 August 2014.



- 3.3.3.6 Photo record of sea condition taken during flood tide at north of HKBCF Reclamation Works near IS(Mf)11, IS10 and SR5 on 15 August 2014.



- 3.3.3.7 Construction activities were reviewed, almost the same marine works were conducted at almost the same location on 13, 15 and 18 August 2014, but no DO exceedance was recorded on 13 and 18 August 2014. This indicates that the DO exceedances were unlikely to attribute to marine works of this Contract.
- 3.3.3.8 Low DO value was observed at upstream control station during ebb tide. DA DO (surface & middle) were 5.3mg/L and 5.2 mg/L at CS(Mf)3 and CS4 during ebb tide. DO (bottom) were 4.8mg/L and

4.6mg/L at CS(Mf)3 and CSA respectively. This indicates that low DO (Surface & middle; Bottom) occurred at locations upstream to HKBCF Reclamation Works during ebb tide.

3.3.3.9 Low DO value was observed at upstream control station during flood tide. DA DO (surface & middle) were 5.2mg/L, 4.7 mg/L and 4.6 mg/L at CS(Mf)5, CS6 and CSA during ebb tide. DO (bottom) were 5.3mg/L, 4.5 mg/L and 4.1mg/L at CS(Mf)5, CS6 and CSA respectively. This indicates low DO (Surface & middle; Bottom) occurred at locations upstream to HKBCF Reclamation Works during flood tide.

3.3.3.10 After investigation, the Action Level exceedance of the surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10 and SR5 during Mid-ebb tide; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11 and IS10 during Mid-ebb tide; surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5, SR6 and SR7 during mid-flood tide; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5 and SR6 during mid-flood tide were unlikely to attribute to construction works of this Contract.

3.3.3.11 Action taken under the action plan

- in situ measurement was repeated to confirm findings;
- After considering the above mentioned investigation results, it appears that it was unlikely that the DO exceedances were not attributed to active construction activities of this project;
- Monitoring data, all plant, equipment and Contractor's working methods were checked;
- Since it is considered that the DO exceedances are unlikely to be project related, as such, actions 5 - 7 under the EAP are not considered applicable.

3.3.3.12 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.

3.3.3.13 With reference to the silt curtain checking record on 27 August 2014, the defect observed on 15 August 2014 at north part of the perimeter silt curtain has been repaired. As informed by the Contractor, maintenance work of the silt curtain is on-going and carried out by the Contractor on a daily basis.

3.3.4 The event action plan is annexed in Appendix K.

### 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 June – August 2014**

Number of Impact Surveys Completed <sup>^</sup>	6
Survey Distance Travelled under Favourable On- Effort Condition	661.1km
Number of Sightings	27 sightings (17 sightings are "on effort" (which are all under favourable condition), 10 "sightings are opportunistic")
Number of dolphin individual sighted	87 individuals (the best estimated group size)
Dolphin Encounter Rate#	NEL: 0.5 NWL: 3.6
Dolphin Group Size	Average of NEL: 1.0 Average of NWL: 3.2 Varied from 1-15 individuals
Most Often frequent dolphin sighting area	Sha Chau and Lung Kwu Chau Marine Park, the western limit of NWL and Tai O area.

Remarks:

<sup>^</sup> Completion of line transect survey of NEL and NWL survey area once was counted as one complete survey.

# Dolphin Encounter Rate = (Sum of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> month's total sighting/ Sum of 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> month's total effort)\*100km (encounter rates are calculated using on effort sightings made under favourable conditions only.)

- 3.4.5 One (1) Limit Level exceedance was recorded in the reporting quarter. The investigation results showed that there is no evidence that exceedance is related to Project works are annexed in Appendix L. Actions were taken according to the Event Action Plan for impact dolphin monitoring. Please refer to Appendix L for details of action taken.

**Table 3.7 Summary of STG and ANI encounter rates in June - August 2014**

	NEL	NWL	Level Exceeded
STG*	0.5	0.5	Limit
ANI**	3.6	10.9	

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

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

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

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

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

### **3.5 Environmental Site Inspection and Audit**

3.5.1 Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Project. In the reporting quarter, 12 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 Dark smoke was observed generated by excavator. The Contractor was reminded to regularly maintain the plants to avoid generation of dark smoke. The Contractor prevented generation of dark smoke by plant. (Closed)

3.5.4 Dust control measures such as water car was observed. However the Contractor was reminded to review the need to enhance current dust control measures. (Reminder)

3.5.5 Public fill/exposed soil was observed, surface was kept moist. However, the Contractor was reminded to continue to provide dust control measures to exposed soil. (Reminder)

3.5.6 Fugitive dust was observed generated when excavator was drove through a road; the Contractor was reminded to provide dust control measures. Dust control measures such as watering was provided on the road. (Closed)

3.5.7 It was observed that the water supply of the sprinkler system at Portion D was disconnected. The Contractor was reminded to provide effective dust control measures to the road at Portion D. The Contractor provided effective dust control measures to the road at Portion D. (Closed)

3.5.8 Fugitive dust was observed when vehicle was drove through the road at Portion D. The Contractor was reminded to provide effective dust control measures. The Contractor provided effective dust control measures to the road at Portion D. (Closed)

3.5.9 Filling was observed. The Contractor was reminded to ensure proper implementation of relevant mitigation measures for sand blanket filling or reclamation filling. (Reminder)

#### ***Noise***

3.5.10 No adverse observation was identified in the reporting quarter.

#### ***Chinese White Dolphin***

3.5.11 No adverse observation was identified in the reporting quarter.

#### ***Water Quality***

3.5.12 Oil drum and idle air compressor were observed without drip tray on reclamation work. The Contractor was reminded to provide enough drip trays for oil drum. The Contractor provided enough drip trays for oil drum or removed the oil drum and the Contractor relocated the air compressor. (Closed)

- 3.5.13 Waste at waste collection point, generator and oil drums were observed partially submerged into sea water. The Contractor was advised to put the collected waste, generator and oil drums to higher ground to prevent the situation at near barge 天駿 3 and at near at Portion B. Waste at waste collection point, generator and oil drums were moved to higher ground. (Closed)
- 3.5.14 Water was observed accumulated inside the wheel washing facility; the Contractor was reminded to review and prevent potential overflow of silty water. (Reminder)
- 3.5.15 It was observed that the drainage located next to the road of WA2 was blocked by material fallen off from the lid of the drainage, the Contractor was reminded to unblock the drainage. The Contractor unblocked the drainage. (Closed)
- 3.5.16 Oil drum was observed without drip tray on barge Evershine 18. The Contractor was advised to provide mitigation measures such as drip tray to oil drum. As informed by the Contractor, the barge Evershine 18 left the site area the Contractor was reminded to provide mitigation measures such as drip tray to oil drum when it starts to operate on site. (Reminder)
- 3.5.17 Oil drum was observed without drip tray. The Contractor was advised to provide mitigation measures such as drip tray to oil drum. Contractor relocated the oil drum. (Closed)
- 3.5.18 It was observed that compressors were not provided with drip tray at Portion A. The Contractor was reminded to provide mitigation measures such as drip tray to compressors at Portion A. The Contractor cleared the compressors. (Closed)
- 3.5.19 Oil stain has been observed inside the water of one steel cell when inspection conducted between steel cell 53 – 58. Oil stain was cleared by the Contractor using oil absorbent materials and used oil absorbent materials were disposed of as chemical waste. (Closed)
- 3.5.20 Oil drums were observed without drip tray or bunding on barge GD851 and at area between Portion C1b and Portion A, the Contractor was reminded to provide mitigation measures such as drip tray or bunding to all oil drums. Drip tray or bunding was provided to oil drums on barge GD851 by the Contractor and Oil drum at area between Portion C1b and Portion A was removed by the Contractor. (Closed)
- 3.5.21 Defect (holes and deformed frame of drip tray) was observed within drip tray at area between Portion C1b and Portion A. The Contractor was reminded to provide proper mitigation measure such as drip tray without defect to oil drum and PMEs. The Contractor rectified large majority of the defects (holes and deformed frame of drip tray) observed within drip tray at area between Portion C1b and Portion A. The Contractor provided proper mitigation measure such as drip tray without defect to PME in September 2014. (Closed)

3.5.22

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

- 3.5.23 General refuse and unwanted band drain material were observed at various locations of the reclamation work. The Contractor was reminded to clear the and properly dispose these wastes of regularly. The general refuse and unwanted band drain materials were cleared and disposed of by the Contractor. (Closed)
- 3.5.24 Unwanted/used Band drain materials were observed at various locations. The Contractor was reminded to collect and clear the unwanted/used band drain materials regularly and keep the site clean and tidy. The Contractor cleared the general refuse and used band drain materials. (Closed)
- 3.5.25 General refuses were observed at Portion C, works area WA2; general refuses and band drain material were observed at various locations of portion D; unwanted/used band drain material was observed at Portion C. The Contractor was reminded to review, collect and dispose the refuse regularly to keep the site clean and tidy. The Contractor collected and disposed the refuse regularly to keep the site clean and tidy. (Closed)

- 3.5.26 Rubbish bin without cover or lid was observed at Works Area WA2. The Contractor was reminded to properly cover all rubbish bins. The Contractor removed the rubbish bin without cover or lid. (Closed)
- 3.5.27 General refuse were observed area near steel cell 48, various locations when inspection was conducted at portion B and Portion D and on water at Portion D. The Contractor was reminded to regularly clear the general refuse to keep the site clean and tidy. The Contractor cleared the general refuse to keep the site clean and tidy. (Closed)

***Landscape and Visual Impact***

- 3.5.28 No relevant works was carried out in the reporting Quarter.

***Others***

- 3.5.29 Rectifications of remaining identified items are undergoing by the Contractor. Follow-up inspections on the status on provision of mitigation measures will be conducted to ensure all identified items are mitigated properly.

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

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

- 4.1.1 The Contractor registered as a chemical waste producer for this project. Sufficient numbers of receptacles were available for general refuse collection and sorting.
- 4.1.2 As advised by the Contractor, 3,433,181.4m<sup>3</sup> of fill were imported for the Project use in the reporting period. 336kg of paper/cardboard packaging, 3kg of metals, 1kg of plastics, 9,000kg of chemical waste, 448.5m<sup>3</sup> of general refuse were generated and disposed of in the reporting period. Summary of waste flow table is detailed in Appendix I.
- 4.1.3 The Contractor is advised to properly maintain on site C&D materials and wastes collection, sorting and recording system, dispose of C&D materials and wastes at designated ground and maximize reuse / recycle of C&D materials and wastes. The Contractor is reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly.
- 4.1.4 The Contractor is reminded that chemical waste containers should be properly treated and stored temporarily in designated chemical waste storage area on site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

## 5 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

### 5.1 Implementation Status of Environmental Mitigation Measures

- 5.1.1 In response to the site audit findings, the Contractors carried out corrective actions.
- 5.1.2 A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in Appendix C. Most of the recommended mitigation measures are being upheld. Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.
- 5.1.3 Training of marine travel route for marine vessels operator was given to relevant staff and relevant records were kept properly.
- 5.1.4 Regarding the implementation of dolphin monitoring and protection measures (i.e. implementation of Dolphin Watching Plan, Dolphin Exclusion Zone and Silt Curtain integrity Check), regular checks were conducted by experienced MMOs within the works area to ensure that no dolphins were trapped by the silt curtain area. There were no dolphins spotted within the silt curtain during this quarter. The relevant procedures were followed and all measures were well implemented. The silt curtains were also inspected in accordance to the submitted plan.
- 5.1.5 Acoustic decoupling measures on noisy plants on construction vessels were checked regularly and the Contractor was reminded to ensure provision of ongoing maintenance to noisy plants and to carry out improvement work once insufficient acoustic decoupling measures were found.
- 5.1.6 Frequency of watering per day on exposed soil was checked; with reference to the record provided by the Contract, watering was conducted at least 8 times per day on reclaimed land. The frequency of watering is the mainly refer to water truck. Sprinklers are only served to strengthen dust control measure for busy traffic at the entrance of Portion D. As informed by the Contractor, during the malfunction period of sprinkler, water truck will enhance watering at such area. The Contractor was reminded to ensure provision of watering of at least 8 times per day on all exposed soil within the Project site and associated works areas throughout the construction phase.
- 5.1.7 Noted from contractor's report during the last Site Safety and Environmental Management Committee meeting on 21 August 2014, a number of sprinklers are missing/ damaged on 31 July 2014. Subsequently, with refer to the site inspection and checking record issued on 6 August 2014, the missing and damaged sprinkler was rectified on 6 August 2014.
- 5.1.8 Oil spillage observed on 14 and 20 August 2014 at Steel cell 54. Spill Response Plan was followed by the Contractor.
- 5.1.8.1 Following the spill response plan, ET, IEC and the RSS were informed of the incident by the Contractor and the Contractor used absorption booms to contain and remove the floating oil from water and absorption booms used was collected using disposal bags as part of the spill kits item. The used absorption booms were disposed of as chemical waste.
- 5.1.8.2 The source of the oil spill was identified on 14 August 2014 as a discrete, non-continuous source with approximately less than 15m<sup>2</sup> spread. The cause of the oil spill was not identified due to no continuous runoff was observed after inspection.
- 5.1.8.3 The source of the oil spill was identified on 20 August 2014 as continuous source with approximately less than 15m<sup>2</sup> spread.
- 5.1.8.4 The oil spillage identified on 20 August 2014 was caused by overflow of nearby oil container which tightly closed lids to chemical container was not provided to avoid leakage of chemicals and chemical waste. The oil container which caused the oil spillage was relocated and transferred by the Contractor to designated oil storage area.

- 5.1.8.5 Similar to the oil stain observed on 20 August 2014, the oil stain on 14 August 2014 was also found at steel cell 54, it was considered that the source of the oil stain observed inside steel cell 54 on 14 and 20 August 2014 are likely to be the same and is likely to be caused by overflow of nearby oil container which without proper cover. On both incidents, the oil stain was confined by steel cell 54.
- 5.1.8.6 Monitoring record of 15, 18 and 20 August 2014 have been reviewed. There are action level exceedances of DO recorded on 15 August 2014, but they are not considered as related to this contract. For details of the DO exceedances occurred on 15 August 2014, please refer to section 4.7.3. The action level exceedances of DO occurred at area located north to the HKBCF Reclamation Works which is far away from the cell 54 located at southeast of the HKBCF Reclamation Works. It is unlikely that the DO exceedances were associated with the oil spillage occurred at steel cell no.54.
- 5.1.8.7 In addition, there was no exceedance recorded at monitoring station IS(Mf)16 which is the closest to steel cell 54 which indicates it is unlikely that water quality is affected by the oil spillage occurred at steel cell 54.
- 5.1.8.8 Site inspection was conducted jointly with the ESS and the RSS on 21 August 2014. No oil spillage was further observed on site.
- 5.1.8.9 Recommendation:
- The Contractor was reminded to keep chemical and chemical waste containers in good condition and free from corrosion and damage which may impair the performance of the containers.
  - The Contractor was reminded to provide tightly closed lids to chemical container so as to avoid leakage of chemicals and chemical waste. In addition, the Contractor was reminded to ensure every chemical and chemical waste containers securely closed or sealed, correctly placed and kept clean.
  - The contractor was reminded to continue to follow the spill response plan in the event of accidental oil spillage.

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

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

- 6.1.1 All 1-Hour TSP and 24-hour TSP results were below the Action and Limit Level in the reporting period.
- 6.1.2 For construction noise, no exceedance was recorded at all monitoring stations in the reporting period.
- 6.1.3 Fourteen (14) Action Level Exceedances were recorded at measured dissolved oxygen (DO) value ( $\text{mg L}^{-1}$ ). During Mid-ebb tide on 15 August 2014, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10 and SR5 and; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11 and IS10 exceeded the Action Level. During mid-flood tide on 15 August 2014, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5, SR6 and SR7 and; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5 and SR6 exceeded the Action Level. After investigation, it is unlikely that the DO exceedances are related to the marine construction activities of this Contract.
- 6.1.4 One (1) limit level exceedance of Chinese White Dolphin monitoring was recorded in the reporting quarter. Investigation results show that there is no evidence that exceedance is related to Project works. Event Action Plan for Impact Dolphin Monitoring was triggered. For detail of investigation, please refer to appendix L.
- 6.1.5 Cumulative statistics on exceedances is provided in Appendix J.



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

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

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

7.1.2 Three (3) environmental complaints have been received in reporting quarter.

7.1.3 As informed by the Contractor on 3 July 2014, there was an environmental complaint received on 13 June 14. The complainant who lived at Caribbean Coast complained that there were night time noise and visual impact (strong lighting) from the overnight construction works/plants of HKBCF Island. After investigation, the part of the complaint which is related to visual impact is likely to be related to the construction works of this contract. However, with referred to the available information, it is concluded that the part of the complaint which is related to night time noise is unlikely to be related to this Contract.

7.1.3.1 Photo record of site condition and CNP compliance checking records of 1- 13 Jun 2014 have been reviewed; please see the following for details of investigation actions and results.

7.1.3.2 For the part of the complaint which is related to visual impact:

- After reviewing the available information provided by the complainant, the source of light is likely from lighting system for the construction works conducted at night.
- With referred to the photo record below, there is measure to control night-time lighting and glare such as hooding lights, please see below photo record of hooding of lights.



- In addition, as informed by the Contractor, construction works would be carried out at night in order to be in line with the progress of this project, however, the Contractor has arranged major activities to be performed during the day time to minimize works in the night time.
- As such, the visual impact complaint is likely to be related to the construction works of this Contract.
- As informed by the Contractor, all the night-lighting is movable and would be moved according to the reclamation progress. However, all the night-lighting has been provided with hooding.
- The Contractor was reminded to continue to properly implement existing mitigation measure for visual impact such as provide night-lighting with hooding.
- In addition, the Contractor was recommended to adjust the orientation of light to minimize glare to residence as far as possible.

7.1.3.3 For the part of the complaint which is related to noise:

- As informed by the Contractor, Construction Noise Permit (CNP) was granted by EPD to cover works carry out during restricted hours in order to be in compliance with relevant environmental regulations and requirements.
- Compliance checking records of 1- 13 Jun 2014 provided by the Contractor were reviewed and record shows construction works carried out were in compliance with the CNP in effect.
- As such, with referred to the available information, it is concluded that the night time noise complaint is unlikely to be related to this Contract.
- Nevertheless, the Contractor was reminded to continue to properly implement all noise mitigation measures.

7.1.3.4 Recommendations:

- The Contractor was reminded to refer environmental complaint to ET for investigation as soon as possible after receiving environmental complaint.

For the part of the complaint which is related to visual impact:

- The Contractor was reminded to continue to properly implement existing mitigation measure for visual impact such as provide night-lighting with hooding.
- In addition, the Contractor was recommended to adjust the orientation of light to minimize glare to residence as far as possible.
- Photo record on 16 July 2014 shows that the recommended mitigation measures has been implemented by the Contractor:



For the part of the complaint which is related to noise:

- The Contractor was reminded to continue to properly implement all noise mitigation measures.

7.1.4 As informed by the Contractor on 23 July 14, a complaint has been received from Oriental Daily Newspaper on 22 July 14. In the complaint, Oriental Daily Newspaper stated that Miss Cheung, who is a resident of Miami Beach Towers (Tuen Mun), pointed out that construction was being conducted at the sea area in front of the estate, a lot of sand delivery barges were moored at sea area between Castle Peak Beach (Tuen Mun Typhoon Shelter) and Tuen Mun Ferry Pier. She discovered on several occasions that there were leakage of soil from sand delivery barges causing discoloration of sea water and sometimes, leaking of sand from more than two sand delivery barges at a time was observed.

7.1.4.1 Impact water quality monitoring data of July 14 has been reviewed and site inspections were conducted jointly on 24 and 31 July 14 with RSS and the Contractor.

- There is no sufficient information provided by the complainant to make sure that the concerned barges are related to this project.
- Date of the observed impact was not specified by the complainant so the IWQM results available for July 14 for monitoring stations close to the concerned area - IS12, IS13, IS14, IS15 have been reviewed and there were no impact water quality monitoring result that shows the turbidity or suspended solid of sea water were adversely affected.
- In addition, site inspection has been jointly conducted with the Contractor and RSS on 24 and 31 July 2014, but no leakage of soil/sand material from barges causing discoloration of sea water was observed inside or outside the perimeter silt curtain of HKBCF reclamation works. Please see below the photos taken during site inspection for reference.
- Photo take on 24 July 14.



- Photo take on 31 July 14.



- As informed by the Contractor, overloading of sand on sand delivery barge is prohibited from runoff/overflow of sand material.

7.1.4.2 Conclusion: It is unable to confirm the date of the concerned impact from the information provided by the complainant, therefore the impact water quality monitoring result of July 14 has been reviewed but no result shows adverse impact to the water quality at the concerned area.

7.1.4.3 In addition, site inspection has been jointly conducted with RSS and the Contractor, but no leakage of soil/sand material from barges causing discoloration of sea water was observed inside or outside the perimeter silt curtain of HKBCF reclamation works.

7.1.4.4 After investigation, there is no adequate information to conclude the observed impact is related to this Contract.

7.1.4.5 Recommendations: The Contractor was advised to ensure the provision of routine maintenance and prohibit overloading of sand material on delivery barges to prevent potential leakage of soil from sand delivery barges causing discoloration of sea water

7.1.5 As informed by the Contractor on 22 Aug 2014, EPD referred a complainant to this Contract on 21 August 2014, the complainant raised concern about uncovered sand barges at the sea area outside Melody Garden, Tuen Mun, sand were brought to inside of houses by wind and also causing the vicinity to be covered with sand and dust.

7.1.5.1 Investigation Actions:

- 1hr TSP and 24hrs TSP monitoring data of August 2014 have been reviewed.
- Site inspections were conducted jointly on 28 August 2014 with RSS and the Contractor.

7.1.5.2 Investigation findings:

- There is no sufficient information provided by the complainant to make sure that the concerned barges are related to this project.
- Date of the observed impact was not specified by the complainant so the impact air quality monitoring (IAQM) results available for August 2014 for monitoring stations close to the concerned area – AQMS1, ASR1, ASR5, ASR6 and ASR10 have been reviewed and there was no impact air quality monitoring result that shows 1-hour TSP or 24-hour TSP exceeded the action (AL)/limit level (LL).
- Photo record below shows that Sand barges are equipped with watering equipments. And watering equipment was used to keep the sand filling material wet.

---

• <sup>1</sup> Reviewed IAQM data and the action (AL)/limit level (LL) is available online respectively at:  
[http://www.hzmbenpo.com/php/list\\_air\\_year\\_All.php](http://www.hzmbenpo.com/php/list_air_year_All.php), and  
[http://www.hzmbenpo.com/emna\\_report/tmckl\\_hy201208/manual/html/toc.htm](http://www.hzmbenpo.com/emna_report/tmckl_hy201208/manual/html/toc.htm)



- In addition, site inspection has been jointly conducted with the Contractor and RSS on 28 August 2014, but no generation of fugitive dust was observed to be caused by barges loaded with filling material.

7.1.5.3 After investigation, there is no adequate information to conclude the observed impact is related to this Contract.

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

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

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

## 8 COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

### 8.1 Comments on mitigation measures

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

#### ***Air Quality Impact***

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

#### ***Construction Noise Impact***

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

#### ***Water Quality Impact***

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

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

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

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

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

## **8.2 Recommendations on EM&A Programme**

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

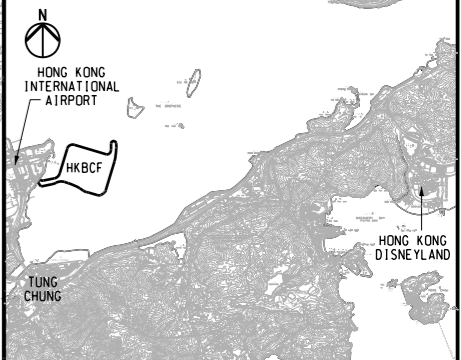
### 8.3 Conclusions

- 8.3.1 The construction phase and EM&A programme of the Project commenced on 12 March 2012.
- 8.3.2 All 1-Hour TSP and 24-hour TSP results were below the Action and Limit Level in the reporting monthperiod.
- 8.3.3 For construction noise, no exceedance was recorded at all monitoring stations in the reporting period.
- 8.3.4 Fourteen (14) Action Level Exceedances were recorded at measured dissolved oxygen (DO) value ( $\text{mg L}^{-1}$ )
- 8.3.5 During Mid-ebb tide on 15 August 2014, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10 and SR5 and; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11 and IS10 exceeded the Action Level. During mid-flood tide on 15 August 2014, surface and middle DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5, SR6 and SR7 and; bottom DO in  $\text{mg L}^{-1}$  recorded at IS(Mf)11, IS10, SR5 and SR6 exceeded the Action Level. After investigation, it is unlikely that the DO exceedances are related to the marine construction activities of this Contract.
- 8.3.6 One (1) Limit Level exceedance was recorded for Chinese White Dolphin monitoring in the reporting quarter. Investigation results show that there is no evidence that exceedance is related to Project works.
- 8.3.7 Environmental site inspection was carried out twelfth times in the reporting quarter. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.
- 8.3.8 As informed by the Contractor on 3 July 2014, there was an environmental complaint received on 13 June 14. The complainant who lived at Caribbean Coast complained that there were night time noise and visual impact (strong lighting) from the overnight construction works/plants of HKBCF Island. After investigation, the part of the complaint which is related to visual impact is likely to be related to the construction works of this contract. However, with referred to the available information, it is concluded that the part of the complaint which is related to night time noise is unlikely to be related to this Contract.
- 8.3.9 As informed by the Contractor on 23 July 14, a complaint has been received from Oriental Daily Newspaper on 22 July 14. In the complaint, Oriental Daily Newspaper stated that Miss Cheung, who is a resident of Miami Beach Towers (Tuen Mun), pointed out that construction was being conducted at the sea area in front of the estate, a lot of sand delivery barges were moored at sea area between Castle Peak Beach (Tuen Mun Typhoon Shelter) and Tuen Mun Ferry Pier. She discovered on several occasions that there were leakage of soil from sand delivery barges causing discoloration of sea water and sometimes, leaking of sand from more than two sand delivery barges at a time was observed. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.
- 8.3.10 As informed by the Contractor on 22 Aug 2014, EPD referred a complainant to this Contract on 21 August 2014, the complainant raised concern about uncovered sand barges at the sea area outside Melody Garden, Tuen Mun, sand were brought to inside of houses by wind and also causing the vicinity to be covered with sand and dust. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.
- 8.3.11 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.
- 8.3.12 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.



8.3.13 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.

DO NOT SCALE DRAWING. CHECK ALL DIMENSIONS ON-SITE.  
ALL RIGHTS RESERVED.  
© OVE ARUP & PARTNERS HONG KONG LIMITED.



KEY PLAN

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

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

Rev	Description	By	Date
-	FOR CONSTRUCTION	HYJL	11/11

Consultant

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

Supported By :

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

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

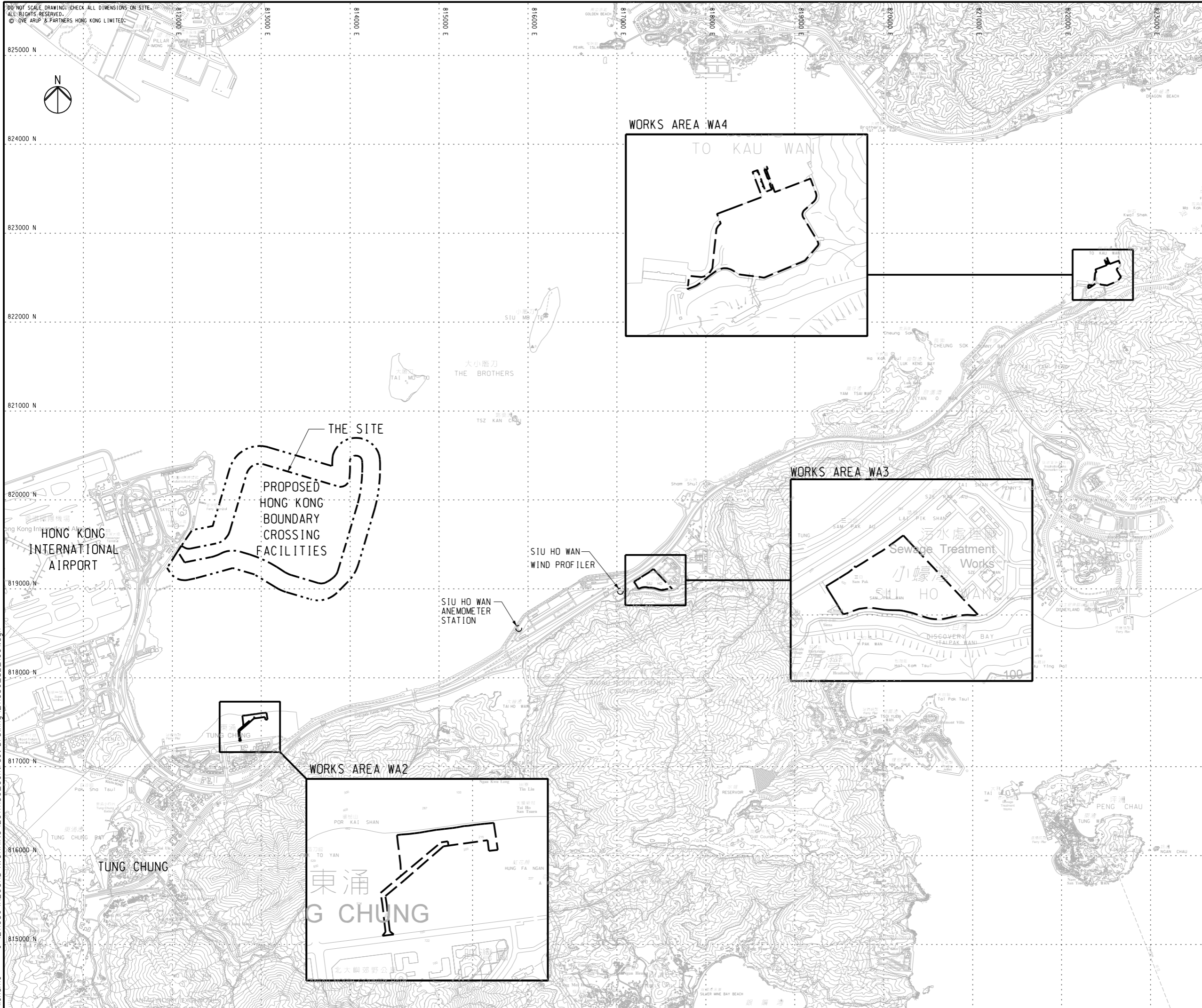
Drawing title  
**KEY PLAN**

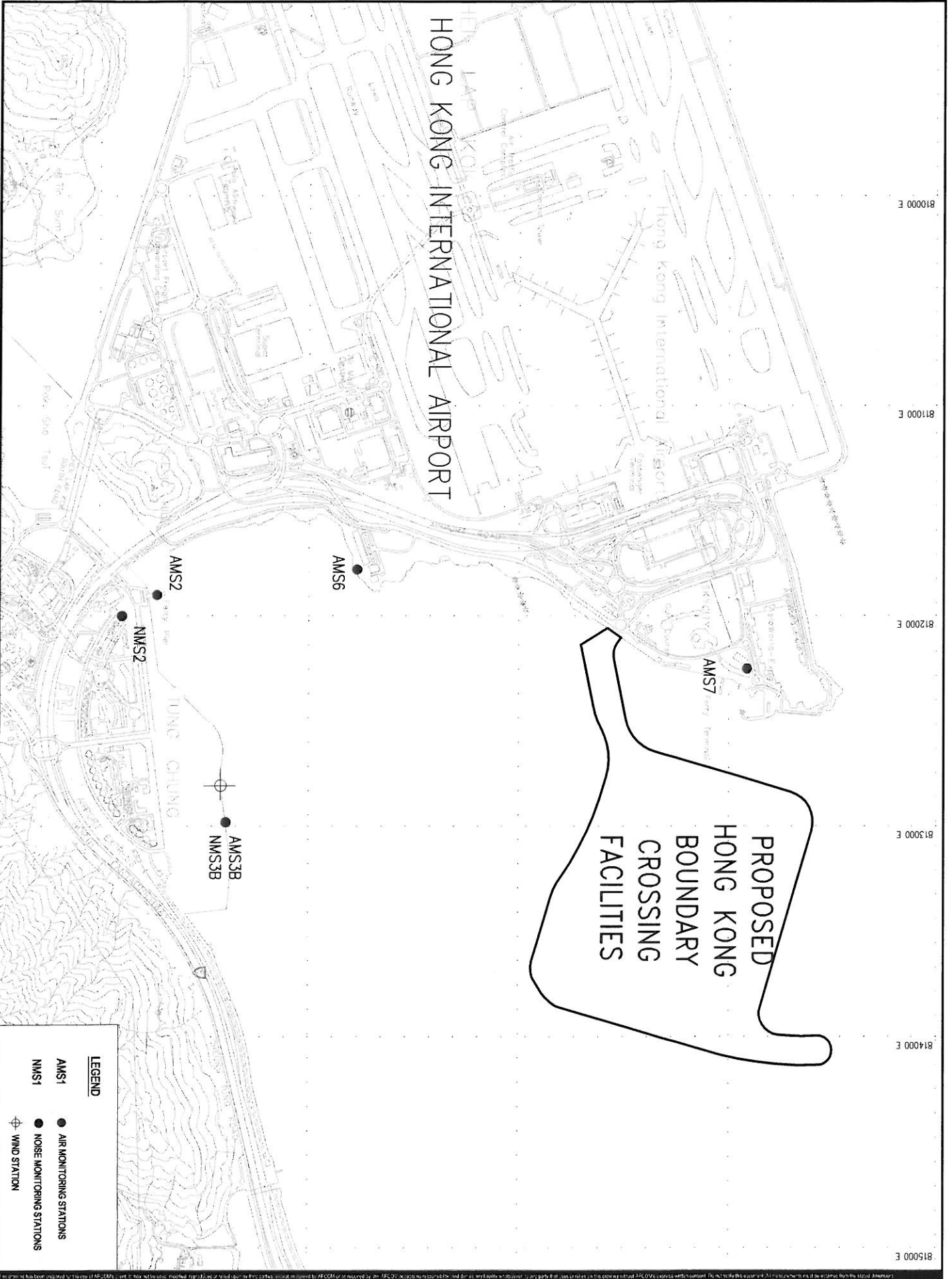
Drawing no. 211036/SL/1001		Rev. -	
Drawn RL	Date 11/09	Checked KKY	Approved DML
Scale 1:20000 @A1 1:40000 @A3		Status	WORKING

COPYRIGHT RESERVED

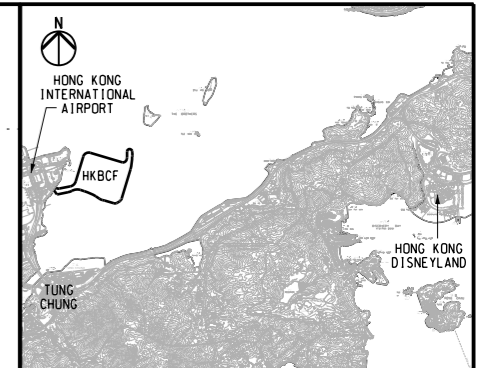
路政署  
**HIGHWAYS DEPARTMENT**  
港珠澳大橋香港工程管理局  
Hong Kong - Zhuhai - Macao Bridge  
Hong Kong Project Management Office

Printed by : 12/17/2011  
Filename : J:\211036\RECORD\WORKING\20111130\_Contract Drawing\_211036\_SL\_1001.dgn





DO NOT SCALE DRAWING. CHECK ALL DIMENSIONS ON SITE.  
ALL RIGHTS RESERVED.  
© OVE ARUP & PARTNERS HONG KONG LIMITED.



KEY PLAN

NOTES

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

LEGEND

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

Rev	Description	By	Date
-	FOR CONSTRUCTION	HYJL	11/11

Consultant	
<b>ARUP</b>	奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited
Supported By :	<ul style="list-style-type: none"> <li>Ecosystems Ltd. <input type="radio"/></li> <li>EDA Marine Ltd. <input type="radio"/></li> <li>Geotechnical Consulting Group (Asia) Ltd. <input type="radio"/></li> <li>Hong Kong Cetacean Research Project <input type="radio"/></li> <li>Intel:Build Technyx Asia Limited <input type="radio"/></li> <li>Tony Gee and Partners LLP <input type="radio"/></li> </ul>

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

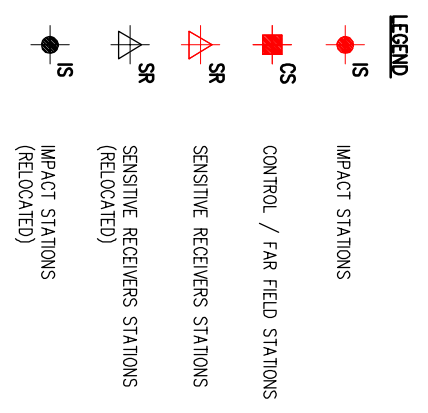
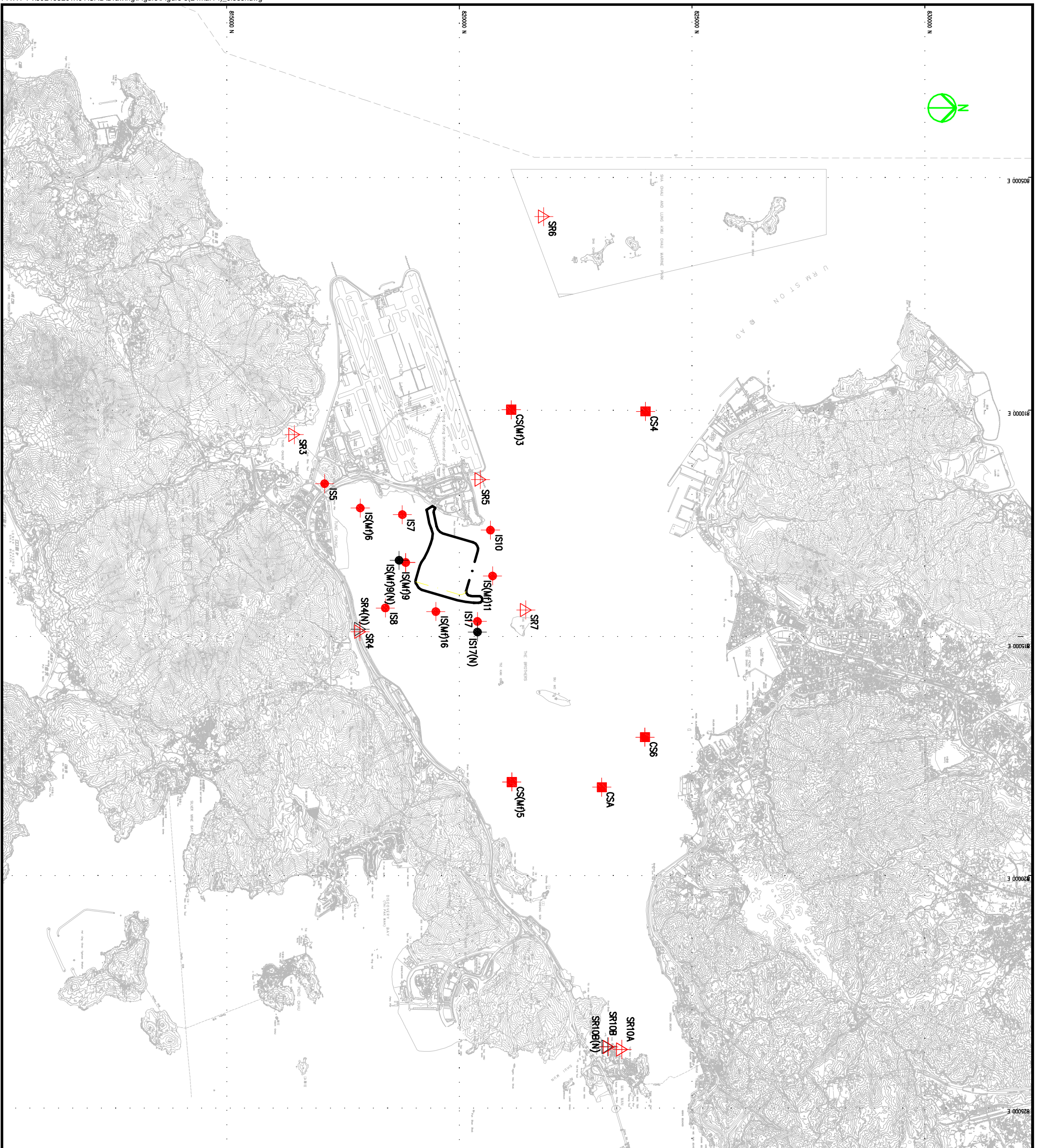
Drawing title  
**WORKS AREA LAYOUT**  
**AND HOARDING PLAN**  
**(SHEET 2 OF 3)**

Drawing no. <b>211036/SL/1014</b>		Rev. -	
Drawn RL	Date 06/10	Checked KKY	Approved DML
Scale 1:5000 @A1 1:10000 @A3		Status <b>WORKING</b>	

COPYRIGHT RESERVED

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

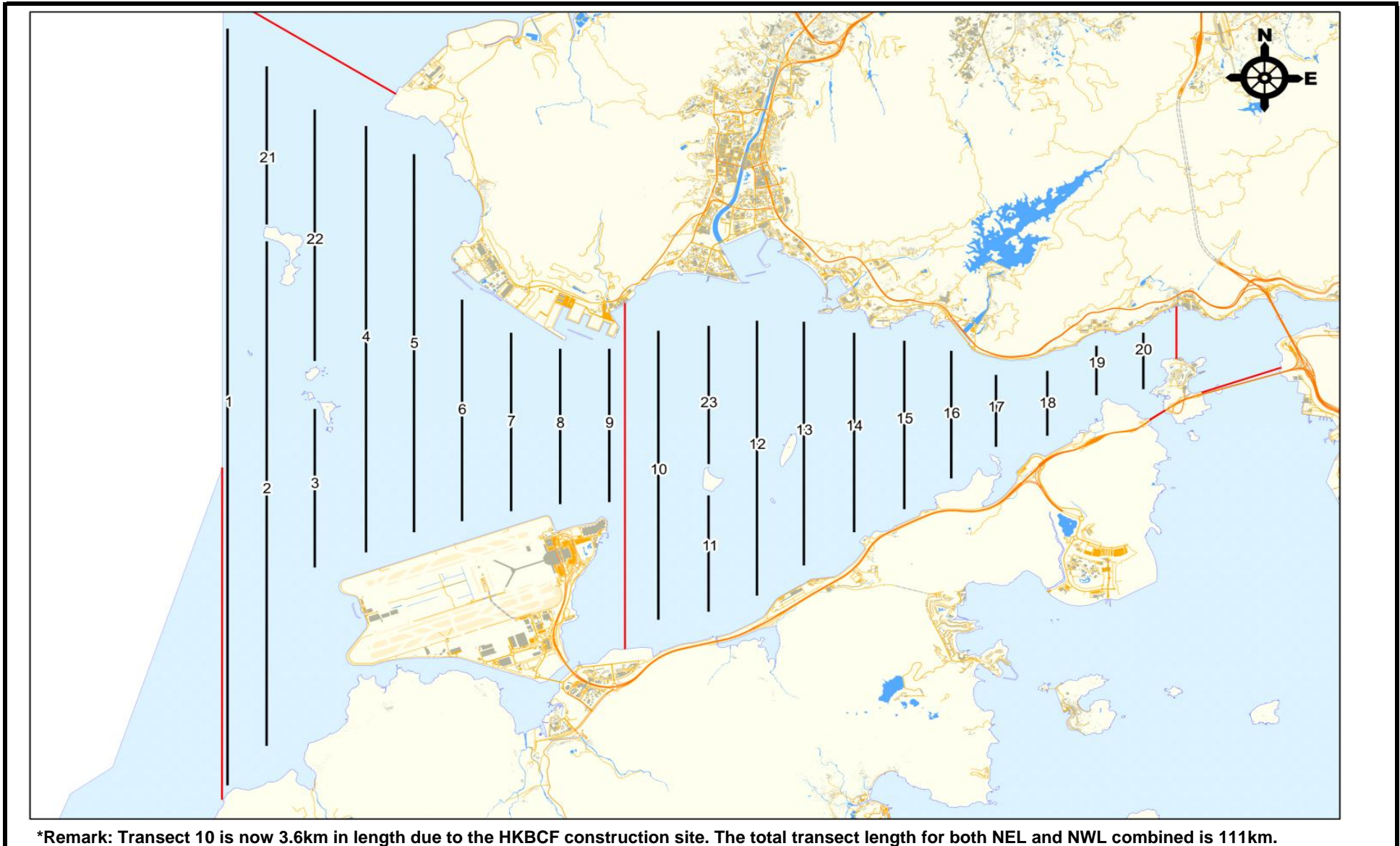
Printed by : 12/17/2011  
 Filename : J:\211036\RECORD\WORKING\20111130\_Contract Drawing\_211036\_SL\_1014.dgn



**SETTING OUT SCHEDULE**

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

This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and disclaims any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.



**\*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.**

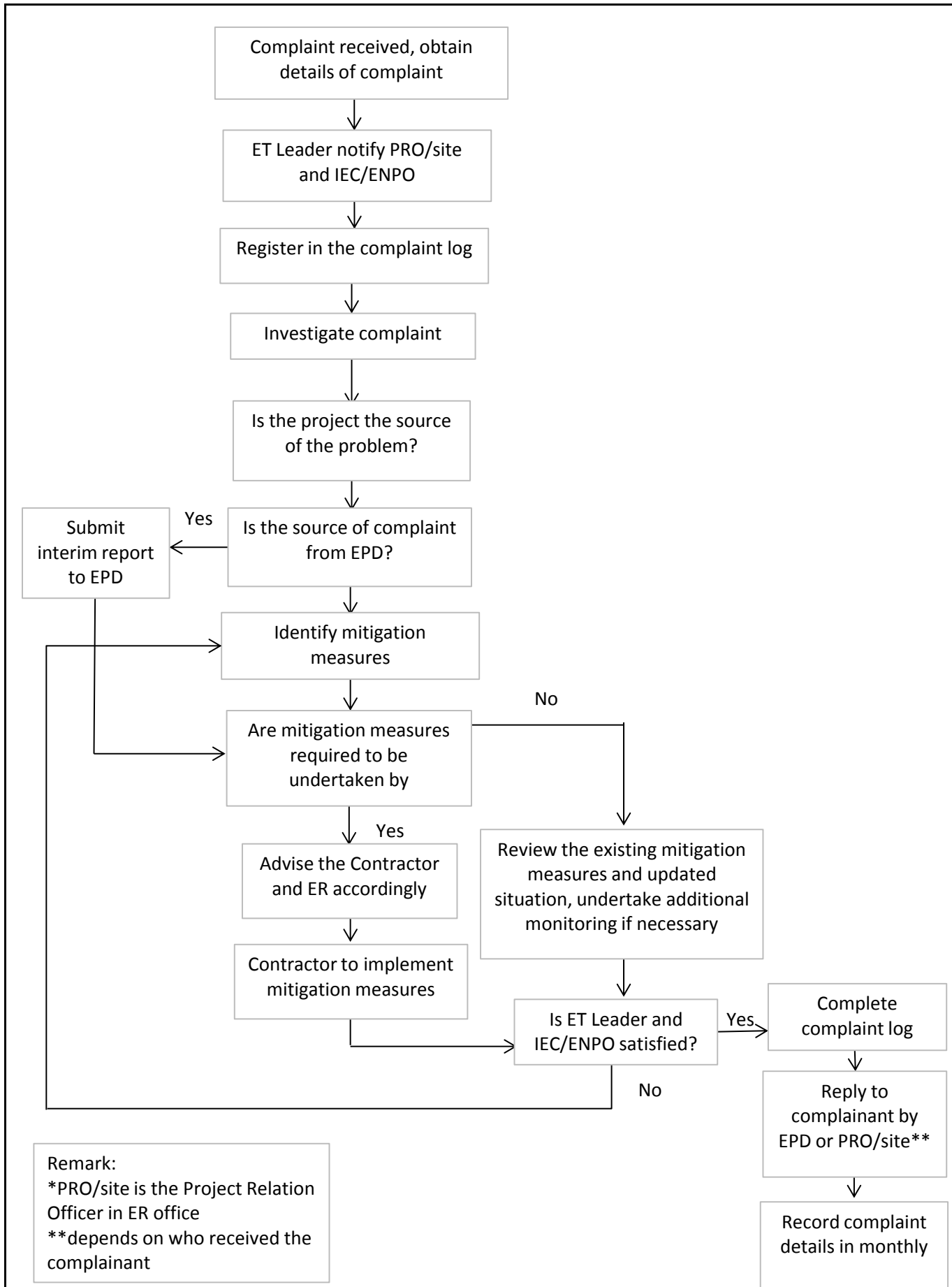
This Drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the field.

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

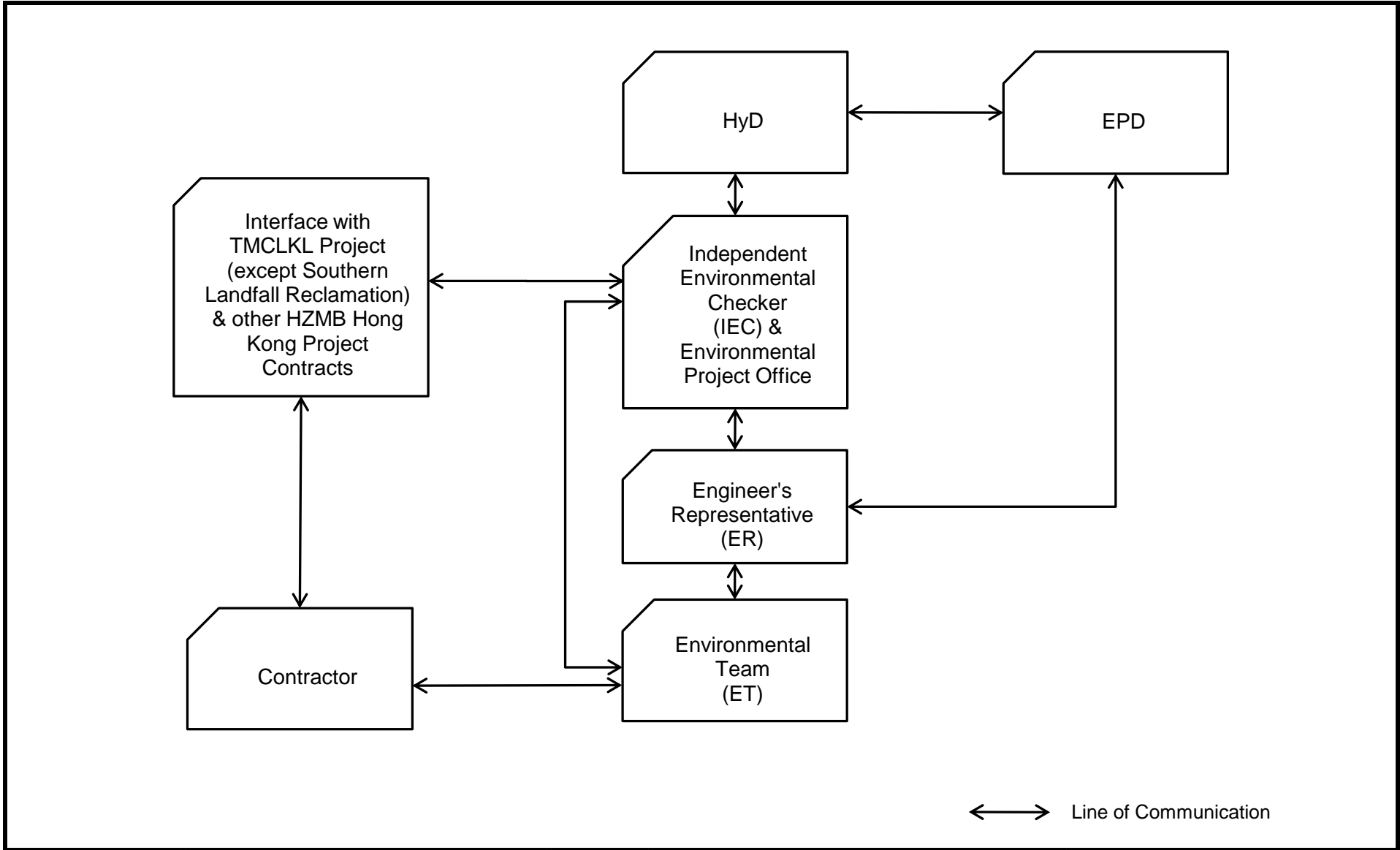
**Impact Dolphin Monitoring  
 Line Transect Layout Map**



**Figure 4**



This Drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.



This Drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.



Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014				
						Aug 33	Sep 34	Oct 35	Nov 36	
<b>32th Monthly Progress Report Status as on 21Aug2014 Ver.5</b>										
<b>Contract Key Dates</b>										
<b>Key Dates for achievement of Stages and completion of Sections</b>										
G1040	KD-2, Achievement of Stage 2 (420days+EOT 2days, 24Jan2013)	0		28-Aug-14*	-214					
G1050	KD-3, Achievement of Stage 3 (730days+EOT 2days, 30Nov2013)	0		21-Aug-14*	-263					
G1063	KD-4, Completion of Section A Main Area (730days+EOT 0.5days, 29Nov2013) PCB Arc	0		25-Aug-14*	-118					
<b>Vacation of Site</b>										
G1370	WorksArea TKO-WA (Zone C)	0		20-Sep-14*	-29					
<b>Work Zone, as defined in PS Clause 1.03(6)</b>										
<b>Portion A, B, C &amp; E</b>										
<b>Portion A, B, C &amp; E</b>										
<b>Seawall</b>										
<b>Cellular Structures</b>										
<b>Cellular Main Cells 85cells</b>										
<b>Full Guide Frames Method 85cells</b>										
<b>Portion E1 C078 &amp; C079 &amp; Portion E2 C065 &amp; C066 4cells</b>										
CSE1-040	PE1 Cellular Structure C078 & C079 2cells Type_C 9,143m3	48	01-Aug-14 A	20-Sep-14	-60					
<b>Connecting Arcs</b>										
<b>Portion E2 between K051/K052 to C066/C067 16arcs</b>										
CAE2-025L	PE2 Connecting Arc C063/C064 - C065/C066 Landside upper arcs splicing 3nrs (WC1)	18	25-Jun-14 A	27-Aug-14	-27					
CAE2-028	PE2 Final backfill cellular cells & Arcs C063/C064, C064/C065, C065/C066 & C066/C067	7	21-Aug-14	28-Aug-14	-173					
<b>Portion E1 between C073/C074 to C090/C091 18arcs</b>										
CAE1-014L	PE1 Connecting Arc C084/C085 - C087/C088 Landside upper arcs splicing 4nrs (HF)	34	07-Apr-14 A	22-Aug-14	9					
CAE1-018	PE1 Final backfill cellular cells & Arcs C080/C081 to C090/C091 Type_C 91,454.5 m3	22	31-May-14 A	28-Aug-14	9					
CAE1-022L	PE1 Connecting Arc C077/C078 - C079/C080 Landside lower arcs 3nrs	3	22-Sep-14	24-Sep-14	-54					
CAE1-022S	PE1 Connecting Arc C077/C078 - C079/C080 Seaside lower arcs 3nrs	3	25-Sep-14	27-Sep-14	-40					
CAE1-024L	PE1 Connecting Arc C077/C078 - C079/C080 Landside upper arcs splicing 3nrs (WC1)	17	25-Sep-14	16-Oct-14	-54					
CAE1-024S	PE1 Connecting Arc C077/C078 - C079/C080 Seaside upper arcs splicing 3nrs (WC1)	18	17-Oct-14	06-Nov-14	-54					
CAE1-028	PE1 Final backfill cellular cells & Arcs C077/C078 to C079/C080 Type_C 28,665m3	6	07-Nov-14	13-Nov-14	-54					
CAE1-048	PE1 Final backfill cellular cells & Arcs C077 to C066 Type_C 108,416m3	26	13-Jun-14 A	22-Aug-14	13					
CAE1-099	PE1 Completion of Cellular Cell at interface of TM-CLKL Tunnel	0		28-Aug-14	312					
<b>Capping Beams</b>										
<b>Portion B between K028 to K056 Capping Beams</b>										
CB025-00020	PB Capping Beams structure K044 - K056 13cells 4days/cell	52	29-Apr-14 A	25-Aug-14	-122					
<b>Portion E2 between K057 to C067 Capping Beams</b>										
CBE2-000	PE2 Capping Beams structure K057 to C062 6cells 4days/cell	13	04-Aug-14 A	29-Aug-14	-19					
CBE2-005	PE2 Capping Beams structure K063 to C064 2cells 4days/cell	8	30-Aug-14	06-Sep-14	-19					
CBE2-010	PE2 Capping Beams structure C065 to C067 3cells 4days/cell	12	08-Sep-14	19-Sep-14	-12					
<b>Portion C2a between C112 to C103 Capping Beams</b>										
CBC2a-010	PC2a Capping Beams structure C106 to C103 4cells 4days/cell	16	26-Aug-14	11-Sep-14	-122					
CBC2a-020	PC2a Capping Beams structure C112 to C107 6cells 4days/cell	24	21-Aug-14	15-Sep-14	-126					
<b>Portion C2c between C102 to C091 Capping Beams</b>										
CBC2c-000	PC2c Capping Beams structure C102 to C091 12cells 4days/cell	48	12-Sep-14	01-Nov-14	-48					
<b>Portion E1 between C090 to C074 Capping Beams</b>										
CBE1-010	PE1 Capping Beams structure C090 to C080 11cells 4days/cell	44	03-Nov-14	19-Dec-14	-48					
CBE1-020	PE1 Capping Beams structure C079 & C078 2cells 4days/cell	8	14-Nov-14	22-Nov-14	-23					
CBE1-030	PE1 Capping Beams structure C068 to C077 10cells 4days/cell	40	20-Sep-14	01-Nov-14	-12					

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

Hong Kong Boundary Corssing Facilities - Reclamation Works

Data Date :21-Aug-14

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014					
						Aug 33	Sep 34	Oct 35	Nov 36		
<b>Optimizing Rubble Mound Seawalls</b>											
<b>Seawall Portion C2a at C117 - C113</b>											
RFC2a-0070	PC2a at C117 - C113 Rockfill (Cat1), filter layer & geotextile +2.5mPD 21,060m3	12	15-Jul-14 A	27-Aug-14	-138						
RFC2a-0080	PC2a at C117 - C113 Rockfill (Cat1) for platform upto +2.5mPD 19,530m3	10	28-Aug-14	06-Sep-14	-138						
RFC2a-0090	PC2a at C117 - C113 Rockfill (Cat1 Fill) upto +6.0mPD & geotextile laying 7,980m3	4	08-Sep-14	11-Sep-14	-122						
RFC2a-0100	PC2a at C117 - C113 UnderLayer (0mPD 12,600m3	6	12-Sep-14	17-Sep-14	-110						
<b>Conforming Sloping Seawalls</b>											
<b>Geotextile</b>											
<b>Seawall Portion E1 at C068 - C090 23cells</b>											
SGE1-010	PE1 Geotextile at C090 - C080 11cells	22	11-Jul-14 A	03-Sep-14	885						
SGE1-020	PE1 Geotextile at C079 - C078 2cells	4	18-Jul-14 A	22-Aug-14	5						
SGE1-030	PE1 Geotextile at C077 - C068 10cells	20	13-Jul-14 A	03-Sep-14	885						
<b>Rockfill</b>											
<b>Seawall Portion C2a at C112 - C103 10cells</b>											
RFC2a-000	PC2a Rockfill at C112 - C103 Rockfill 10cells	40	05-May-14 A	05-Sep-14	-128						
<b>Seawall Portion C2c at C102 - C091 12cells</b>											
RFC2c-000	PC2c Rockfill at C102 - C091 12cells	48	18-Jun-14 A	08-Sep-14	78						
<b>Seawall Portion E2 at K052 - C067 16cells</b>											
RFE2-010	PE2 Rockfill at C052 - C062 11cells	44	14-May-14 A	09-Sep-14	-75						
RFE2-020	PE2 Rockfill at C063 - C067 5cells	20	10-Sep-14	30-Sep-14	-4						
<b>Seawall Portion E1 at C068 - C090 23cells</b>											
RFE1-010	PE1 Rockfill at C090 - C080 11cells	34	08-Aug-14 A	24-Sep-14	-15						
RFE1-020	PE1 Rockfill at C079 - C078 2cells	10	10-Sep-14	19-Sep-14	-11						
RFE1-030	PE1 Rockfill at C077 - C068 10cells	50	08-Aug-14 A	30-Sep-14	-21						
RFE1-099	PE1 Completion of Type V1 seawall	0		30-Sep-14	-22						
<b>Reclamation</b>											
		304	01-Apr-14 A	27-Nov-14	868						
<b>Ground Treatment</b>											
<b>Geotextile</b>											
<b>Existing Seabed Below -5mPD</b>											
<b>Land Portion E2 Northern Part</b>											
GERE2-010	PE2 Geotextile for sand blanket Northern (seabed below -5mPD)	8	01-May-14 A	30-Aug-14	-29						
<b>Sand Blankets</b>											
<b>Existing Seabed below -5mPD</b>											
<b>Land Portion E2 Northern Part</b>											
SABRE2-020	Sand Blankets at PE2 71,000m3 5,000m3/day North-East	15	10-Jun-14 A	04-Sep-14	-29						
<b>Vertical Band Drains by Marine Plant</b>											
<b>Land Portion E2 Northern Part 84,746nrs</b>											
VBDE2-020	Vertical Band Drains 61,714nrs by marine plant at PE2 (750nrs/day)	84	01-Apr-14 A	11-Sep-14	-29						
<b>Marine Fill</b>											
<b>Land Portion C1b</b>											
MFC1b-030	Marine Fill Type A Sand 70% at PC1b east 454,612m3 20,000m3/day	23	11-Aug-14 A	03-Sep-14	-161						
<b>Land Portion C2a</b>											
MFC2a-010	Marine Fill Type A Sand 70% at PC2a 730,287m3 20,000m3/day	36	11-Aug-14 A	15-Sep-14	-146						
<b>Land Portion E2</b>											
MFE2-005	Start PE2 after Marine Fill Type A Sand 100% at PC1b	0	04-Sep-14		-75						
MFE2-010	Marine Fill Type A Sand 70% at PE2 South 516,405m3 20,000m3/day	26	16-Sep-14	13-Oct-14	-81						
MFE2-020	Marine Fill Type A Sand 70% at PE2 North-W 76,867m3 20,000m3/day	4	14-Oct-14	17-Oct-14	-59						
MFE2-030	Marine Fill Type A Sand 70% at PE2 North-M 182,445m3 20,000m3/day	9	18-Oct-14	27-Oct-14	-59						

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

Hong Kong Boundary Corssing Facilities - Reclamation Works

Data Date :21-Aug-14

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014			
						Aug 33	Sep 34	Oct 35	Nov 36
MFE2-040	Marine Fill Type A Sand 70% at PE2 North-E 257,093m3 20,000m3/day	13	28-Oct-14	10-Nov-14	-59				
<b>Land Portion E1</b>									
MFE1-010	Marine Fill Type A Sand 70% at PE1 255,355m3 20,000m3/day	13	14-Nov-14	27-Nov-14	-62				
<b>Vertical Band Drains by Land Plant</b>									
<b>Land Portion B 304,328nrs</b>									
<b>Main Area 201,530nrs by Land</b>									
VBDB0-060	Vertical Band Drains by land plant at PB Main North 15,000nrs 4,000nrs/day (13HP)	4	20-May-14 A	30-Aug-14	957				
<b>Land Portion C2a 111,740nrs by Land</b>									
VBDC2a-030	Vertical Band Drains 111,740nrs by land plant at PC2a 3,000nrs/day (11HP)	38	25-Jun-14 A	06-Oct-14	-157				
<b>Land Portion E2 Southern Part 84,746nrs</b>									
VBDE2-012	Vertical Band Drains 84,746nrs by land plant at PE2 South 3,000nrs/day (11HP)	28	26-Jun-14 A	03-Nov-14	-71				
<b>Land Portion E1 12,243nrs by Land</b>									
VBDE1-10	Vertical Band Drains 12,243nrs by land plant at PE1 (1200nrs/day) (5HP)	10	10-Jul-14 A	27-Aug-14	62				
<b>Earthwork Fill</b>									
<b>Land Portion A</b>									
EFA0-050	Earthwork Fill Type D Sand 100% at PA at C122 - C126 Edge Area 146,046m3 12,000r	12	20-Jul-14 A	01-Aug-14 A					
EFA0-070	Earthwork Fill Type D Sand 100% at PA at C127 - C134 Edge Area 202,097m3 12,000r	17	02-Jun-14 A	31-Aug-14	888				
<b>Land Portion B</b>									
<b>Edge K013 - K027</b>									
EFB0-010	Earthwork Fill Type D Sand 100% at PB Edge at K013 - K027 400,000m3 20,000m3/day	4	06-Aug-14 A	25-Aug-14	-231				
<b>Edge K028 - K054</b>									
EFB0-040	Earthwork Fill Type D Sand 100% at PB Edge at K041 - K048 160,000m3 40,000m3/day	4	21-Jul-14 A	24-Jul-14 A					
EFB0-050	Earthwork Fill Type D Sand 100% at PB Edge at K049 - K054 160,000m3 40,000m3/day	4	25-Jul-14 A	28-Jul-14 A					
EFB0-055	Earthwork Fill Type D Sand 100% at PB Edge at K049 - K054 80,000m3 10,000m3/day	8	17-Jul-14 A	24-Jul-14 A					
<b>Main Area</b>									
EFB0-020	Earthwork Fill Type D Sand 100% at PB Main South 190000m3 40,000m3/day	5	11-Jul-14 A	22-Aug-14	-250				
EFB0-032	Earthwork Fill Type D Sand 100% at PB Main North 135,000m3 40,000m3/day	4	19-Aug-14 A	24-Aug-14	-69				
<b>Land Portion C1b</b>									
EFC1b-010	Earthwork Fill Type D Sand 100% at PC1b west 235,109m3 30,000m3/day 1st	8	20-Nov-14	27-Nov-14	-232				
<b>Surcharge</b>									
<b>Temporary Jettys</b>									
<b>2nd Temporary Jetty at C101</b>									
TP20010	Footing at Land - Place Steel Bridge precast footing and anchor block on	5	17-Jun-14 A	21-Aug-14	794				
TP20020	Marine Piling 10nrs	10	04-Aug-14 A	14-Aug-14 A					
TP20030	Installation of Dolphins 2nrs	2	15-Aug-14 A	17-Aug-14 A					
TP20040	Installation of main pier	2	18-Aug-14 A	19-Aug-14 A					
TP20050	Installation of steel bridge from Jetty to the land footing	2	20-Aug-14 A	21-Aug-14	-131				
TP20070	Installation of conveyor	2	22-Aug-14	23-Aug-14	-131				
TP20080	Installation of accessory parts	2	25-Aug-14	26-Aug-14	-131				
TP20090	Trial testing	5	27-Aug-14	01-Sep-14	-131				
TP20100	Certification for the System	1	02-Sep-14	02-Sep-14	-131				
TP20110	Start Operation of unloading public fill at C101	0	03-Sep-14		-162				
<b>3rd Temporary Jetty at C105</b>									
TP30010	Footing at Land - Place Steel Bridge precast footing and anchor block on	5	16-Jul-14 A	21-Jul-14 A					
TP30020	Marine Piling 10nrs	10	15-Aug-14 A	26-Aug-14	-141				
TP30030	Installation of Dolphins 2nrs	2	27-Aug-14	28-Aug-14	-141				
TP30040	Installation of main pier	2	29-Aug-14	30-Aug-14	-141				
TP30050	Installation of steel bridge from Jetty to the land footing	2	01-Sep-14	02-Sep-14	-141				

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

Hong Kong Boundary Corssing Facilities - Reclamation Works

Data Date :21-Aug-14

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014							
						Aug 33		Sep 34		Oct 35		Nov 36	
						Gantt Chart							
TP30060	Assembly of conveyor	10	22-Jul-14 A	01-Aug-14 A		[Gantt bar]							
TP30070	Installation of conveyor	2	03-Sep-14	04-Sep-14	-141	[Gantt bar]							
TP30080	Installation of accessory parts	2	05-Sep-14	06-Sep-14	-141	[Gantt bar]							
TP30090	Trial testing	5	08-Sep-14	13-Sep-14	-141	[Gantt bar]							
TP30100	Certification for the System	1	15-Sep-14	15-Sep-14	-141	[Gantt bar]							
TP30110	Start Operation of unloading public fill at C105	0	16-Sep-14		-175	[Gantt bar]							
<b>4th Temporary Jetty at C109</b>		<b>37</b>	<b>10-Sep-14</b>	<b>17-Oct-14</b>	<b>-147</b>	[Gantt bar]							
TP40010	Footing at Land - Place Steel Bridge precast footing and anchor block on	5	16-Sep-14	20-Sep-14	-121	[Gantt bar]							
TP40020	Marine Piling 10nrs	10	10-Sep-14	20-Sep-14	-117	[Gantt bar]							
TP40030	Installation of Dolphins 2nrs	2	22-Sep-14	23-Sep-14	-117	[Gantt bar]							
TP40040	Installation of main pier	2	24-Sep-14	25-Sep-14	-117	[Gantt bar]							
TP40050	Installation of steel bridge from Jetty to the land footing	2	26-Sep-14	27-Sep-14	-117	[Gantt bar]							
TP40060	Assembly of conveyor	10	22-Sep-14*	04-Oct-14	-121	[Gantt bar]							
TP40070	Installation of conveyor	2	06-Oct-14	07-Oct-14	-121	[Gantt bar]							
TP40080	Installation of accessory parts	2	08-Oct-14	09-Oct-14	-121	[Gantt bar]							
TP40090	Trial testing	5	10-Oct-14	15-Oct-14	-121	[Gantt bar]							
TP40100	Certification for the System	1	16-Oct-14	16-Oct-14	-121	[Gantt bar]							
TP40110	Start Operation of unloading public fill at C109	0	17-Oct-14		-147	[Gantt bar]							
<b>5th Temporary Jetty at K053</b>		<b>35</b>	<b>23-Jul-14 A</b>	<b>27-Aug-14</b>	<b>-157</b>	[Gantt bar]							
TP50010	Footing at Land - Place Steel Bridge precast footing and anchor block on	5	29-Jul-14 A	02-Aug-14 A		[Gantt bar]							
TP50020	Marine Piling 10nrs	10	23-Jul-14 A	02-Aug-14 A		[Gantt bar]							
TP50030	Installation of Dolphins 2nrs	2	04-Aug-14 A	05-Aug-14 A		[Gantt bar]							
TP50040	Installation of main pier	2	06-Aug-14 A	07-Aug-14 A		[Gantt bar]							
TP50050	Installation of steel bridge from Jetty to the land footing	2	08-Aug-14 A	09-Aug-14 A		[Gantt bar]							
TP50060	Assembly of conveyor	10	04-Aug-14 A	14-Aug-14 A		[Gantt bar]							
TP50070	Installation of conveyor	2	15-Aug-14 A	16-Aug-14 A		[Gantt bar]							
TP50080	Installation of accessory parts	2	18-Aug-14 A	19-Aug-14 A		[Gantt bar]							
TP50090	Trial testing	5	20-Aug-14 A	25-Aug-14	-126	[Gantt bar]							
TP50100	Certification for the System	1	26-Aug-14	26-Aug-14	-126	[Gantt bar]							
TP50110	Start Operation of unloading public fill at K053	0	27-Aug-14		-157	[Gantt bar]							
<b>6th Temporary Jetty at K057</b>		<b>35</b>	<b>08-Oct-14</b>	<b>12-Nov-14</b>	<b>-86</b>	[Gantt bar]							
TP60010	Footing at Land - Place Steel Bridge precast footing and anchor block on	5	14-Oct-14	18-Oct-14	-71	[Gantt bar]							
TP60020	Marine Piling 10nrs	10	08-Oct-14	18-Oct-14	-67	[Gantt bar]							
TP60030	Installation of Dolphins 2nrs	2	20-Oct-14	21-Oct-14	-67	[Gantt bar]							
TP60040	Installation of main pier	2	22-Oct-14	23-Oct-14	-67	[Gantt bar]							
TP60050	Installation of steel bridge from Jetty to the land footing	2	24-Oct-14	25-Oct-14	-67	[Gantt bar]							
TP60060	Assembly of conveyor	10	20-Oct-14*	30-Oct-14	-71	[Gantt bar]							
TP60070	Installation of conveyor	2	31-Oct-14	01-Nov-14	-71	[Gantt bar]							
TP60080	Installation of accessory parts	2	03-Nov-14	04-Nov-14	-71	[Gantt bar]							
TP60090	Trial testing	5	05-Nov-14	10-Nov-14	-71	[Gantt bar]							
TP60100	Certification for the System	1	11-Nov-14	11-Nov-14	-71	[Gantt bar]							
TP60110	Start Operation of unloading public fill at K053	0	12-Nov-14		-86	[Gantt bar]							
<b>Flat Barges for unloading</b>		<b>0</b>	<b>21-Aug-14</b>	<b>21-Aug-14</b>	<b>967</b>	[Gantt bar]							
FB10010	Flat Barge for unloading at C132	0	21-Aug-14*		967	[Gantt bar]							
<b>Portion A Surcharge</b>		<b>328</b>	<b>05-Feb-14 A</b>	<b>29-Dec-14</b>	<b>836</b>	[Gantt bar]							
<b>Main Reclamation Areas</b>		<b>328</b>	<b>05-Feb-14 A</b>	<b>29-Dec-14</b>	<b>836</b>	[Gantt bar]							
<b>A1 PCB East</b>		<b>202</b>	<b>05-Feb-14 A</b>	<b>30-Aug-14</b>	<b>957</b>	[Gantt bar]							
SURA0-120	Surcharge Period at PA PCB East 3.5mths (8-4.5=3.5mths)	105	05-Feb-14 A	30-Aug-14	957	[Gantt bar]							

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

Hong Kong Boundary Corssing Facilities - Reclamation Works

Data Date :21-Aug-14

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014			
						Aug 33	Sep 34	Oct 35	Nov 36
SURA0-130	Sand Surcharge Removal at PA PCB East 126,794m3 20,000m3/day	4	07-Aug-14 A	25-Aug-14	-109				
SURA0-140	Completion of PA PCB East	0		25-Aug-14	-118				
<b>A1 PCB West</b>		183	24-Feb-14 A	30-Aug-14	957				
SURA0-220	Surcharge Period at PA PCB West 3.5mths (8-4.5=3.5mths)	105	24-Feb-14 A	30-Aug-14	957				
SURA0-230	Sand Surcharge Removal at PA PCB West 126,794m3 20,000m3/day	7	07-Aug-14 A	25-Aug-14	-109				
SURA0-240	Completion of PA PCB West	0		25-Aug-14	-118				
<b>A2</b>		181	02-Jul-14 A	29-Dec-14	-255				
SURA0-410	Surcharge Laying upto +11.5mPD & compaction upto +8.5mPD on Main Area at PA 285,	29	02-Jul-14 A	31-Aug-14	-232				
SURA0-420	Surcharge Period on Main Area at PA 6mth (8-2-1-1=4mths)	120	01-Sep-14	29-Dec-14	-255				
<b>at C127 - C134 for Power Substation Area</b>		175	20-Jun-14 A	23-Dec-14	-242				
SURA0-310	Sand Surcharge Laying upto +11.5mPD & compaction upto +8.5mPD on Main Area at P	4	20-Jun-14 A	25-Aug-14	-220				
SURA0-320	Surcharge Period on Main Area at PA CLP substation 6mth (8-2-1-1=4mths)	120	26-Aug-14	23-Dec-14	-242				
<b>Edge Areas</b>		161	02-Jul-14 A	09-Dec-14	-183				
<b>at C125 - C119</b>		130	02-Aug-14 A	09-Dec-14	-183				
SUEA0-055	Pause Period on Edge Area at PA 2mths	60	02-Aug-14 A	30-Sep-14	-183				
SUEA0-060	Surcharge Laying & compaction upto 8.5mPD on Edge Area at PA 83,452m3 10,000m3/	9	01-Oct-14	10-Oct-14	-170				
SUEA0-070	Surcharge Pause Period on Edge Area at PA 2mths	60	11-Oct-14	09-Dec-14	-183				
<b>at C134 - C126</b>		148	02-Jul-14 A	26-Nov-14	-174				
SUEA0-005	Pause Period on Edge Area at PA 2mths	60	02-Jul-14 A	30-Aug-14	-159				
SUEA0-010	Surcharge Laying & compaction upto 8.5mPD on Edge Area at PA 107,295m3 10,000m3	11	16-Sep-14	27-Sep-14	-162				
SUEA0-020	Surcharge Pause Period on Edge Area at PA 2mths	60	28-Sep-14	26-Nov-14	-174				
<b>Land Portion B</b>		202	23-Aug-14	12-Mar-15	-77				
<b>Edge Areas</b>		199	26-Aug-14	12-Mar-15	-77				
<b>at K013 - K027</b>		146	26-Aug-14	18-Jan-15	-157				
SUEB0-005	Surcharge Period 2mths after Fill upto +5.5mPD at PB at K013-K027	60	26-Aug-14	24-Oct-14	-231				
SUEB0-010	Sand Surcharge Laying up to 8.5mPD on Edge Area at PB at K013 - K027 240,000m3 4	6	13-Nov-14	19-Nov-14	-232				
SUEB0-020	Surcharge Period 1st stage on Edge Area at PB at K013 - K027 2mths	60	20-Nov-14	18-Jan-15	-157				
<b>at K028 - K034</b>		186	27-Aug-14	28-Feb-15	-71				
SUEB0-060	Sand Surcharge Laying up to 8.5mPD on Edge Area at PB at K028 - K034 100,000m3 4	3	27-Aug-14	29-Aug-14	-228				
SUEB0-070	Surcharge Period 1st stage on Edge Area at PB 2mths (4.5-2.5=2mths)	60	30-Aug-14	28-Oct-14	-249				
SUEB0-080	Sand Surcharge Laying up to top on Edge Area at PB 100,000m3 40,000m3/day	3	29-Oct-14	31-Oct-14	-231				
SUEB0-090	Surcharge Period 2nd stage on Edge Area at PB (5-1=4mths)	120	01-Nov-14	28-Feb-15	-71				
<b>at K035 - K040</b>		186	30-Aug-14	03-Mar-15	-68				
SUEB0-140	Sand Surcharge Laying up to 8.5mPD on Edge Area at PB at K035 - K040 60,000m3 40	2	30-Aug-14	31-Aug-14	-228				
SUEB0-150	Surcharge Period 1st stage on Edge Area at PB 2mths (4.5-2.5=2mths)	60	01-Sep-14	30-Oct-14	-248				
SUEB0-160	Sand Surcharge Laying up to top on Edge Area at PB 60,000m3 40,000m3/day	2	01-Nov-14	03-Nov-14	-231				
SUEB0-170	Surcharge Period 2nd stage on Edge Area at PB (5-1=4mths)	120	04-Nov-14	03-Mar-15	-68				
<b>at K041 - K048</b>		188	01-Sep-14	07-Mar-15	-135				
SUEB0-0100	Sand Surcharge Laying up to 8.5mPD on Edge Area at PB at K041 - K051 160,000m3 4	4	01-Sep-14	04-Sep-14	-228				
SUEB0-0105	Additional GI Works by Other Contractors HY/2010/07	30	05-Sep-14	13-Oct-14	-185				
SUEB0-0110	Surcharge Period 1st stage on Edge Area at PB 2mths (4.5-2.5=2mths)	60	05-Sep-14	03-Nov-14	-250				
SUEB0-0120	Sand Surcharge Laying up to top on Edge Area at PB 160,000m3 40,000m3/day	4	04-Nov-14	07-Nov-14	-231				
SUEB0-0130	Surcharge Period 2nd stage on Edge Area at PB (5-1=4mths)	120	08-Nov-14	07-Mar-15	-135				
<b>at K049 - K054</b>		189	05-Sep-14	12-Mar-15	-138				
SUEB0-190	Sand Surcharge Laying up to 8.5mPD on Edge Area at PB at K049 - K054 160,000m3 4	4	05-Sep-14	09-Sep-14	-227				
SUEB0-195	Additional GI Works by Other Contractors HY/2010/07	30	10-Sep-14	16-Oct-14	-184				
SUEB0-200	Surcharge Period 1st stage on Edge Area at PB 2mths (4.5-2.5=2mths)	60	10-Sep-14	08-Nov-14	-250				
SUEB0-210	Sand Surcharge Laying up to top on Edge Area at PB 160,000m3 40,000m3/day	4	09-Nov-14	12-Nov-14	-232				

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

Hong Kong Boundary Corssing Facilities - Reclamation Works

Data Date :21-Aug-14

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014			
						Aug 33	Sep 34	Oct 35	Nov 36
SUEB0-220	Surcharge Period 2nd stage on Edge Area at PB (5-1=4mths)	120	13-Nov-14	12-Mar-15	-138				
<b>Reclamation Areas</b>		145	23-Aug-14	14-Jan-15	-85				
<b>at Main 1</b>		124	23-Aug-14	24-Dec-14	-64				
SURB0-010	Sand Surcharge Laying upto top on Main Reclamation Area at PB South 110,000m3 40,l	3	23-Aug-14*	26-Aug-14	-228				
SURB0-020	Surcharge Period on Main Reclamation Area at PB 6mths (7-3=4mths)	120	27-Aug-14	24-Dec-14	-64				
<b>at Main 2</b>		127	10-Sep-14	14-Jan-15	-85				
SURB0-060	Sand Surcharge Laying upto top on Main Reclamation Area at PB K041 - K051 267,000r	7	10-Sep-14	16-Sep-14	-79				
SURB0-070	Surcharge Period on Main Reclamation Area at PB 6mths (7-3=4mths)	120	17-Sep-14	14-Jan-15	-85				
<b>Geotechnical Instrumentation Works</b>		303	02-Apr-14 A	01-Mar-15	24				
<b>Geotechnical Instrumentation Works for Seawalls</b>		303	02-Apr-14 A	01-Mar-15	24				
<b>Cluster Type SA 2nrs Piezometer, Extensometer and Settlement Marker Cluster inside Cells</b>		303	02-Apr-14 A	01-Mar-15	24				
<b>SA-1 K048 Portion B</b>		274	02-Apr-14 A	31-Jan-15	-31				
CTSA1-020	Montioring of SA-1 C048 PB by weekly for subsequent 10mths	274	02-Apr-14 A	31-Jan-15	-31				
<b>SA-2 C113 Portion C2a</b>		303	02-Apr-14 A	01-Mar-15	24				
CTSA2-020	Monitoring of SA-2 C113 PC2a by weekly for subsequent 10mths	303	02-Apr-14 A	01-Mar-15	24				
<b>Cluster Type SE 26nrs Surface movement marker cluster at top of cell and sloping seawall</b>		7	08-Aug-14 A	15-Aug-14 A					
CTSE-120	Installation of SE-12 (C069) PE2	7	08-Aug-14 A	15-Aug-14 A					
CTSE-130	Installation of SE-13 (C071) PE1	7	08-Aug-14 A	15-Aug-14 A					
CTSE-140	Installation of SE-14 (C077) PE1	7	08-Aug-14 A	15-Aug-14 A					
CTSE-150	Installation of SE-15 (C079) PE1	7	08-Aug-14 A	15-Aug-14 A					
CTSE-160	Installation of SE-16 (C082) PE1	7	08-Aug-14 A	15-Aug-14 A					
CTSE-170	Installation of SE-17 (C087) PE1	7	08-Aug-14 A	15-Aug-14 A					
<b>Geotechnical Instrumentation Works for Reclamation RA &amp; RB</b>		71	03-Sep-14	27-Nov-14	-10				
<b>RA</b>		39	03-Sep-14	21-Oct-14	-26				
CTRA-060	Installation of RA 6sets at PC1b	7	04-Sep-14	12-Sep-14	-126				
CTRA-070	Installation of RA 4sets at PC2a	7	03-Sep-14	11-Sep-14	-97				
CTRA-100	Installation of RA 6sets at PE2	7	14-Oct-14	21-Oct-14	-26				
<b>RB</b>		38	04-Sep-14	21-Oct-14	-53				
SMT1-060	Installation of RB at PC1b	7	04-Sep-14	12-Sep-14	-126				
SMT1-110	Installation of RB at PE2	7	14-Oct-14	21-Oct-14	-53				
<b>Settlement Marker Type 2</b>		70	04-Sep-14	27-Nov-14	-10				
SMT2-060	M2 - Installation of Settlement Marker Type2 at PC1b	7	04-Sep-14	12-Sep-14	-126				
SMT2-070	M2 - Installation of Settlement Marker Type2 at PC2a	7	06-Sep-14	15-Sep-14	-96				
SMT2-100	M2 - Installation of Settlement Marker Type2 at PE1	7	20-Nov-14	27-Nov-14	-10				
SMT2-110	M2 - Installation of Settlement Marker Type2 at PE2	7	06-Oct-14	13-Oct-14	-16				
<b>Portion D</b>		214	22-May-14 A	20-Jan-15	814				
<b>Submission</b>		0	21-Aug-14	21-Aug-14	967				
<b>Design Submission</b>		0	21-Aug-14	21-Aug-14	967				
<b>Stability Analysis and Settlement Assessment for Vertical Seawall w No Dredging</b>		0	21-Aug-14	21-Aug-14	967				
PD-DGN-02010	Stability Analysis and settlement assessment for vertical seawall with no dredging	0		21-Aug-14*	967				
<b>Stability Analysis and Settlement Assessment for Sloping Seawall w No Dredging</b>		0	21-Aug-14	21-Aug-14	967				
PD-DGN-03010	Stability Analysis and Settlement Assessment for Sloping seawall with no dredging	0		21-Aug-14*	967				
<b>Settlement Assessment for Culverts C1 - C4 w No Dredging</b>		0	21-Aug-14	21-Aug-14	967				
PD-DGN-04010	Settlement assessment for box culverts C1 - C4 with no dredging	0		21-Aug-14*	967				
<b>Structural Analysis for Culverts C1 - C4 w Precast Method</b>		0	21-Aug-14	21-Aug-14	-74				
PD-DGN-05010	Structural analysis for Box Culverts C1 - C4 with Precast Method	0		21-Aug-14*	-74				
<b>Drainage Impact Assessment &amp; Temporary Diversion (stg2 - for construction of box culvert EC1)</b>		0	21-Aug-14	21-Aug-14	-74				
PD-DGN-07010	Drainage Impact Assessment and Temporary Diversion (stage 2 - for construction of box	0		21-Aug-14*	-74				

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

Hong Kong Boundary Corssing Facilities - Reclamation Works

Data Date :21-Aug-14

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014				
						Aug 33	Sep 34	Oct 35	Nov 36	
<b>Settlement Assessment for Box Culvert EC1</b>										
PD-DGN-08010	Settlement Assessment for Box culvert EC1 Submission 1st	0	21-Aug-14	21-Aug-14	-74					
<b>Structural Analysis for Box Culvert EC1 w Precast &amp; Cast in-situ Method</b>										
PD-DGN-09010	Structural Analysis for Box culvert EC1 with Precast and Cast in-situ Method	0	21-Aug-14	21-Aug-14	-74					
<b>Detailed General Arrangement &amp; RC drawings for C1 to C4 w Precast Method</b>										
PD-DGN-10010	Detailed General Arrangement and RC drawings for Box culverts C1 to C4 with Precast	0	21-Aug-14	21-Aug-14	-74					
<b>Detailed General Arrangement &amp; RC drawings for EC1 w Precast &amp; Cast insitu Methods</b>										
PD-DGN-11010	Detailed General Arrangement and RC drawings for Box Culverts EC1 with Precast and	0	21-Aug-14	21-Aug-14	967					
<b>Precast Yard for Seawall Blocks &amp; Culverts</b>										
<b>Culverts</b>										
PD-PY-0210	Precast C1 6nrs	60	02-Jul-14 A	30-Sep-14	-146					
PD-PY-0220	Precast EC1 10nrs	60	01-Aug-14 A	29-Sep-14	-123					
PD-PY-0230	Precast C2 5nrs	60	01-Oct-14	29-Nov-14	-146					
PD-PY-0240	Precast C3 5nrs	60	30-Sep-14	28-Nov-14	-123					
PD-PY-0250	Precast C4 5nrs	60	30-Oct-14	28-Dec-14	-123					
<b>Site Construction</b>										
<b>Seawall Construction</b>										
<b>Access at Portion D</b>										
<b>WaterMain Construction</b>										
A30020	PD - Temp Watermain Construction along Access	60	10-Jul-14 A	08-Oct-14*	-31					
<b>Surcharge</b>										
<b>West1 Portion</b>										
A1640	PD West1 - Surcharge Laying upto 8.5mPD 42,843m3 5,000m3/day outstanding	15	22-May-14 A	28-Aug-14	890					
A1650	PD West1 - Surcharge compaction upto 8.5mPD	15	22-May-14 A	02-Sep-14	954					
A1658	PD West1 - Surcharge Laying +11.5mPD 42,843m3 5,000m3/day	8	23-Jul-14 A	31-Jul-14 A						
A1660	PD West1 - Surcharge Period 4mths	120	21-Aug-14	18-Dec-14	-210					
<b>West2 Portion</b>										
A2194	PD West2 - Allow to surcharge upto 8.5mPD by result of Vent Shear Test	0	16-Jul-14 A	21-Aug-14	795					
A2200	PD West2 - Surcharge Laying upto +8.5mPD 42,843m3 5,000m3/day outstanding	7	16-Jul-14 A	22-Jul-14 A						
A2210	PD West2 - Surcharge compaction upto 8.5mPD	7	17-Jul-14 A	23-Jul-14 A						
A2212	PD West2 - Vent Shear Test after +8.5mPD 6nrs	12	24-Jul-14 A	06-Aug-14 A						
A2216	PD West2 - Surcharge Pause Period 0mths	0	07-Aug-14 A	07-Aug-14 A						
A2218	PD West2 - Surcharge Laying +11.5mPD 42,843m3 5,000m3/day	8	09-Aug-14 A	18-Aug-14 A						
A2220	PD West2 - Surcharge Period 4mths	120	21-Aug-14	18-Dec-14	-182					
<b>East1 Portion</b>										
A1672	PD East1 - Vent Shear Test 6nrs	12	16-Jul-14 A	29-Jul-14 A						
A1673	PD East1 - Allow to surcharge upto 8.5mPD by result of Vent Shear Test	0	30-Jul-14 A	30-Jul-14 A						
A1675	PD East1 - Surcharge Laying upto +8.5mPD 42,843m3 5,000m3/day outstanding	8	01-Aug-14 A	08-Aug-14 A						
A1680	PD East1 - Surcharge Compaction upto 8.5mPD	9	02-Aug-14 A	10-Aug-14 A						
A1682	PD East1 - Vent Shear Test after +8.5mPD 6nrs	4	11-Aug-14 A	25-Aug-14	-130					
A1686	PD East1 - Surcharge Pause Period 0mths	0	26-Aug-14	26-Aug-14	-161					
A1688	PD East1 - Surcharge Laying +11.5mPD 42,843m3 5,000m3/day	8	29-Aug-14	05-Sep-14	-152					
A1690	PD East1 - Surcharge Period 4mths	120	06-Sep-14	03-Jan-15	-164					
<b>East2 Portion</b>										
A2234	PD East2 - Vent Shear Test 6nrs	12	30-Jul-14 A	12-Aug-14 A						
A2236	PD East2 - Allow to surcharge upto 8.5 by result of Vent Shear Test	0	13-Aug-14 A	13-Aug-14 A						
A2240	PD East2 - Surcharge Laying upto +8.5mPD 42843m3 5,000m3/day	7	18-Aug-14 A	28-Aug-14	-152					
A2250	PD East2 - Surcharge Compaction upto 8.5mPD	9	21-Aug-14	29-Aug-14	-154					

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

Hong Kong Boundary Corssing Facilities - Reclamation Works

Data Date :21-Aug-14

Activity ID	Activity Name	Original Duration	Start	Finish	Total Float	2014			
						Aug 33	Sep 34	Oct 35	Nov 36
A2252	PD East2 - Vent Shear Test after +8.5mPD 6hrs	12	30-Aug-14	13-Sep-14	-124				
A2256	PD East2 - Surcharge Pause Period 0mths	0	14-Sep-14	14-Sep-14	-154				
A2258	PD East2 - Surcharge Laying +11.5mPD 42,843m3 5,000m3/day	8	14-Sep-14	22-Sep-14	-143				
A2260	PD East2 - Surcharge Period 4mths	120	23-Sep-14	20-Jan-15	-154				
<b>Box Culvert Construction</b>		<b>0</b>	<b>21-Aug-14</b>	<b>21-Aug-14</b>	<b>-9</b>				
<b>Extension Culvert EC1</b>		<b>0</b>	<b>21-Aug-14</b>	<b>21-Aug-14</b>	<b>-9</b>				
EC1-0005	The Area of EC1 handback by HY/2011/03	0	21-Aug-14*		-9				
<b>Works Area WA2 (Tung Chung)</b>		<b>1431</b>	<b>21-May-12 A</b>	<b>27-Mar-17</b>	<b>-23</b>				
<b>Zone A</b>		<b>1431</b>	<b>21-May-12 A</b>	<b>27-Mar-17</b>	<b>-23</b>				
A1880	Maintenance of Engineer's Accommodation	1431	21-May-12 A	27-Mar-17	-23				
<b>Works Area TKO Fill Bank</b>		<b>1251</b>	<b>25-Sep-12 A</b>	<b>29-Dec-16</b>	<b>-24</b>				
WA-TKO-1040	Operate and Maintain Public Fill Sorting Facilities in Zone A, B1 & B2	1251	25-Sep-12 A	29-Dec-16	-24				
WA-TKO-1050	Maintainance of Site in Zone C	568	25-Sep-12 A	20-Sep-14	-24				

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



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

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
<b>Air Quality</b>				
S5.5.6.1 of HKBCFEIA	A1	The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	All construction sites	V
S5.5.6.2 of HKBCFEIA and S4.8.1 of TKCLKLEIA	A2	Proper watering of exposed spoil should be undertaken throughout the construction phase: <ul style="list-style-type: none"> <li>• Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;</li> <li>• Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;</li> <li>• A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones.</li> <li>• Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;</li> <li>• When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;</p> <ul style="list-style-type: none"> <li>• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;</li> <li>• Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;</li> <li>• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;</li> <li>• Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;</li> <li>• Any skip hoist for material transport should be totally enclosed by impervious sheeting;</li> <li>• Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;</li> <li>• Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;</p> <ul style="list-style-type: none"> <li>• All unpaved roads/exposed area shall be watered which results in dust suppression by forming moist cohesive films among the discrete grains of road surface material.</li> <li>• No burning of debris or other materials on the works areas is allowed;</li> <li>• Water spray shall be used during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created;</li> <li>• Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading;</li> <li>• During transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards;</li> <li>• Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and</li> <li>• Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		construction site or part of the construction site where the exposed earth lies.		
S5.5.6.3 of HKBCFEIA and S4.8.1 of TKCLKLEIA	A3	The Contractor should undertake proper watering on all exposed spoil and associated work areas (with at least 8 times per day) throughout the construction phase.	All construction sites	V
S5.5.6.4 of HKBCFEIA and S4.11 of TKCLKLEIA	A4	Implement regular dust monitoring under EM&A programme during the construction stage.	Selected representative dust monitoring station	V
S5.5.7.1 of HKBCFEIA	A5	The following mitigation measures should be adopted to prevent fugitive dust emissions for concrete batching plant: <ul style="list-style-type: none"> <li>• Loading, unloading, handling, transfer or storage of any dusty materials should be carried out in totally enclosed system;</li> <li>• All dust-laden air or waste gas generated by the process operations should be properly extracted and vented to fabric filtering system to meet the emission limits for TSP;</li> <li>• Vents for all silos and cement/ pulverised fuel ash (PFA) weighing scale should be fitted with fabric filtering system;</li> <li>• The materials which may generate airborne dusty emissions should be wetted by water spray system;</li> <li>• All receiving hoppers should be enclosed on three sides up to 3m above unloading</li> </ul>	All construction sites	N/A

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

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

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
			monitoring station	
<b>Waste Management (Construction Waste)</b>				
S12.6 of TMCLKLEIA	WM1	The Contractor shall identify a coordinator for the management of waste.	All construction sites	V
S12.6 of TMCLKLEIA	WM2	The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	All construction sites	V
S12.6 of TMCLKLEIA	WM3	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All construction sites	V
S8.3.8 of HKBCFEIA and S12.6 of TMCLKLEIA	WM4	<p><u>Construction and Demolition Material</u></p> <p>The following mitigation measures should be implemented in handling the waste:</p> <ul style="list-style-type: none"> <li>• Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement;</li> <li>• Carry out on-site sorting;</li> <li>• Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate;</li> <li>• Adopt ‘Selective Demolition’ technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible;</li> <li>• Implement a trip-ticket system for each works contract to ensure that the disposal of</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>C&amp;D materials are properly documented and verified;</p> <ul style="list-style-type: none"> <li>• Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – “Environmental Management on Construction Sites” to encourage on-site sorting of C&amp;D materials and to minimize their generation during the course of construction;</li> <li>• In addition, disposal of the C&amp;D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation; and</li> <li>• The surplus surcharge should be transferred to a fill bank.</li> </ul>		
<p>S8.3.9- S8.3.11 of HKBCFEIA and S12.6 of TMCLKLEIA</p>	<p>WM5</p>	<p><u>C&amp;D Waste</u></p> <ul style="list-style-type: none"> <li>• Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&amp;D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding and falsework should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage.</li> <li>• The Contractor should recycle as much of the C&amp;D materials as possible on-site. Public fill and C&amp;D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel</li> </ul>	<p>All construction sites</p>	<p>V</p>



EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.</p>		
<p>S8.2.12- S8.3.15 of HKBCFEIA and S12.6 of TMCLKLEIA</p>	<p>WM6</p>	<p><u>Chemical Waste</u></p> <ul style="list-style-type: none"> <li>• Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.</li> <li>• Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation.</li> <li>• The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated.</li> <li>• Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.</li> </ul>	<p>All construction sites</p>	<p>V</p>

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
S8.3.16 of HKBCFEIA and S12.6 of TMCLKLEIA	WM7	<p><u>Sewage</u></p> <ul style="list-style-type: none"> <li>Adequate numbers of portable toilets should be provided for the workers. The portable toilets should be maintained in a state, which will not deter the workers from utilizing these portable toilets. Night soil should be collected by licensed collectors regularly.</li> </ul>	All construction sites	V
S8.3.17 of HKBCFEIA and S12.6 of TMCLKLEIA	WM8	<p><u>General Refuse</u></p> <ul style="list-style-type: none"> <li>The site and surroundings shall be kept tidy and litter free. General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes.</li> <li>A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law.</li> <li>Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible.</li> <li>Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. In addition, waste separation facilities for paper, aluminum cans, plastic bottles etc., should be provided.</li> </ul>	All construction sites	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>• Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including reduction, reuse and recycling of wastes.</li> <li>• Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station.</li> <li>• All waste containers shall be in a secure area on hardstanding.</li> </ul>		
<b>Water Quality (Construction Phase)</b>				
	W1	<p>Mitigation during the marine works to reduce impacts to within acceptable levels have been recommended and will comprise a series of measures that restrict the method and sequencing of backfilling, as well as protection measures. Details of the measures are provided below:</p> <ul style="list-style-type: none"> <li>• Reclamation filling for the Project shall not proceed until at least 200m of leading seawall at the reclamation area formed above +2.2mPD, unless otherwise</li> </ul>	During filling	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<p>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;</p> <ul style="list-style-type: none"> <li>• Except for the filling of the cellular structures, not more than 15% public fill shall be used for reclamation filling below +2.5mPD during construction of the seawall;</li> <li>• After the seawall is completed except for the 300m marine access as indicated in the EPs, not more than 30% public fill shall be used for reclamation filling below +2.5mPD, unless otherwise agreement from EPD was obtained;</li> <li>• Upon completion of 200m leading seawall, no more than a total of 60 filling barge trips per day shall be made with a cumulative maximum daily filling rate of 60,000 m3 for HKBCF and TMCLKL southern landfall reclamation during the filling operation; and</li> <li>• Upon completion of the whole section of seawall except for the 300m marine access as indicated in the EPs, no more than a total of 190 filling barge trips per day shall be made with a cumulative maximum daily filling rate of 190,000 m3 for the remaining filling operations for HKBCF and TMCLKL southern landfall reclamation.</li> <li>• Floating type perimeter silt curtains shall be around the HKBCF site before the commencement of marine works. Staggered layers of silt curtain shall be provided to prevent sediment loss at navigation accesses. The length of each staggered layers shall be at least 200m;</li> </ul>		

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>• Single layer silt curtain to be applied around the North-east airport water intake;</li> <li>• The silt-curtains should be maintained in good condition to ensure the sediment plume generated from filling be confined effectively within the site boundary;</li> <li>• The filling works shall be scheduled to spread the works evenly over a working day;</li> <li>• Cellular structure shall be used for seawall construction;</li> <li>• A layer of geotextile shall be placed on top of the seabed before any filling activities take place inside the cellular structures to form the seawall;</li> <li>• The conveyor belts shall be fitted with windboards and conveyor release points shall be covered with curtain to prevent any spillage of filling materials onto the surrounding waters; and</li> <li>• An additional layer of silt curtain shall be installed near the active stone column installation points. A layer of geotextile with stone blanket on top shall be placed on the seabed prior to stone column installation works.</li> </ul>		
S9.11.1.3 of HKBCFEIA and S6.10 of TMCLKLEIA	W2	<p><u>Land Works</u></p> <p>General construction activities on land should also be governed by standard good working practice. Specific measures to be written into the works contracts should include:</p> <ul style="list-style-type: none"> <li>• wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;</li> </ul>	All land-based construction sites	V

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

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

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>• waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance;</li> <li>• all fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank; and</li> <li>• surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the storm water system..</li> </ul>		
S9.14 of HKBCFEIA and S6.10 of TMCLKLEIA	W3	Implement a water quality monitoring programme	At identified monitoring location	V
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
<b>Ecology (Construction Phase)</b>				
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E1	<ul style="list-style-type: none"> <li>• Install silt curtain during the construction</li> <li>• Limit works fronts</li> <li>• Construct seawall prior to reclamation filling where practicable</li> <li>• Good site practices</li> <li>• Strict enforcement of no marine dumping</li> </ul>	Seawall, reclamation area	V



EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		<ul style="list-style-type: none"> <li>• Site runoff control</li> <li>• Spill response plan</li> </ul>		
S10.7 of HKBCFEIA	E2	<ul style="list-style-type: none"> <li>• Watering to reduce dust generation; prevention of siltation of freshwater habitats; Site runoff should be desilted, to reduce the potential for suspended sediments, organics and other contaminants to enter streams and standing freshwater.</li> </ul>	Land-based works areas	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E3	<ul style="list-style-type: none"> <li>• Good site practices, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time.</li> </ul>	Land-based works areas	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E4	<ul style="list-style-type: none"> <li>• Dolphin Exclusion Zone</li> <li>• Dolphin watching plan</li> </ul>	Marine works	V
S10.7 of HKBCFEIA and S8.14 of TMCLKLEIA	E5	<ul style="list-style-type: none"> <li>• Decouple compressors and other equipment on working vessels</li> <li>• Proposal on design and implementation of acoustic decoupling measures applied during reclamation works</li> <li>• Avoidance of percussive piling</li> </ul>	Marine works	V
S10.7 of HKBCFEIA and S8.14 of	E6	<ul style="list-style-type: none"> <li>• Control vessel speed</li> <li>• Skipper training</li> <li>• Predefined and regular routes for working vessels; avoid Brothers Islands</li> </ul>	Marine traffic	V

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
TMCLKLEIA				
S10.10 of HKBCFEIA and S8.14 of TMCLKLEIA	E7	<ul style="list-style-type: none"> <li>Vessel based dolphin monitoring</li> </ul>	Northeast and Northwest Lantau	V
<b>Fisheries</b>				
S11.7 of HKBCFEIA	F1	<ul style="list-style-type: none"> <li>Reduce re-suspension of sediments</li> <li>Limit works fronts</li> <li>Good site practices</li> <li>Strict enforcement of no marine dumping</li> <li>Spill response plan</li> </ul>	Seawall, reclamation area	V
S11.7 of HKBCFEIA	F2	<ul style="list-style-type: none"> <li>Install silt-grease trap in the drainage system collecting surface runoff</li> </ul>	Reclamation area	V
<b>Landscape &amp; Visual (Construction Phase)</b>				
S14.3.3. 3 of HKBCFEIA and S10.9 of TMCLKLEIA	LV1	<p><u>Mitigate Landscape Impacts</u></p> <p>G1/CM4 Grass-hydroseed or sheeting bare soil surface and stock pile areas.</p> <p>G9 Reserve of loose natural granite rocks for re-use. Provide new coastline to adopt “natural-look” by means of using armour rocks in the form of natural rock materials and planting strip area accommodating screen buffer to</p>	All construction site areas	N/A

EIA Ref.	EM&A Log Ref	Environmental Mitigation Measures	Location	Implementation Status
		enhance “natural-look” of new coastline.		
S10.9 of TMCLKLEIA	LV2	<u>Mitigate Landscape Impacts</u> CM7 Ensure no run-off into water body adjacent to the Project Area.	All construction site areas	V
S14.3.3. 3 of HKBCFEIA	LV4	<u>Mitigate Visual Impacts</u> V1 Minimize time for construction activities during construction period.	All construction site areas	V
S10.9 of TMCLKLEIA	LV5	<u>Mitigate Visual Impacts</u> CM6 Control night-time lighting and glare by hooding all lights.	All construction site areas	V
<b>EM&amp;A</b>				
S15.2.2 of HKBCFEIA	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	All construction site areas	V
S15.5 - S15.6 of HKBCFEIA	EM2	<ul style="list-style-type: none"> <li>An Environmental Team needs to be employed as per the EM&amp;A Manual.</li> <li>Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures.</li> <li>An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&amp;A Manual are fully complied with.</li> </ul>	All construction site areas	V

Legend: V = implemented; x = not implemented; N/A = not applicable

## Appendix D - Summary of Action and Limit Levels

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

Location	Action Level	Limit Level
AMS2	374 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$
AMS3A*	368 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$
AMS6	360 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$
AMS7	370 $\mu\text{g}/\text{m}^3$	500 $\mu\text{g}/\text{m}^3$

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

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

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

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

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

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

Notes:

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

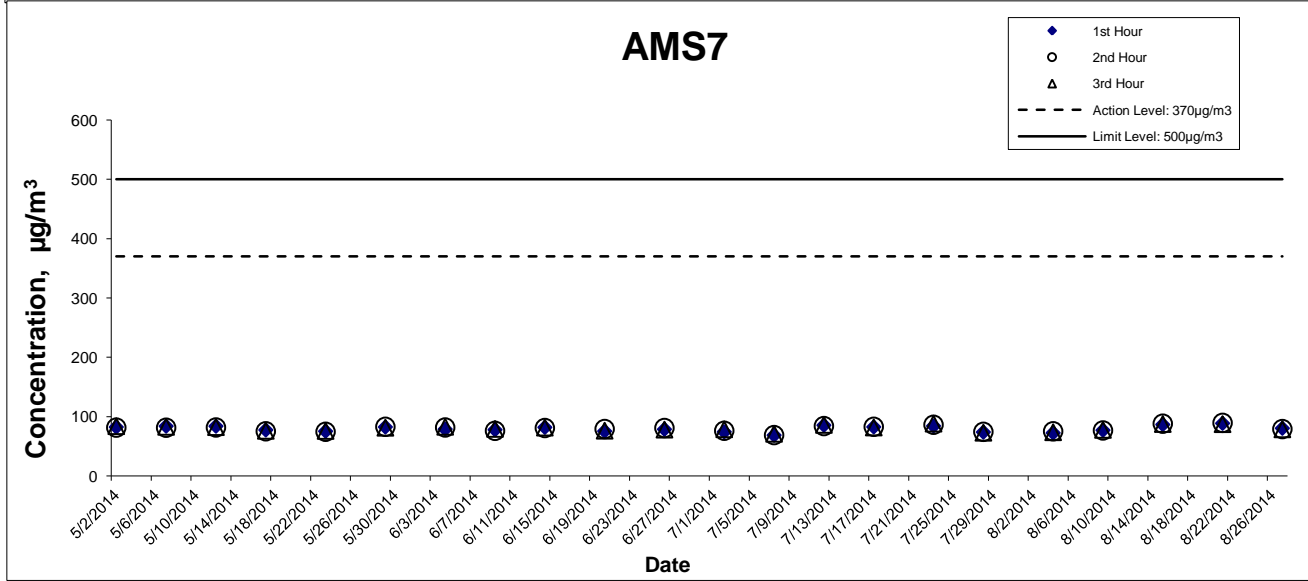
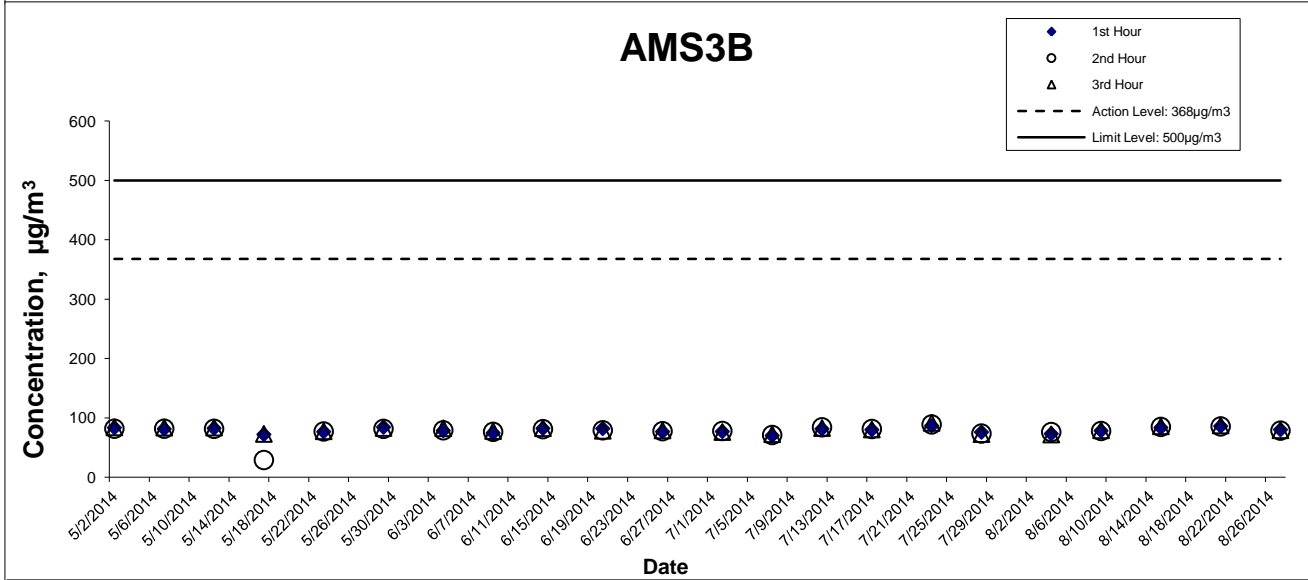
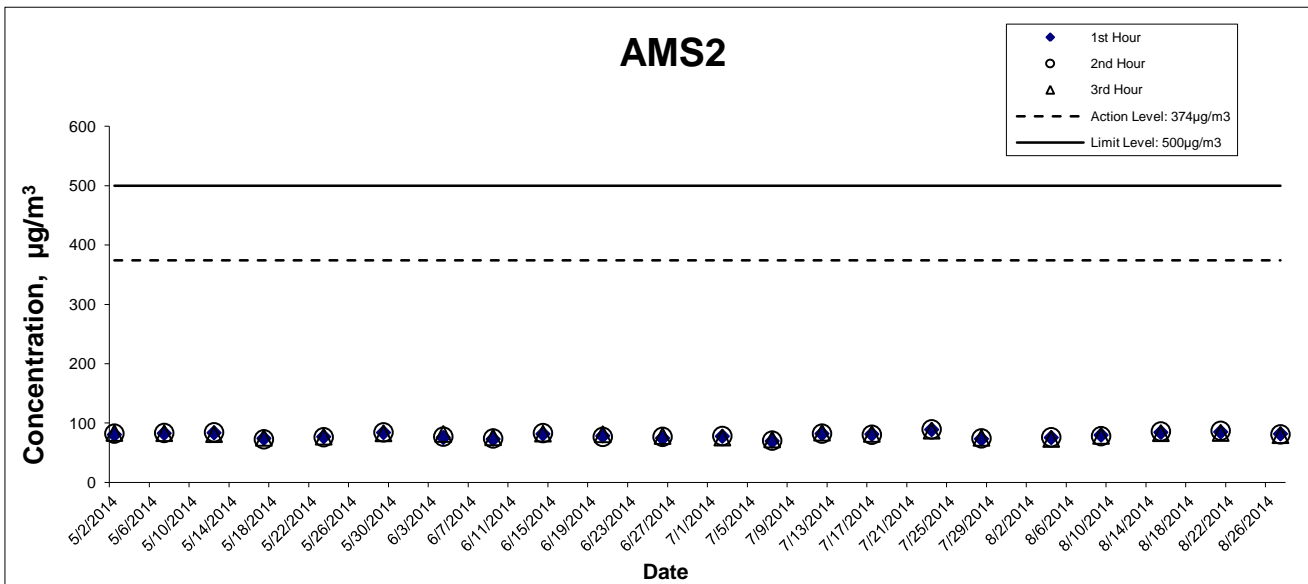
Table 5(a) Action and Limit Levels for Chinese White Dolphin Monitoring - Approach to Define Action Level (AL) and Limit Level (LL):

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

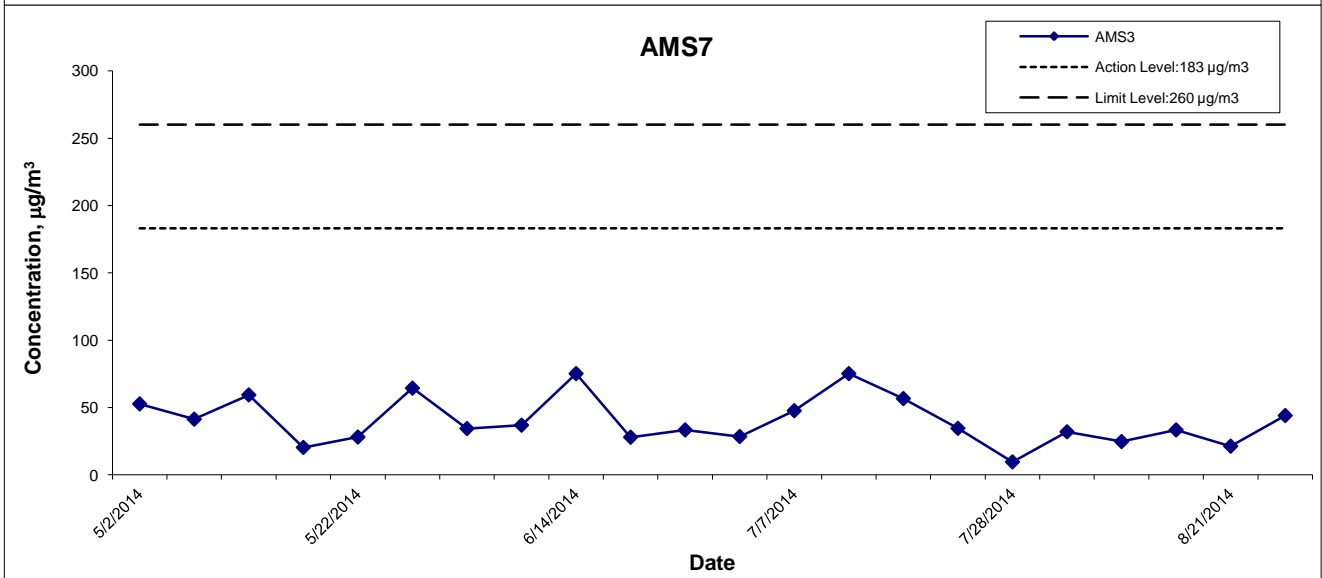
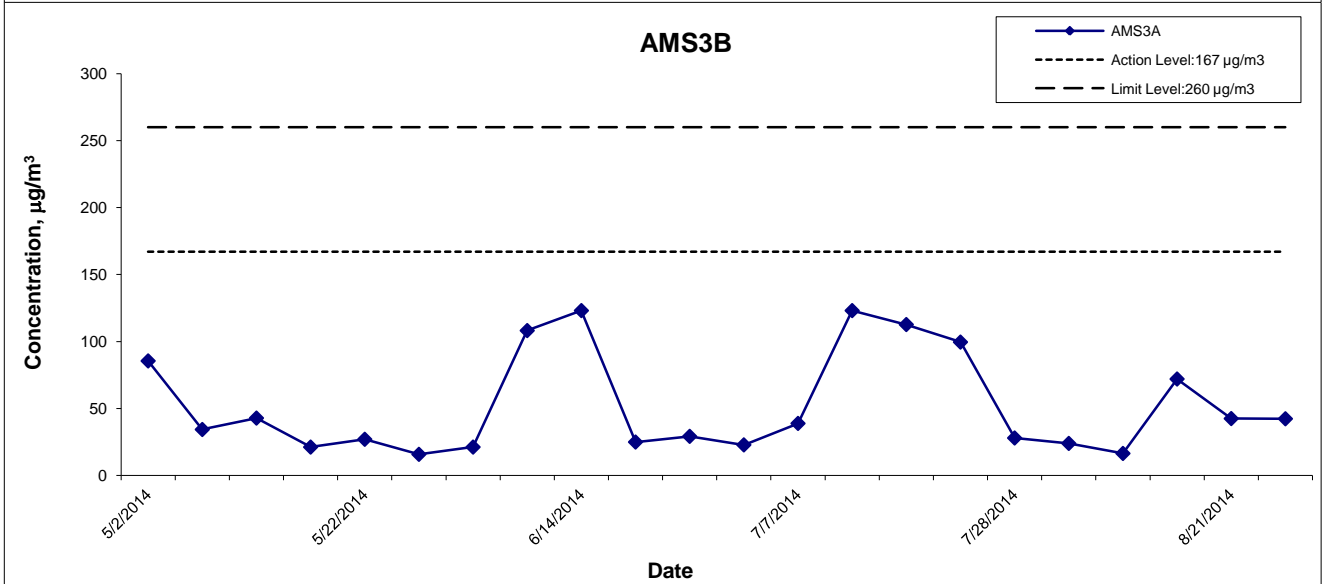
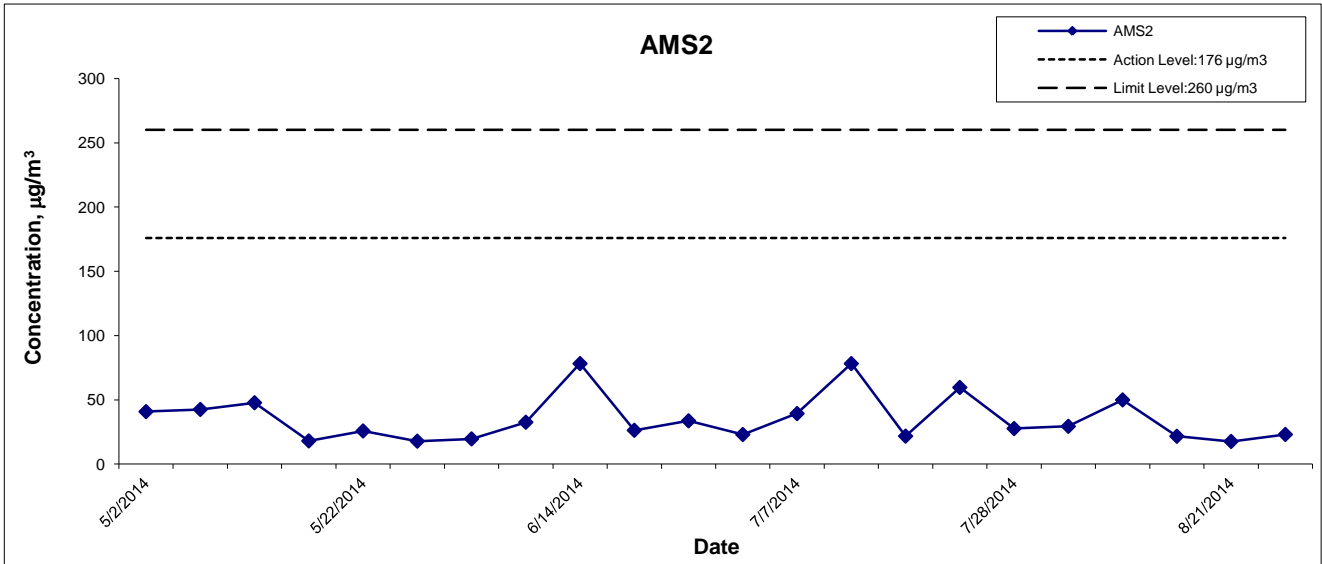
For North Lantau Social Cluster, action level will be trigger if either NEL **or** NWL fall below the criteria; limit level will be triggered if both NEL **and** NWL fall below the criteria.

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

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

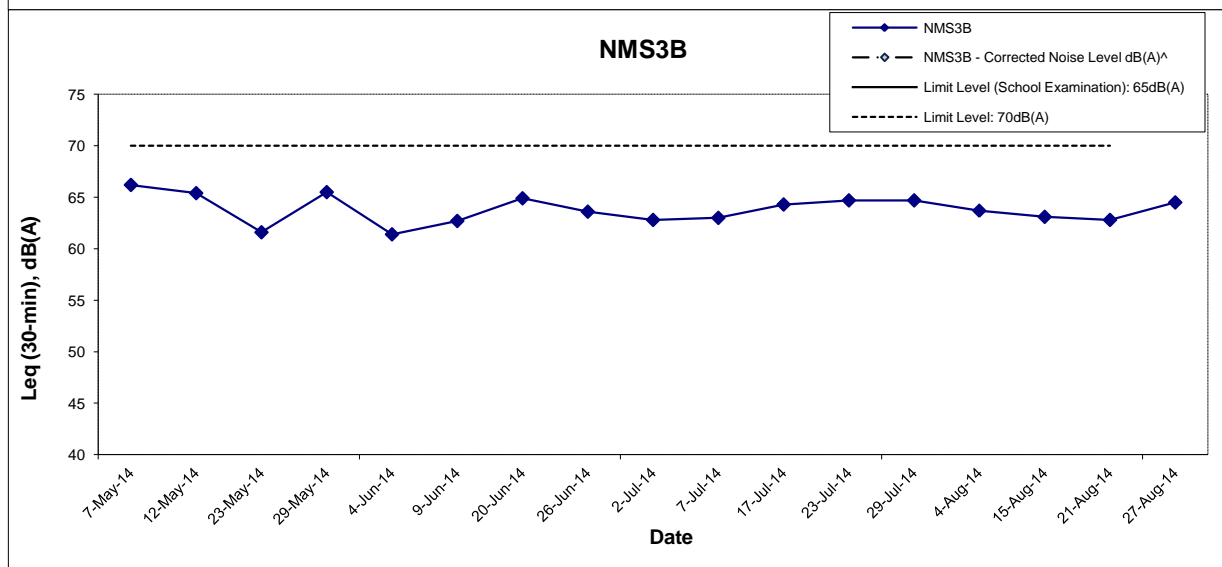
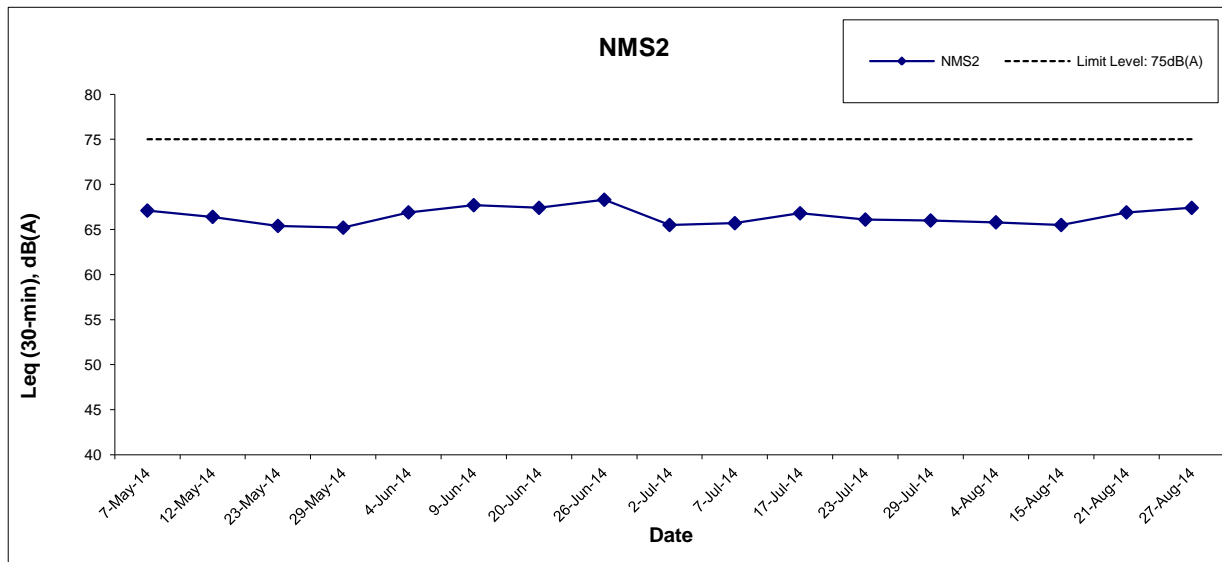


This Drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.



This Drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.





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.

This Drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

Graphical Presentation of Impact Daytime  
 Construction Noise Monitoring Results

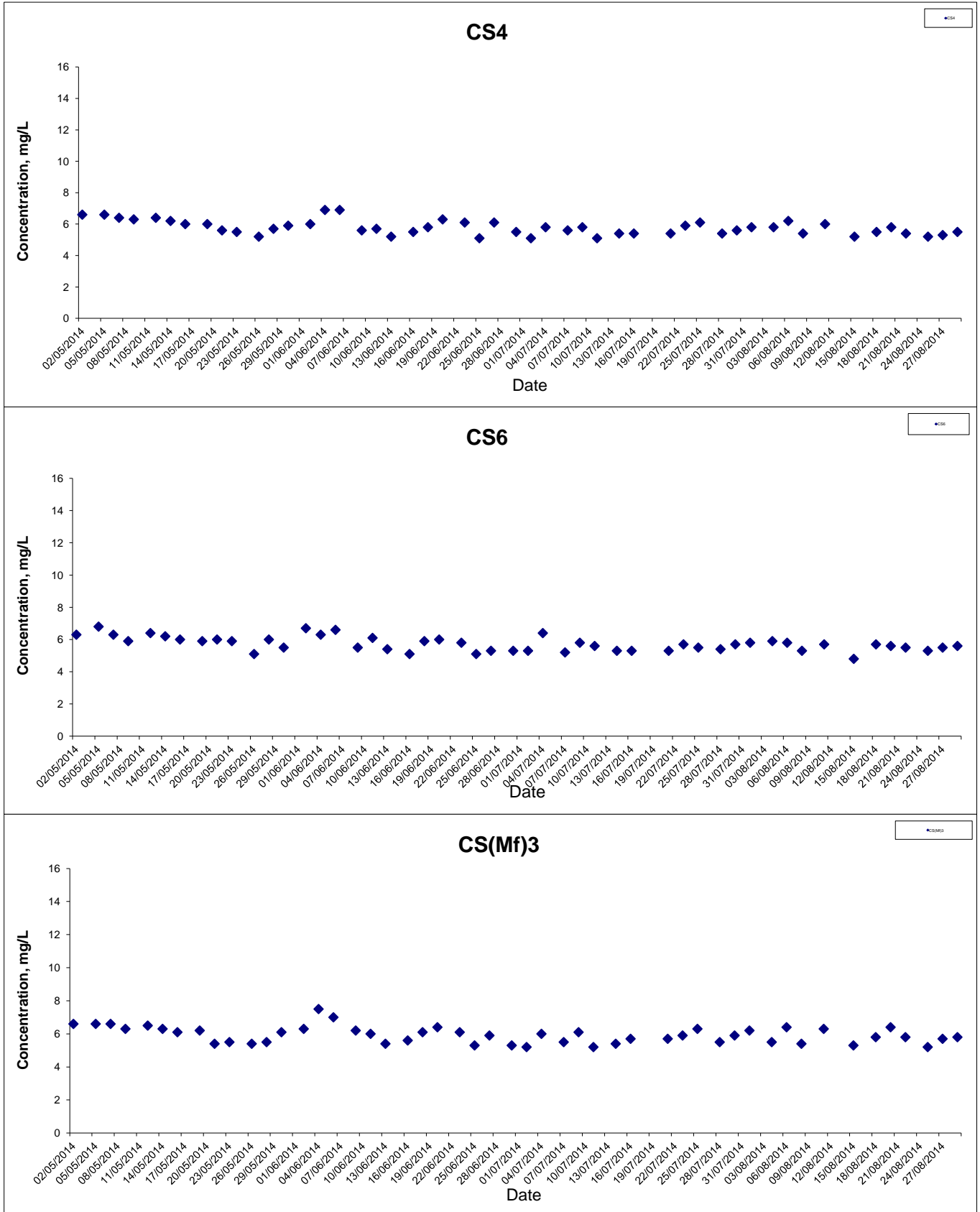


Project No.: 60249820

Date: September 2014

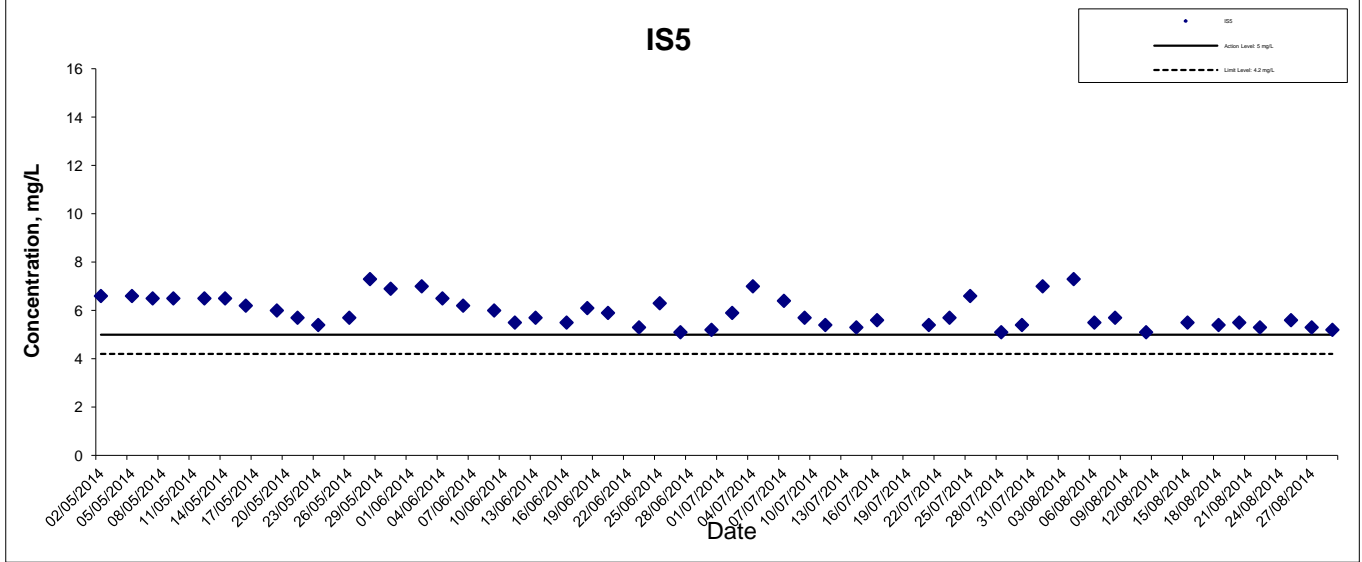
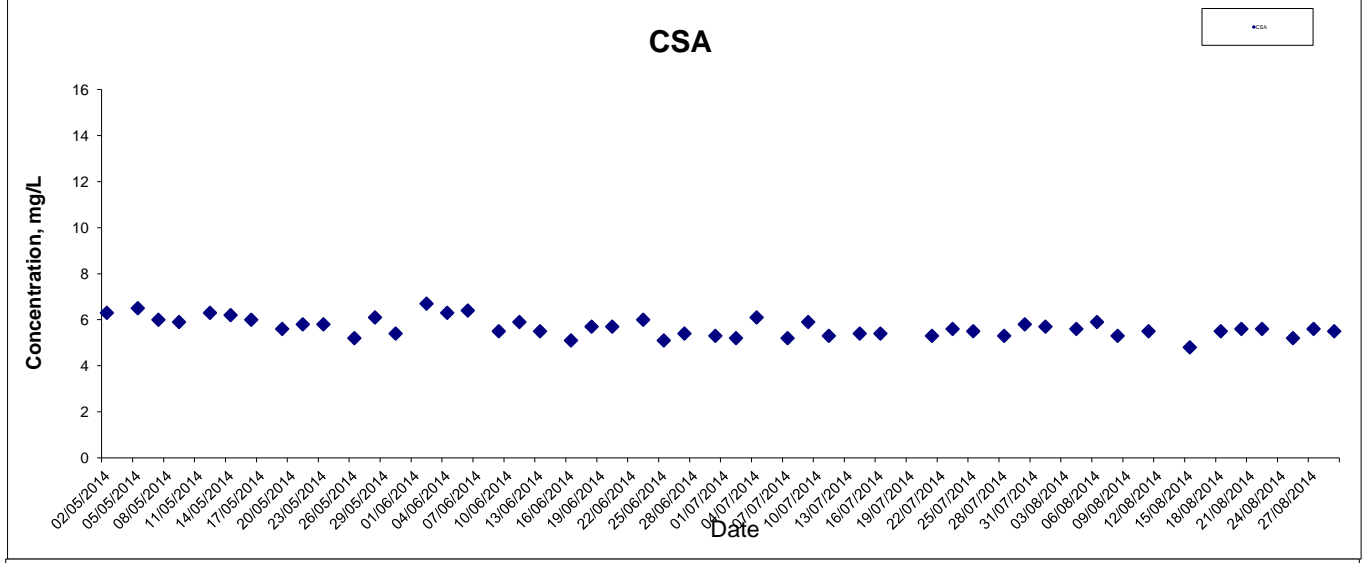
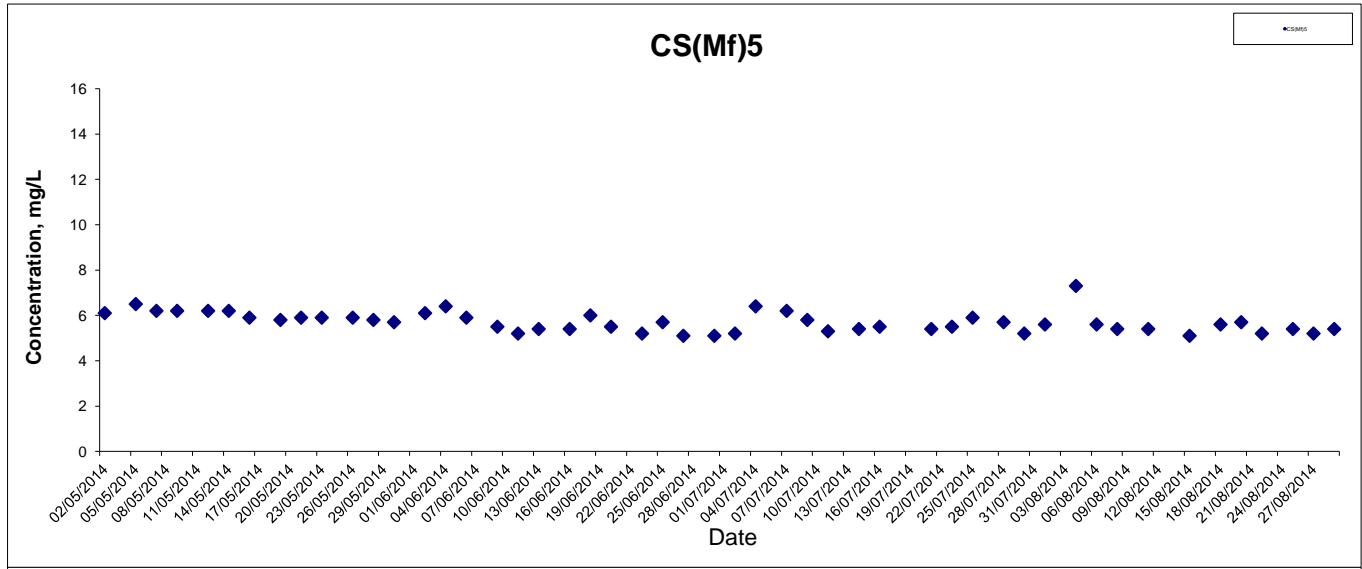
Appendix F

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



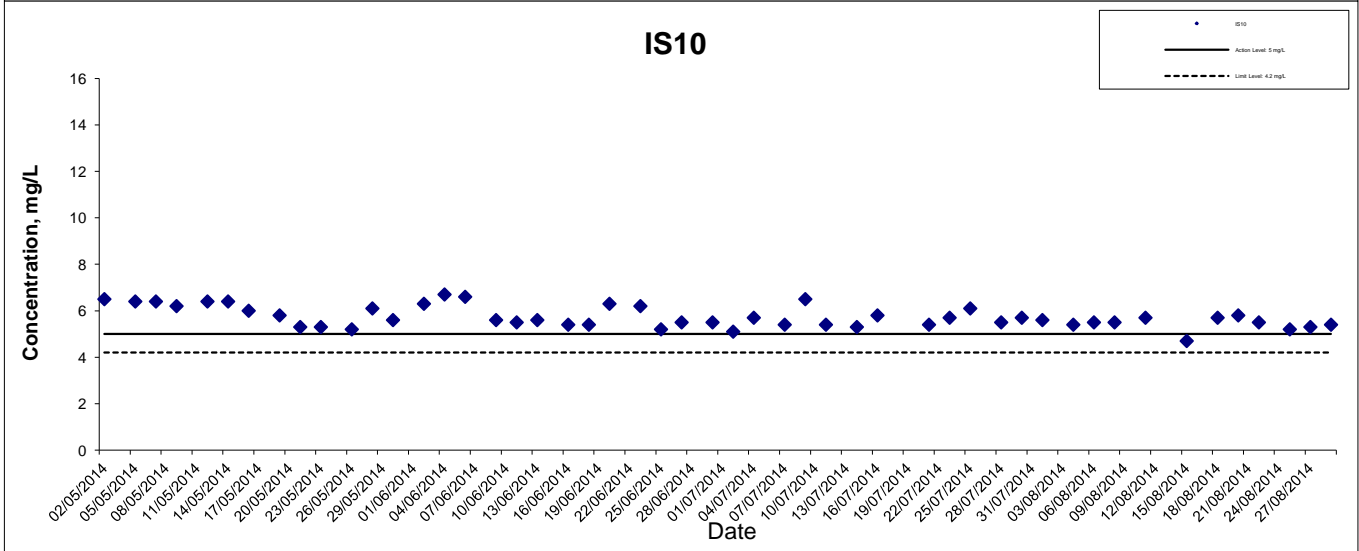
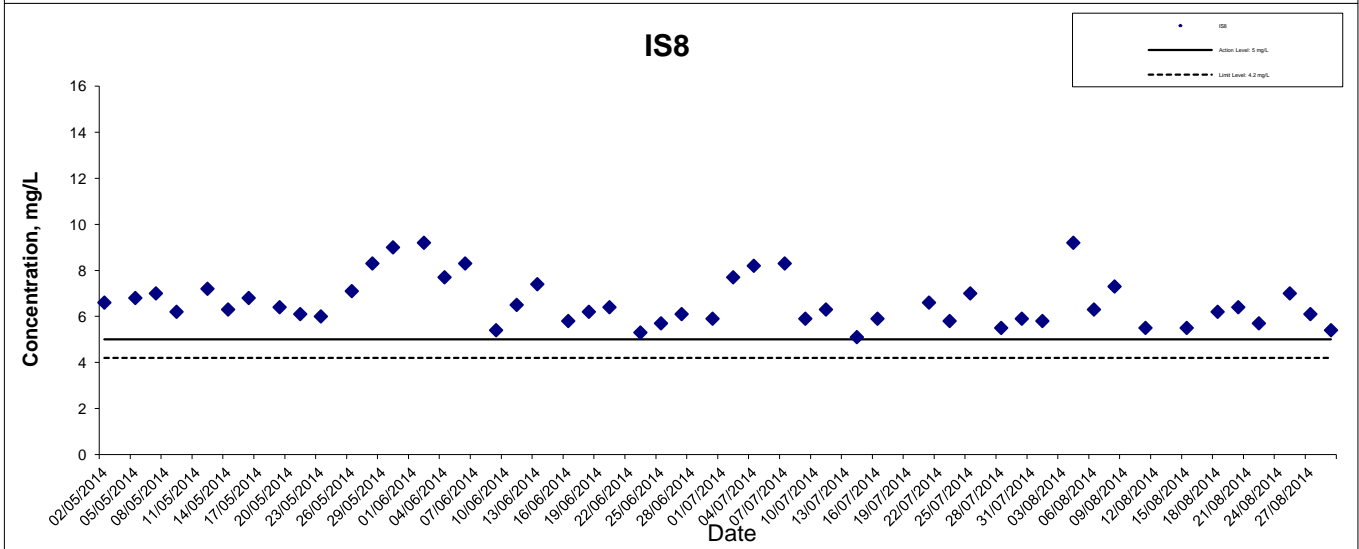
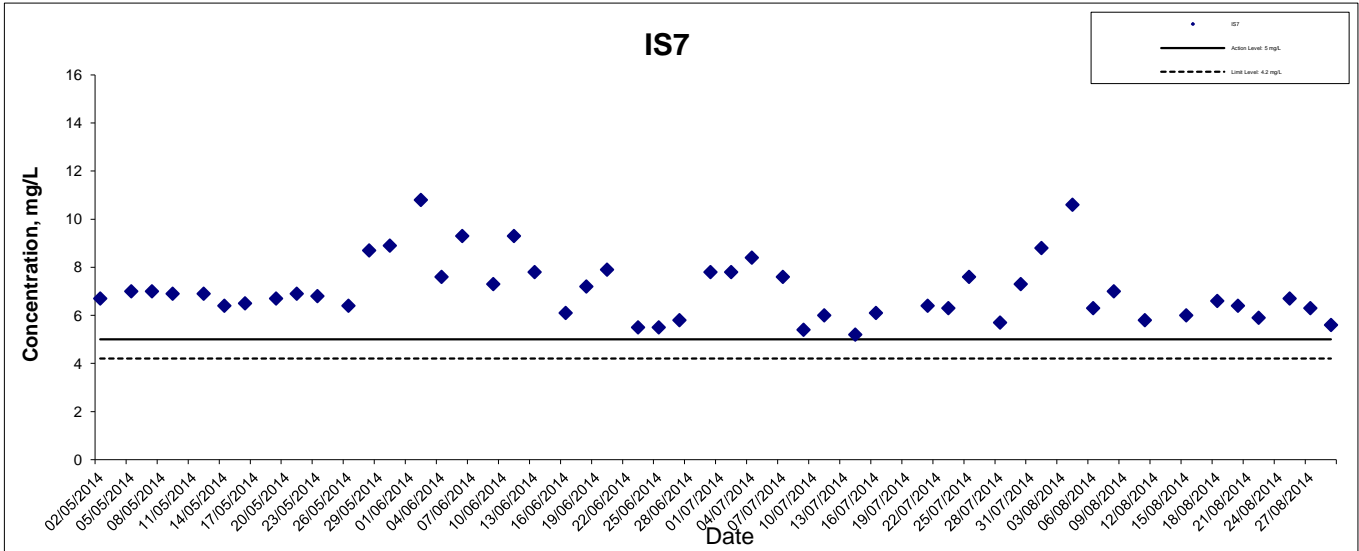
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



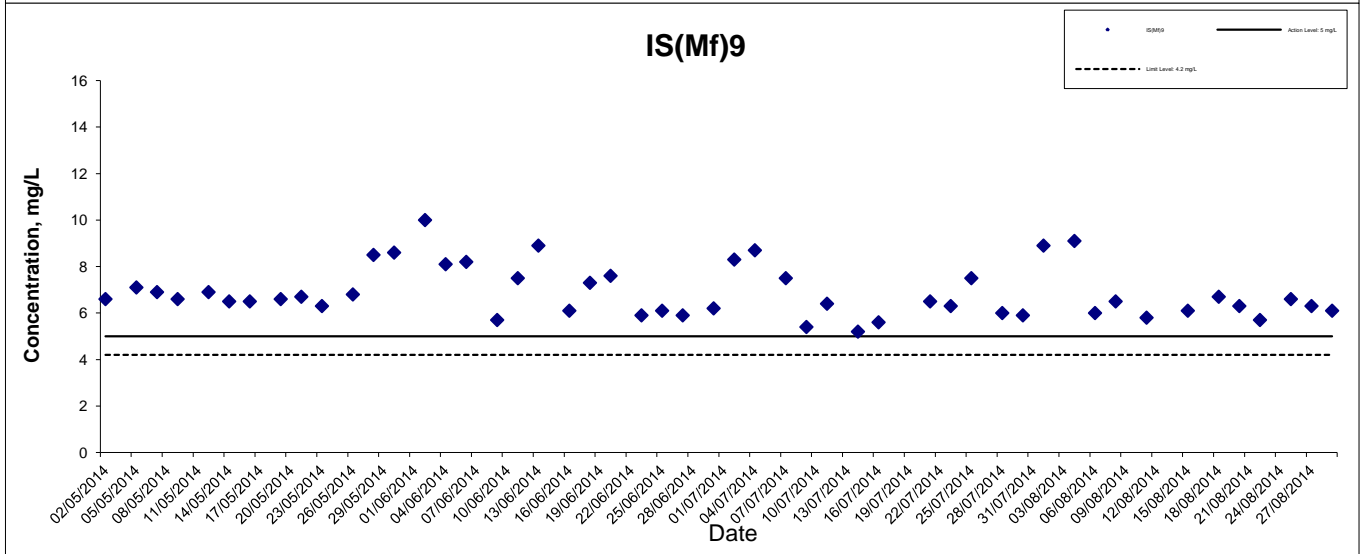
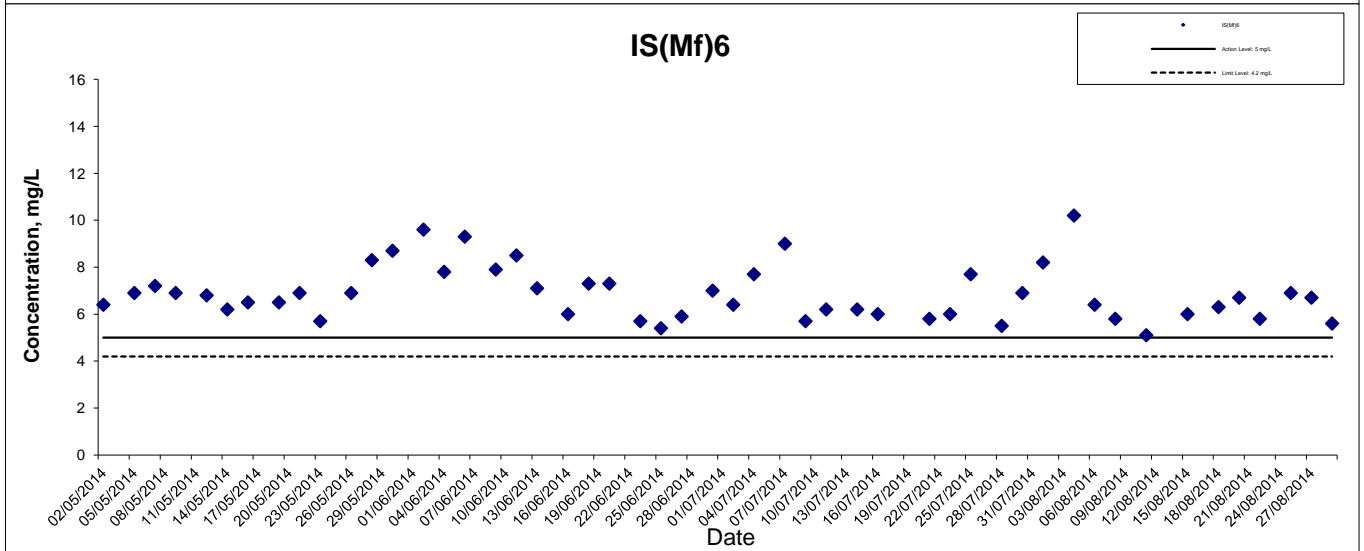
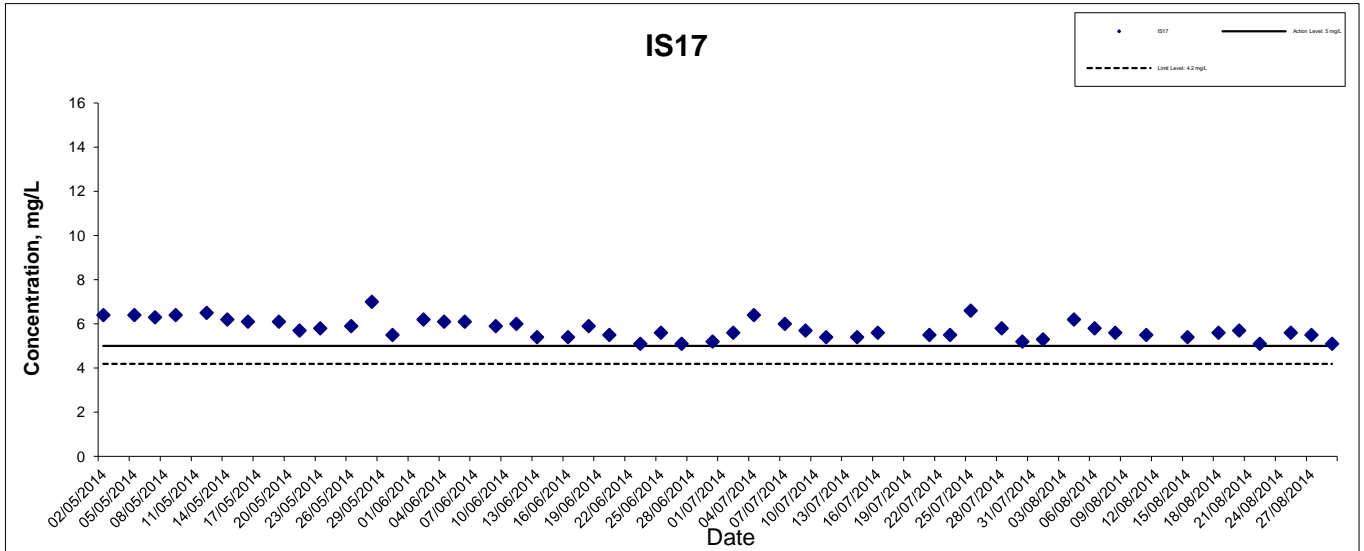
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

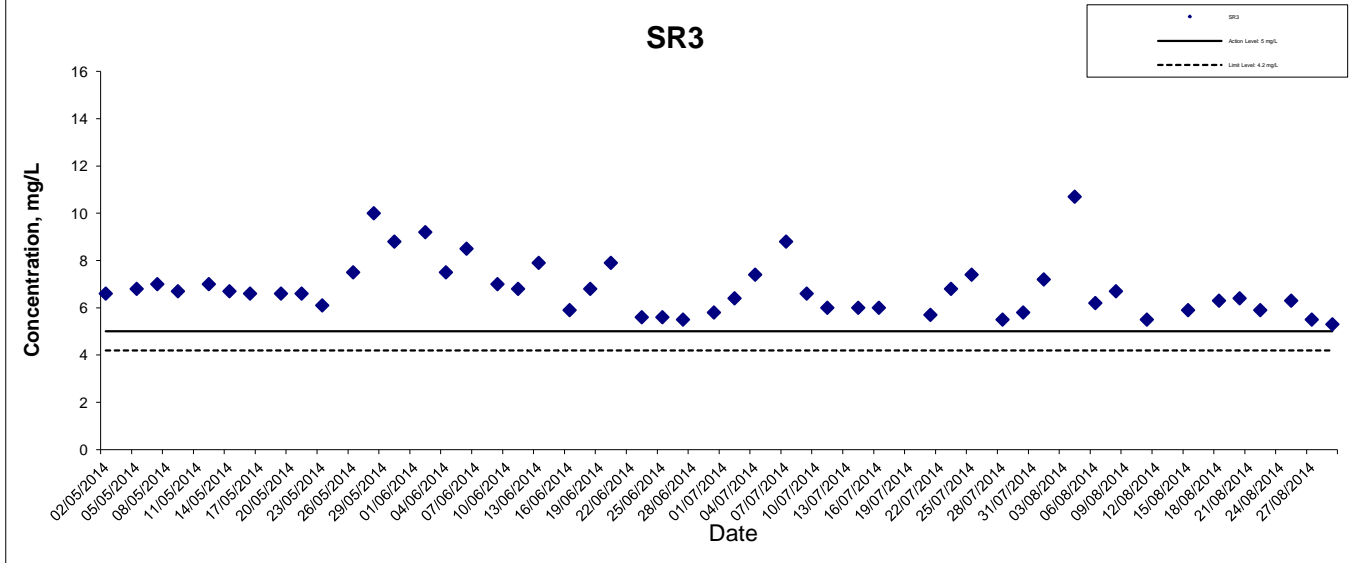
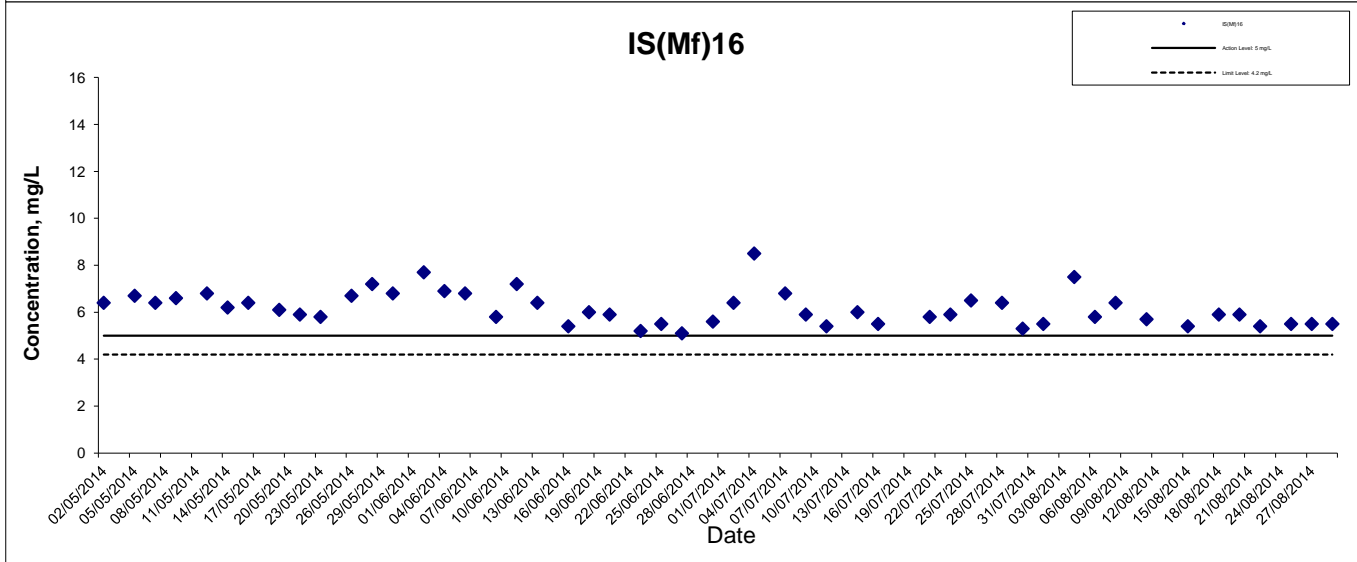
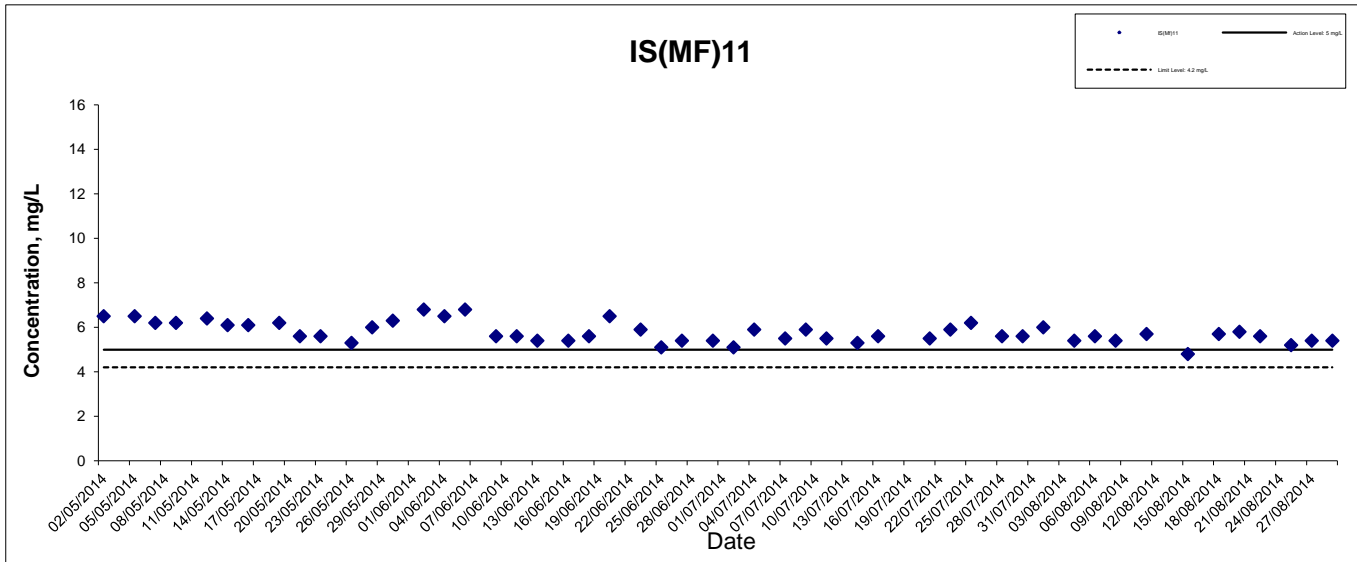


This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

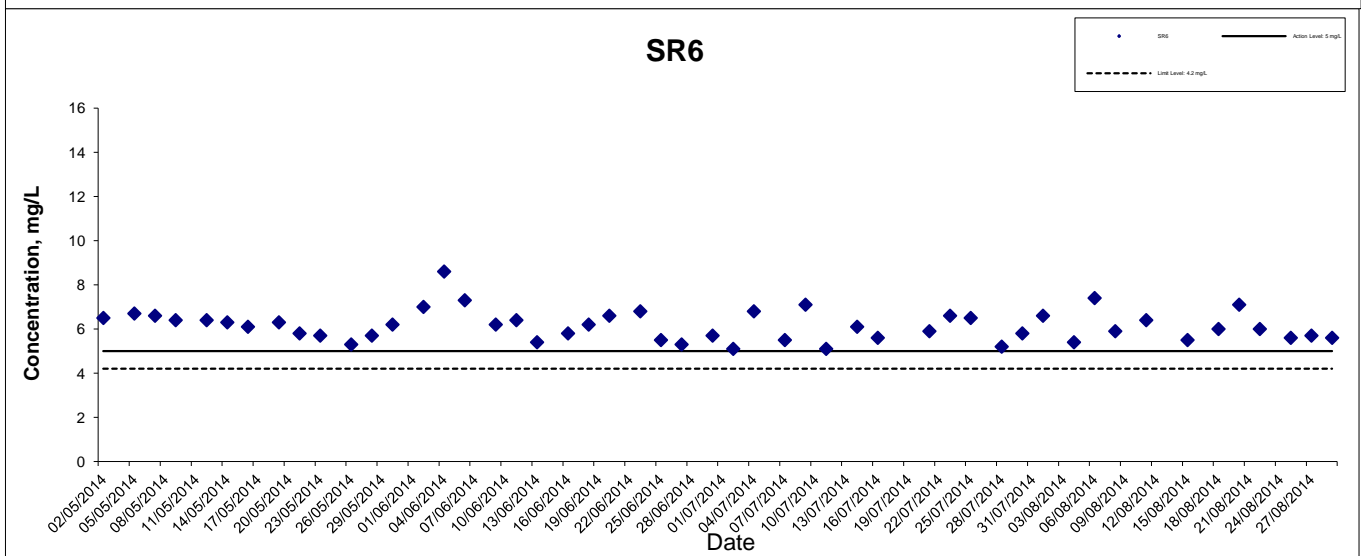
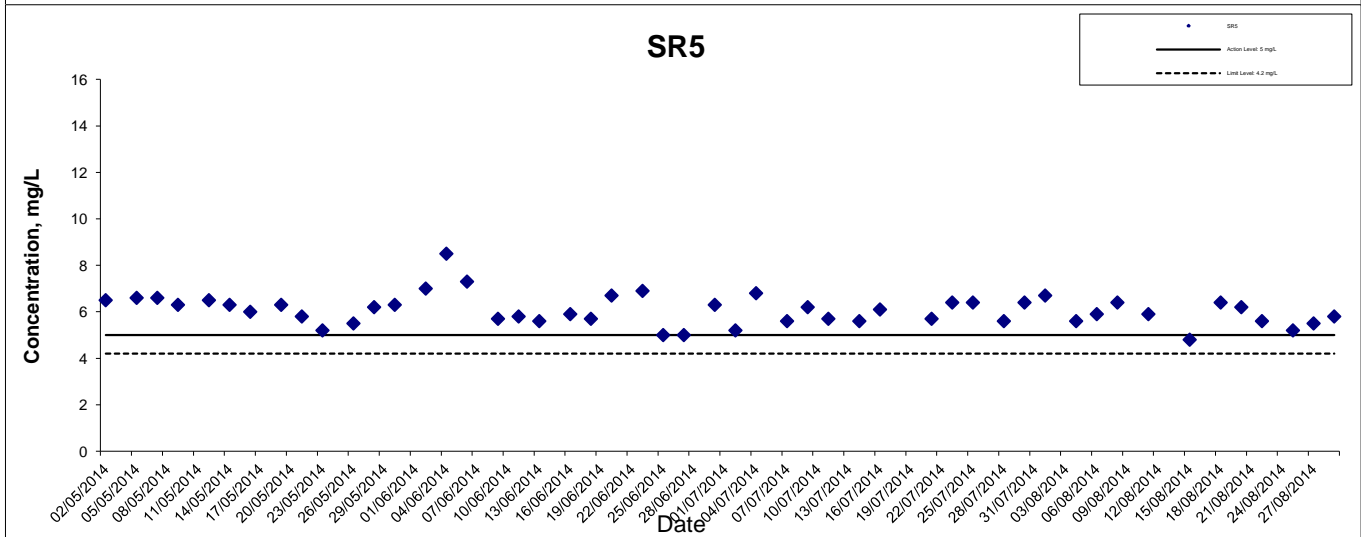
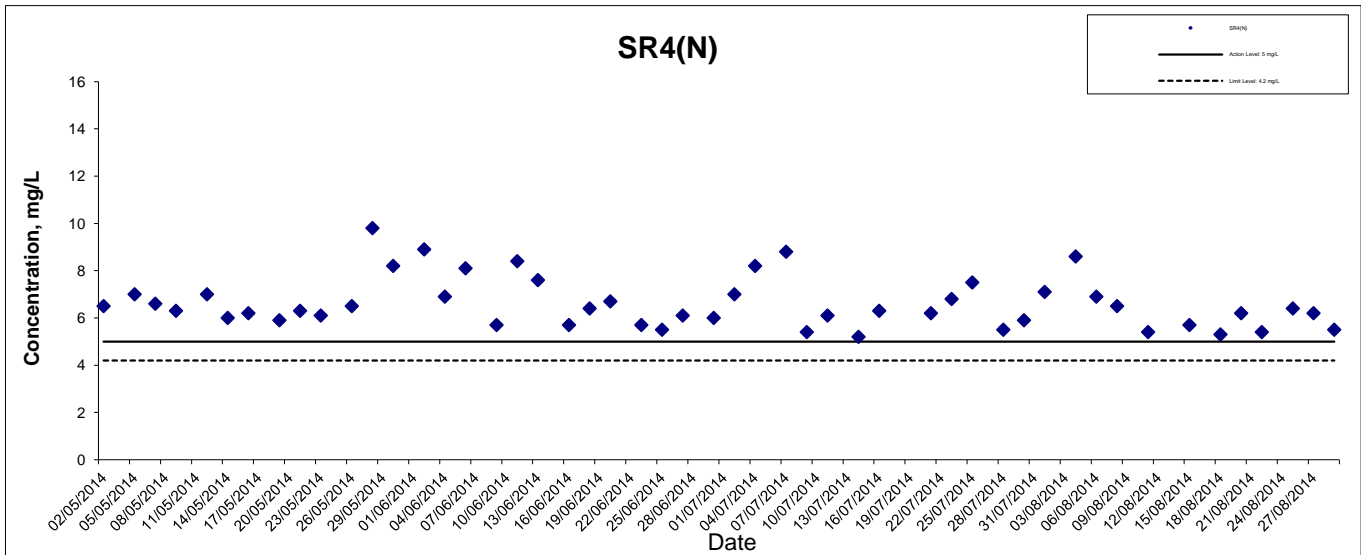
## Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide



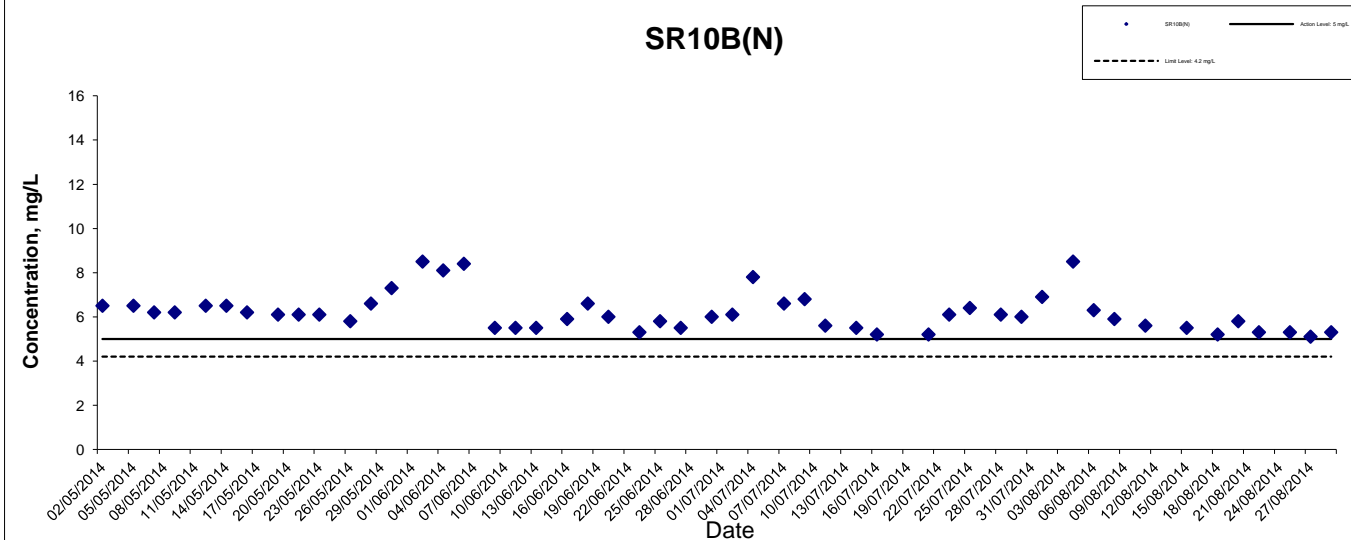
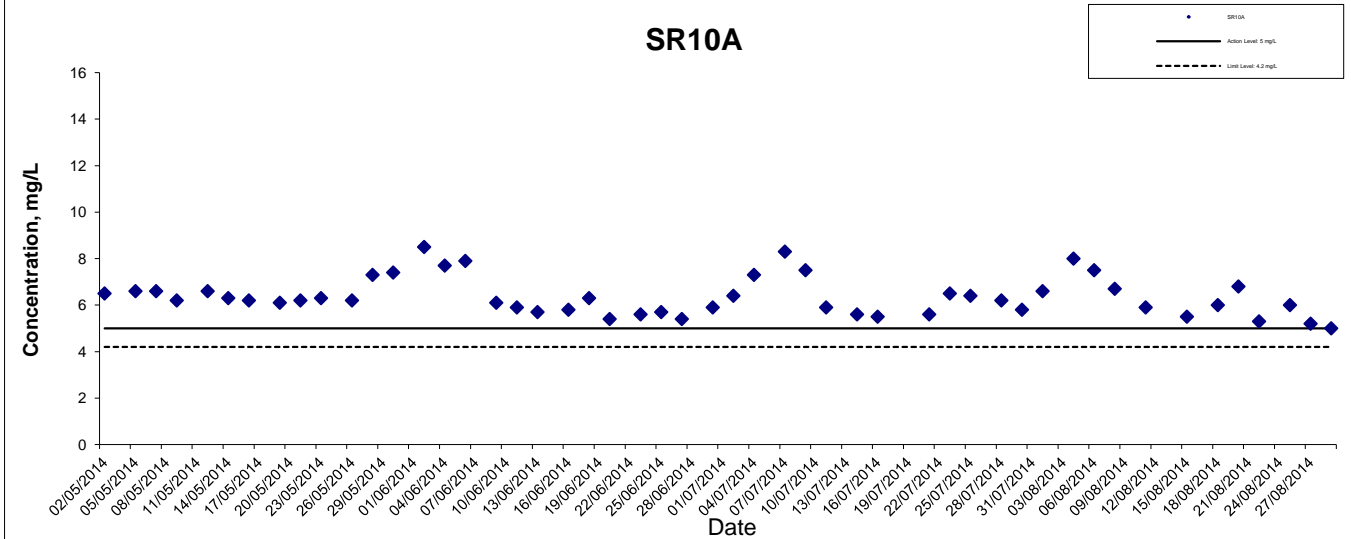
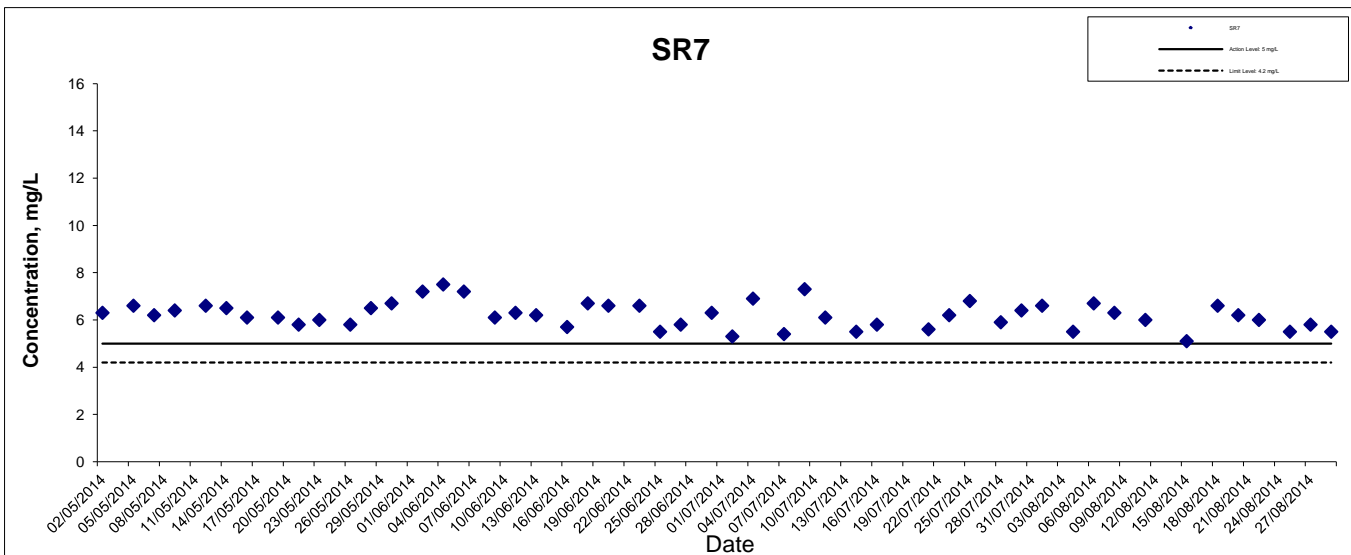
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

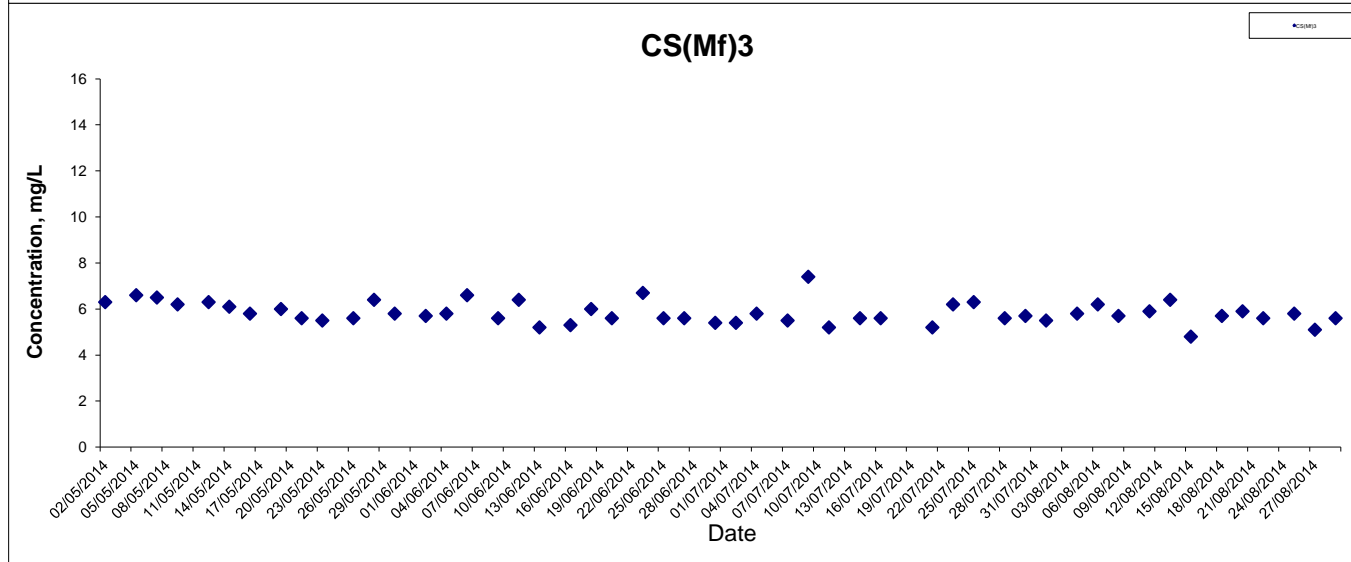
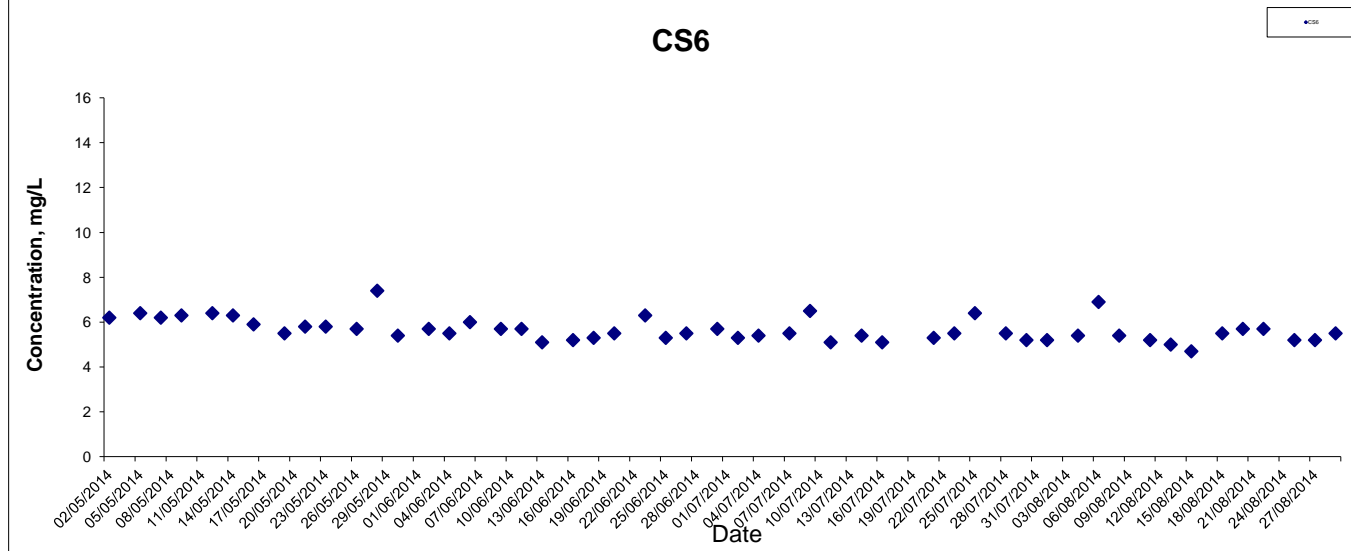
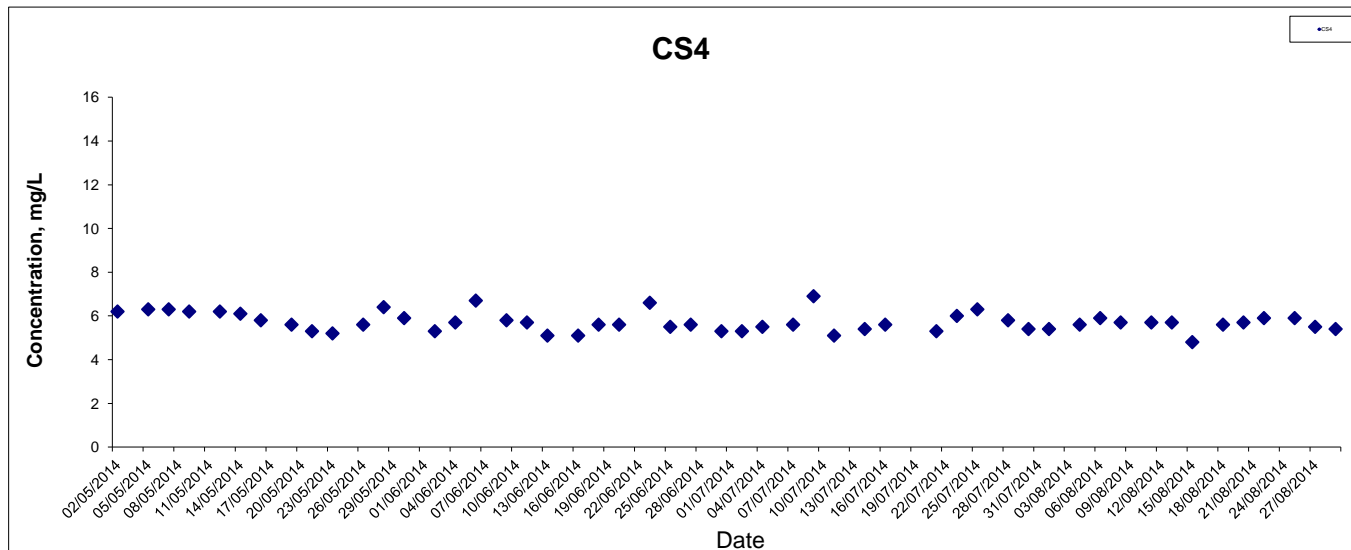


This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.



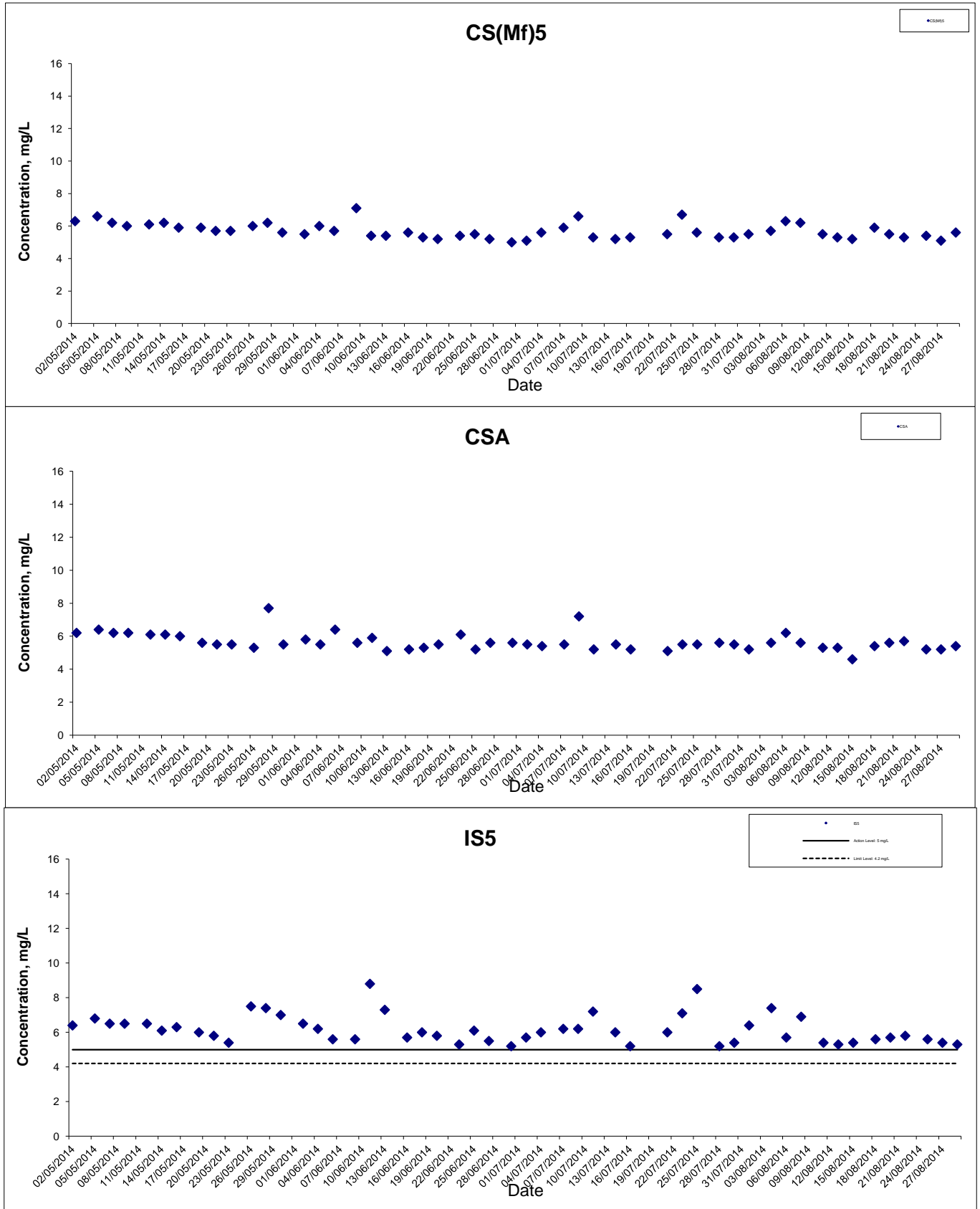


## Dissolved Oxygen (Surface & Middle) at Mid-Flood Tide



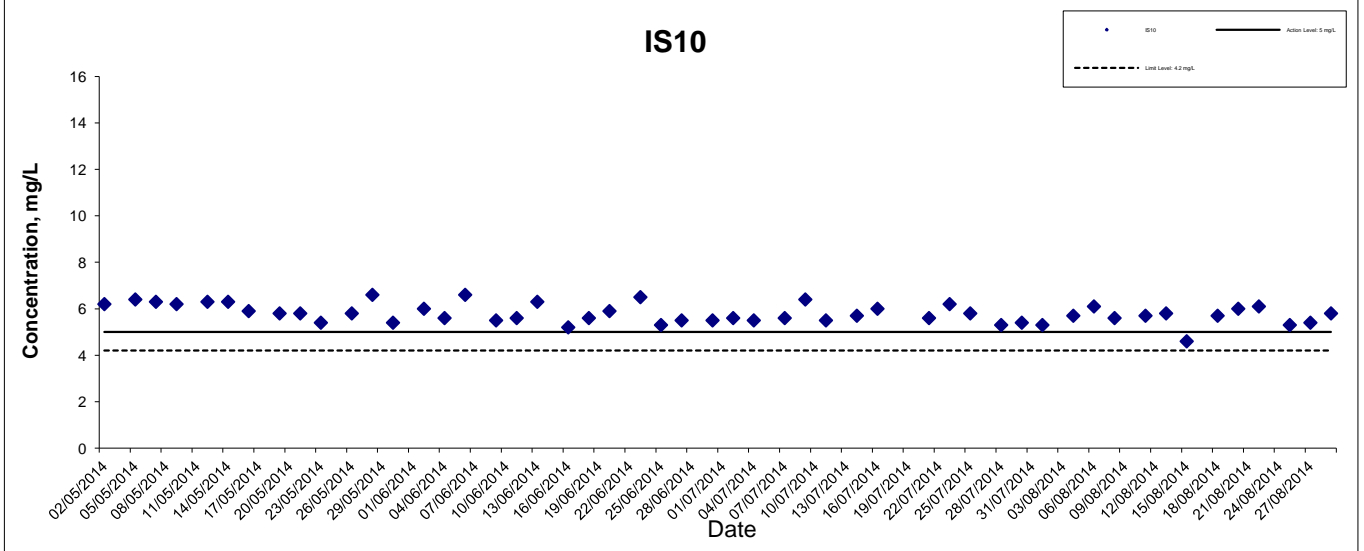
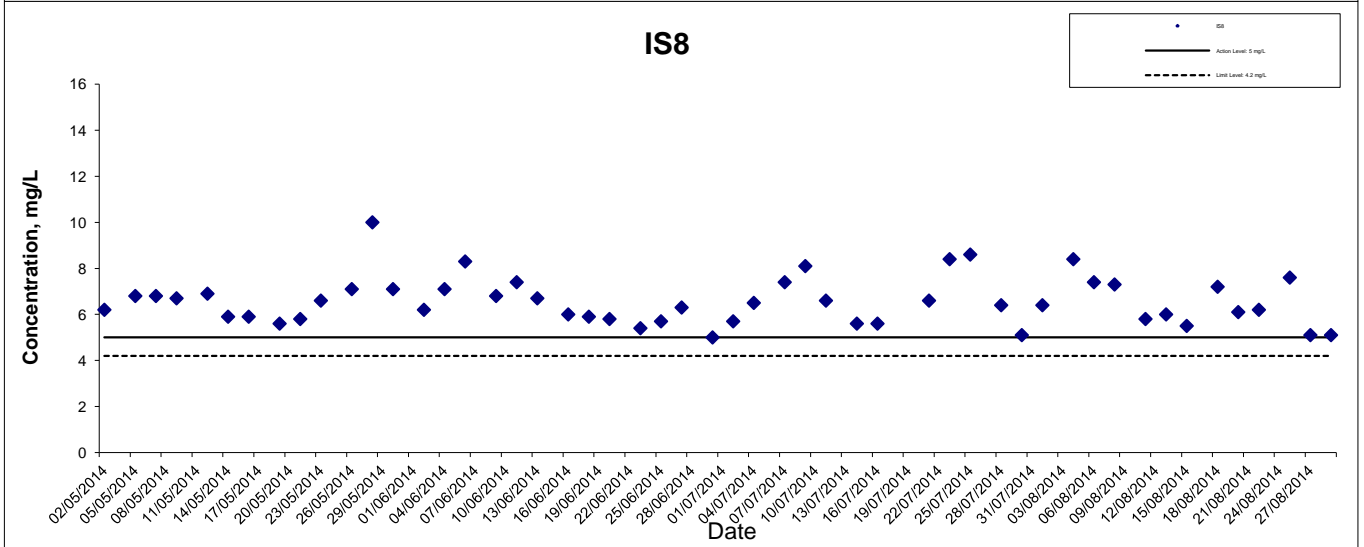
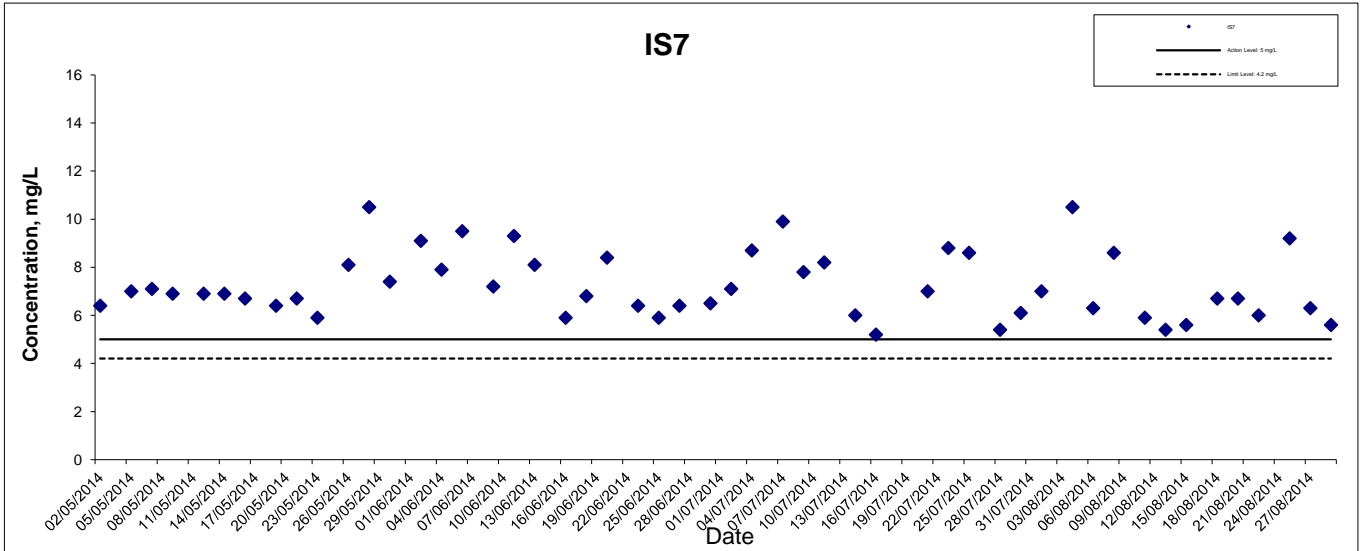
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



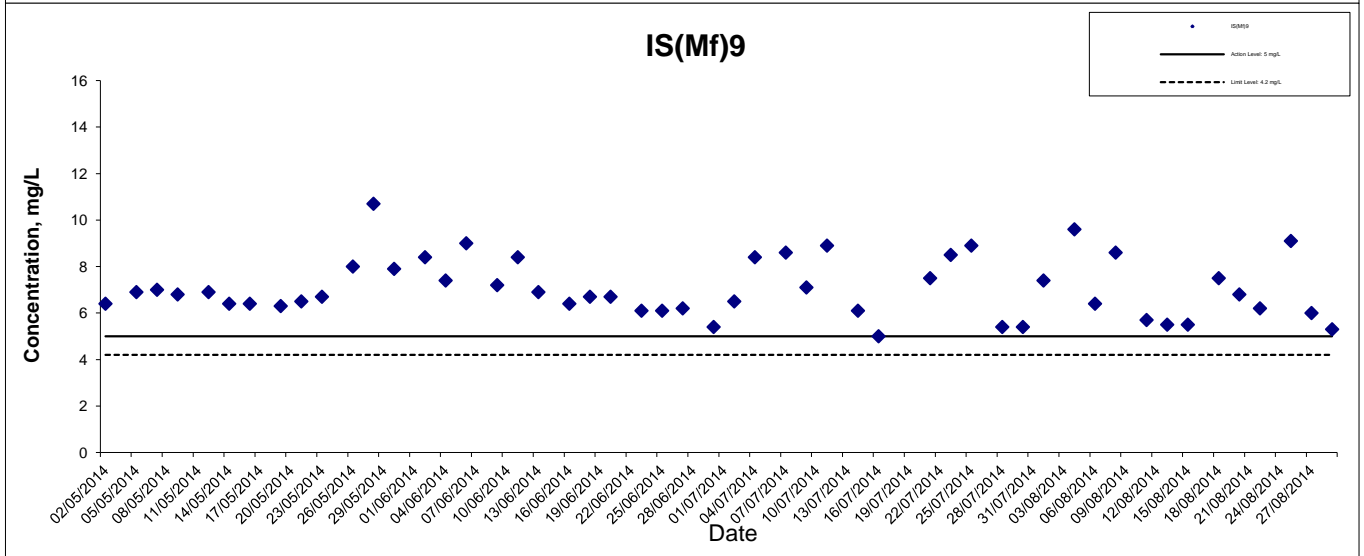
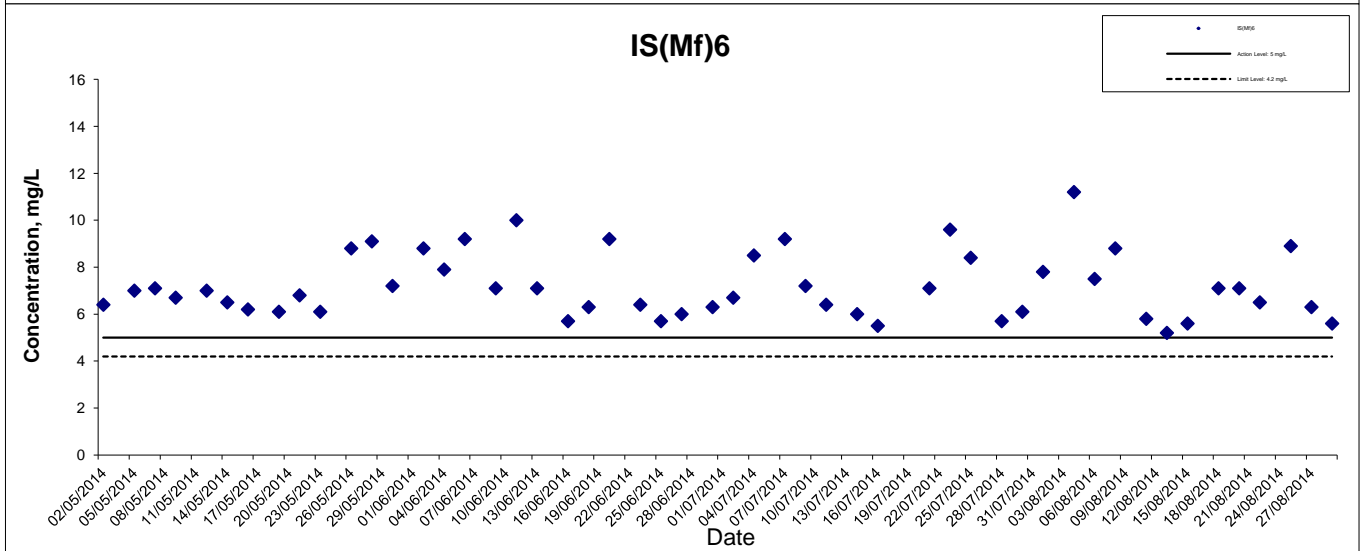
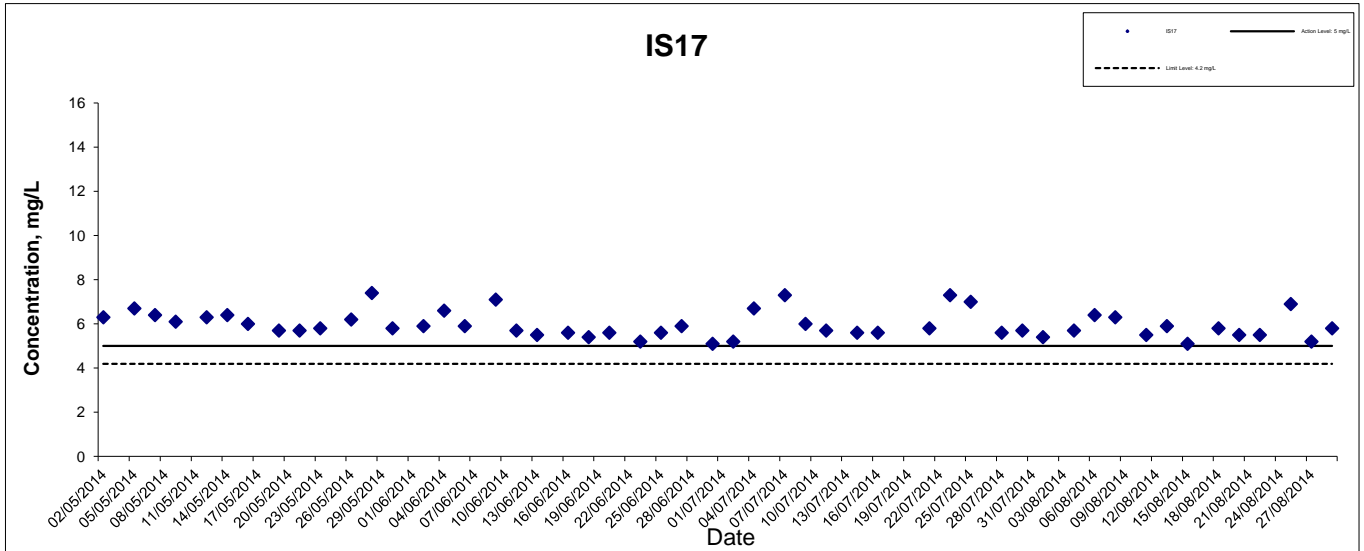
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



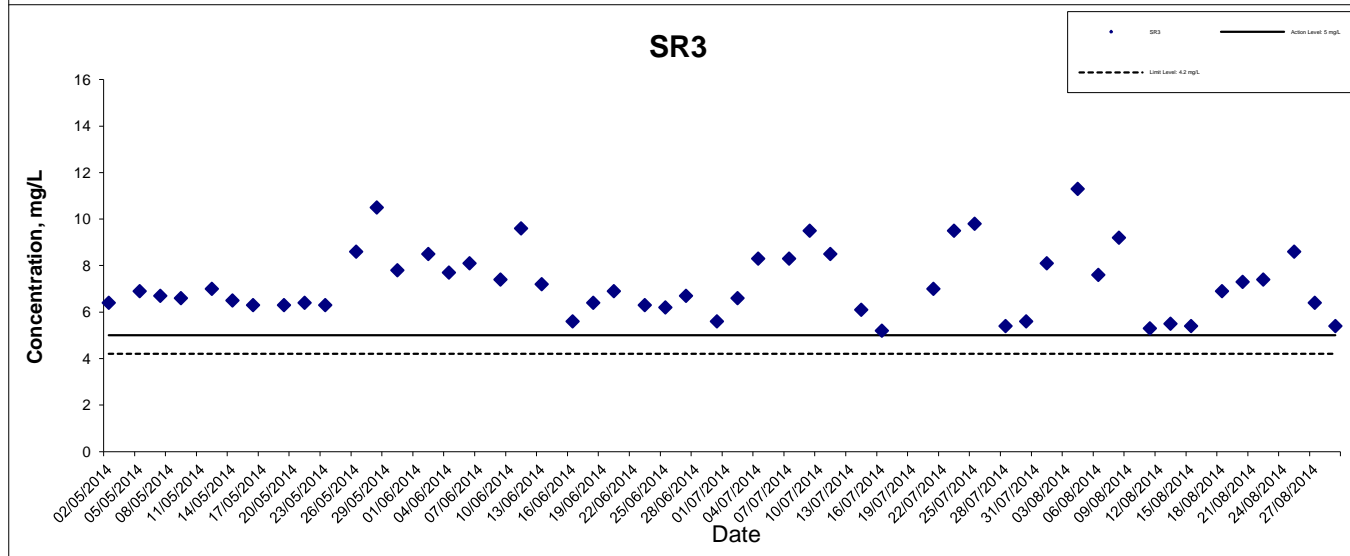
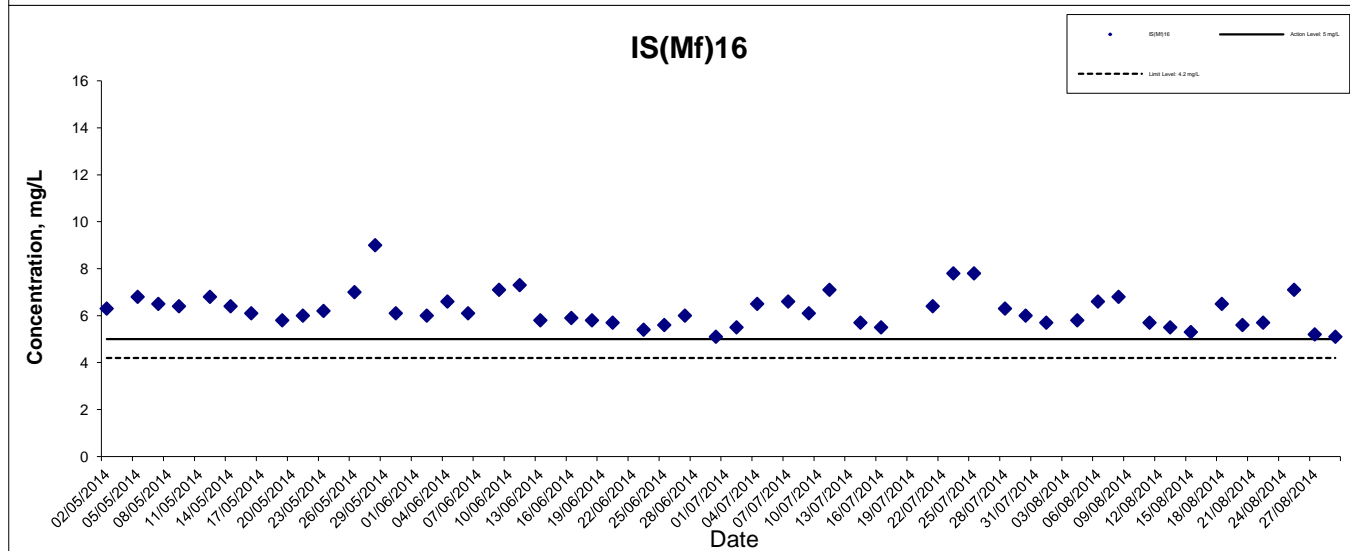
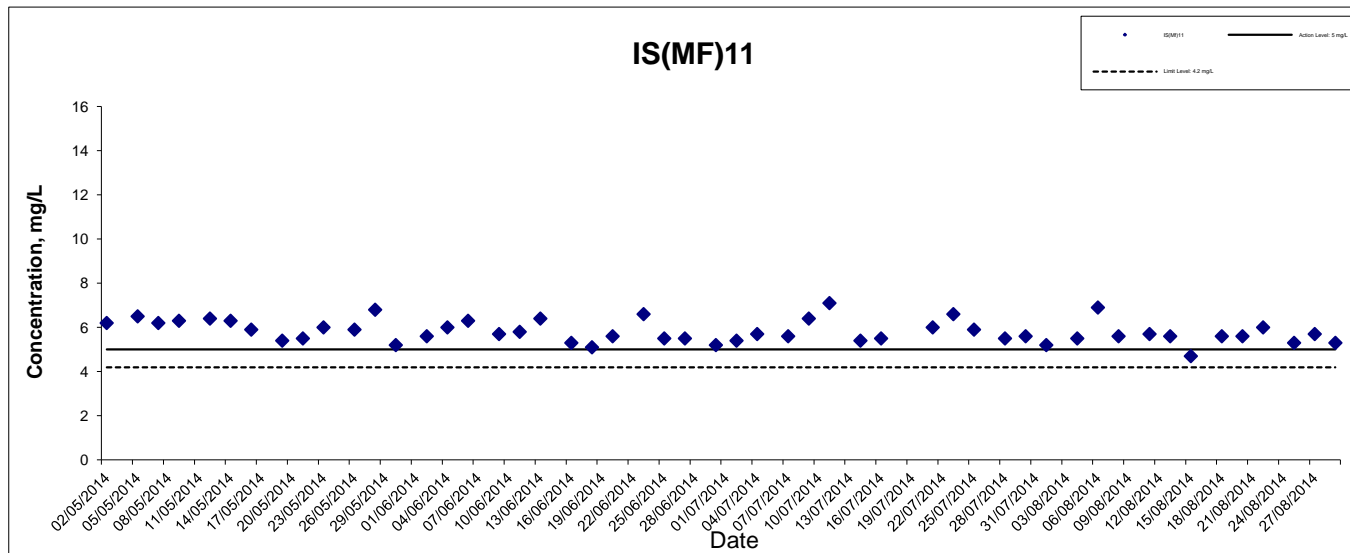
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



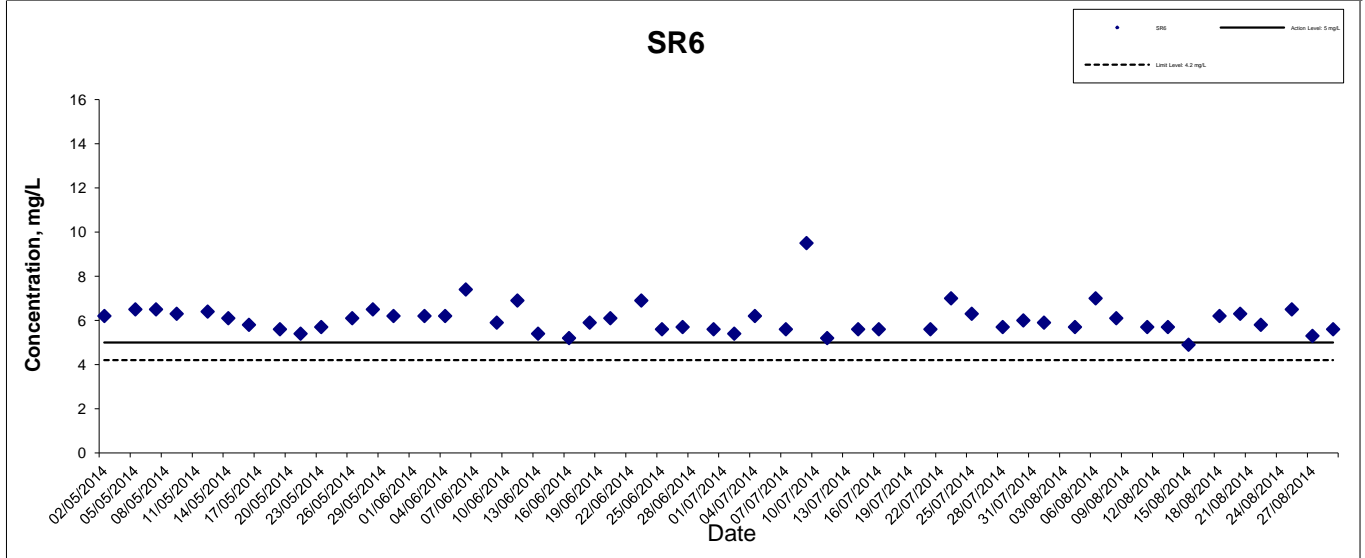
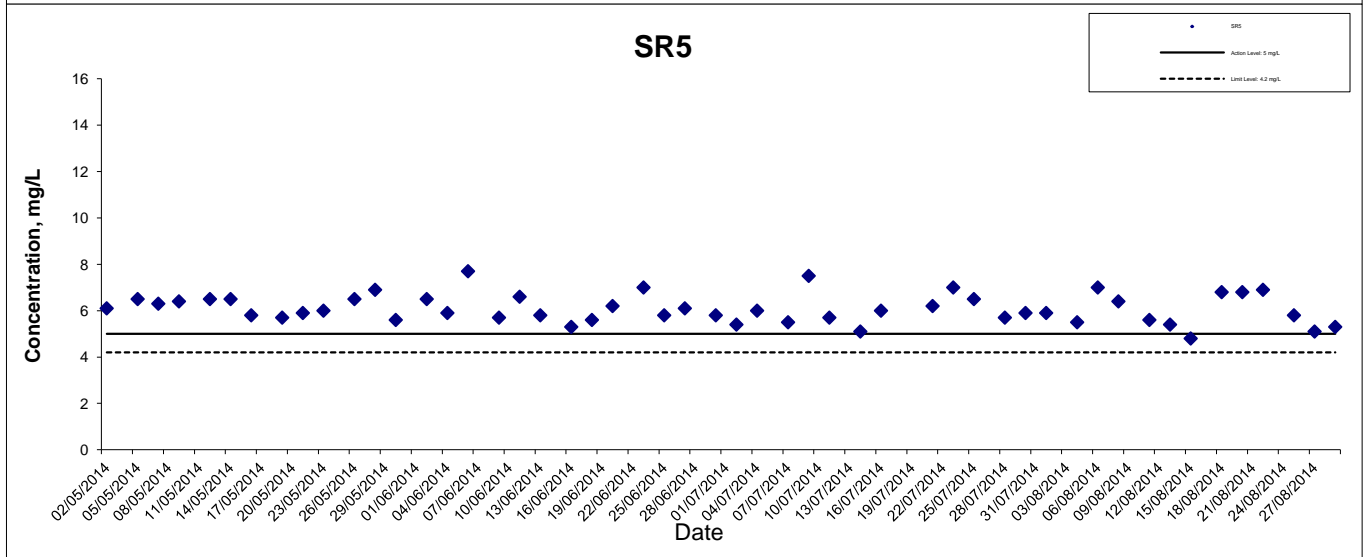
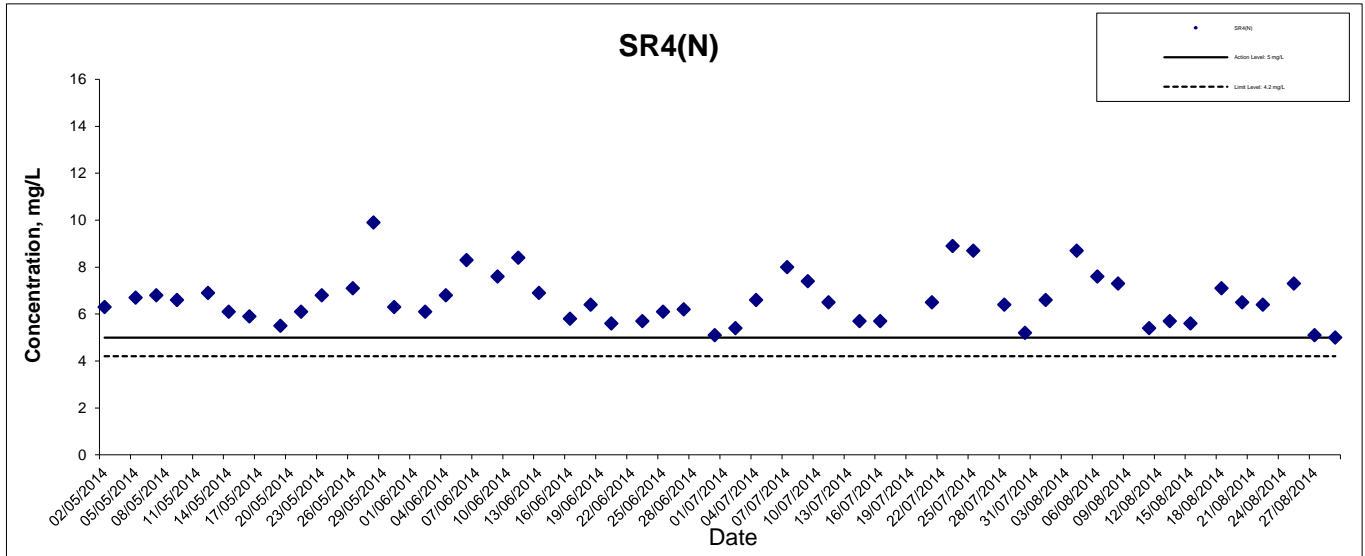
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



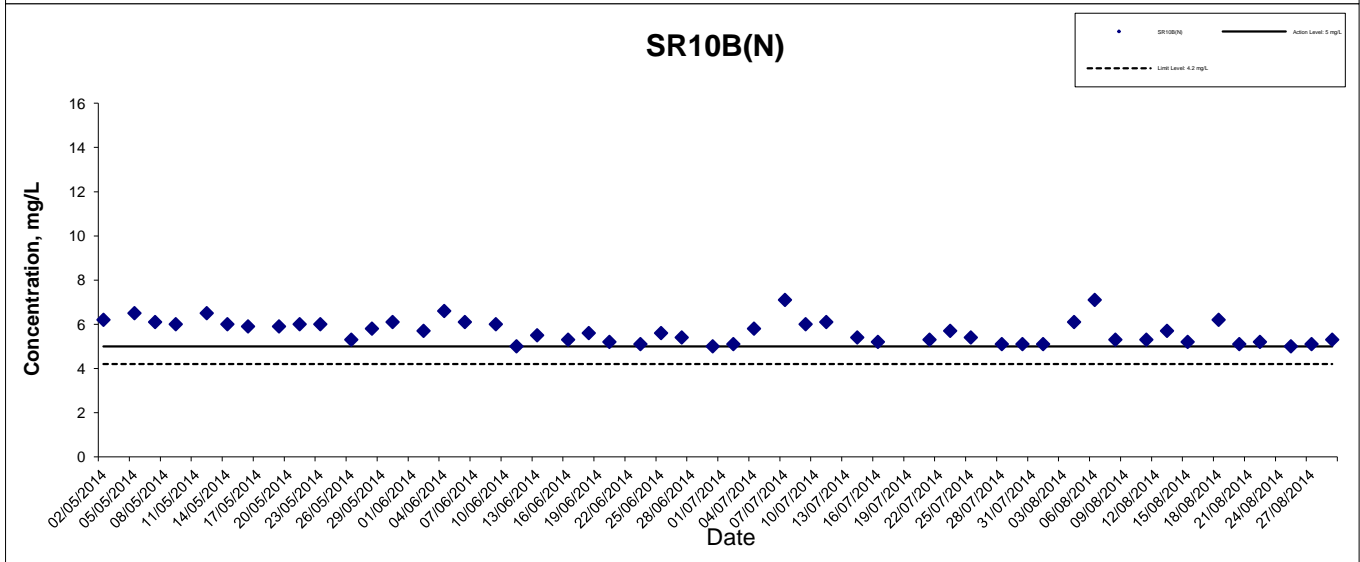
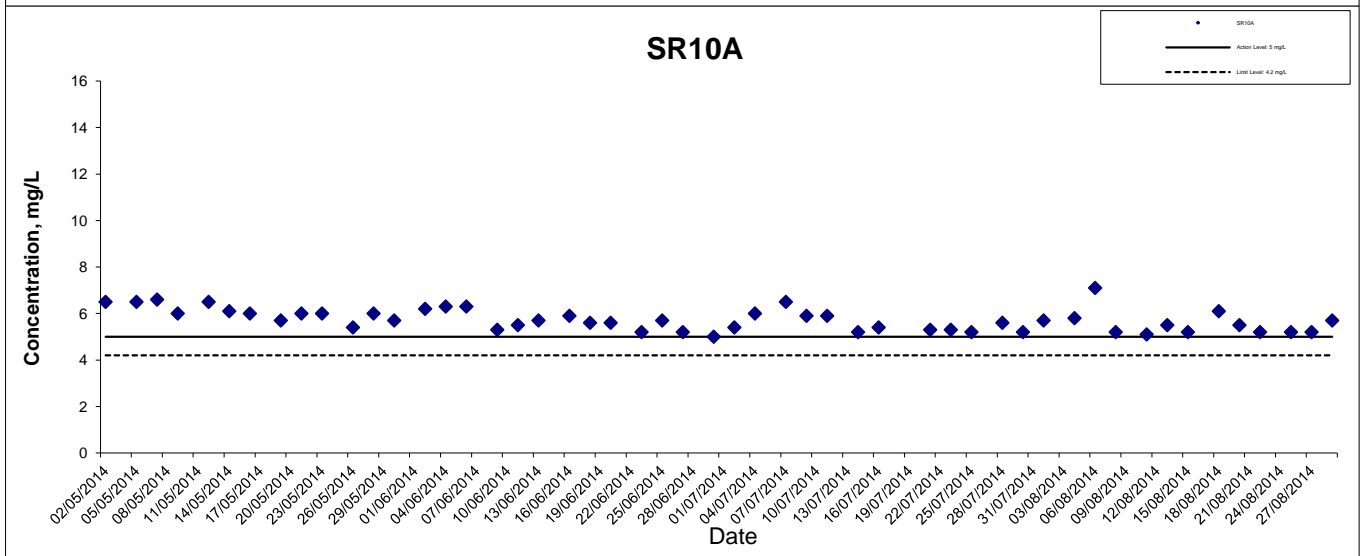
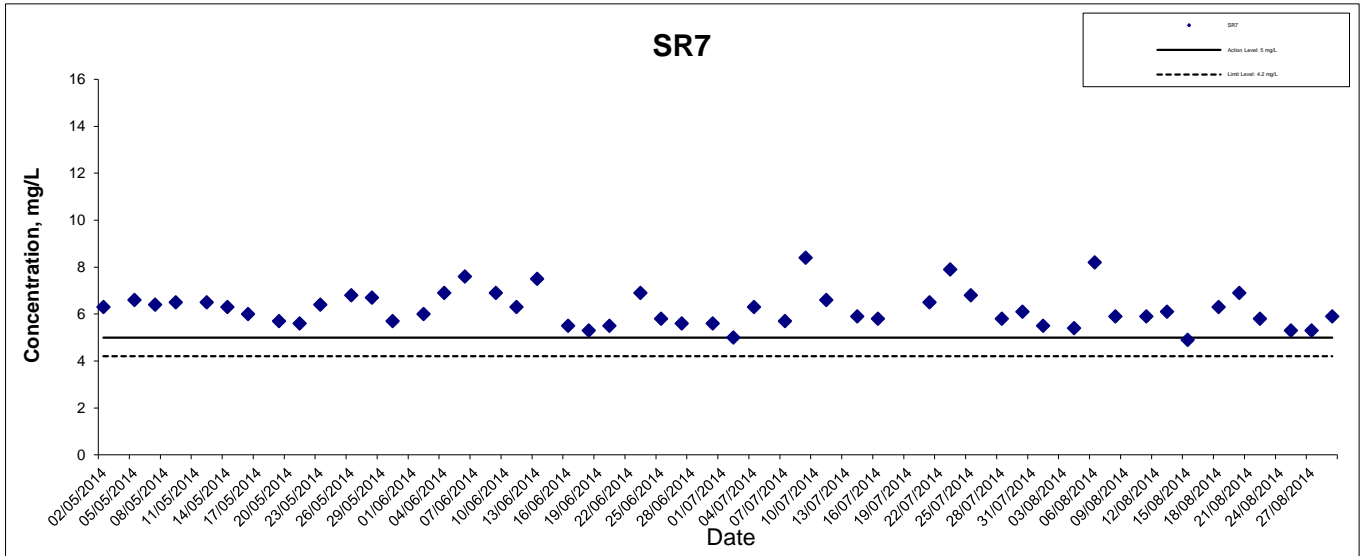
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



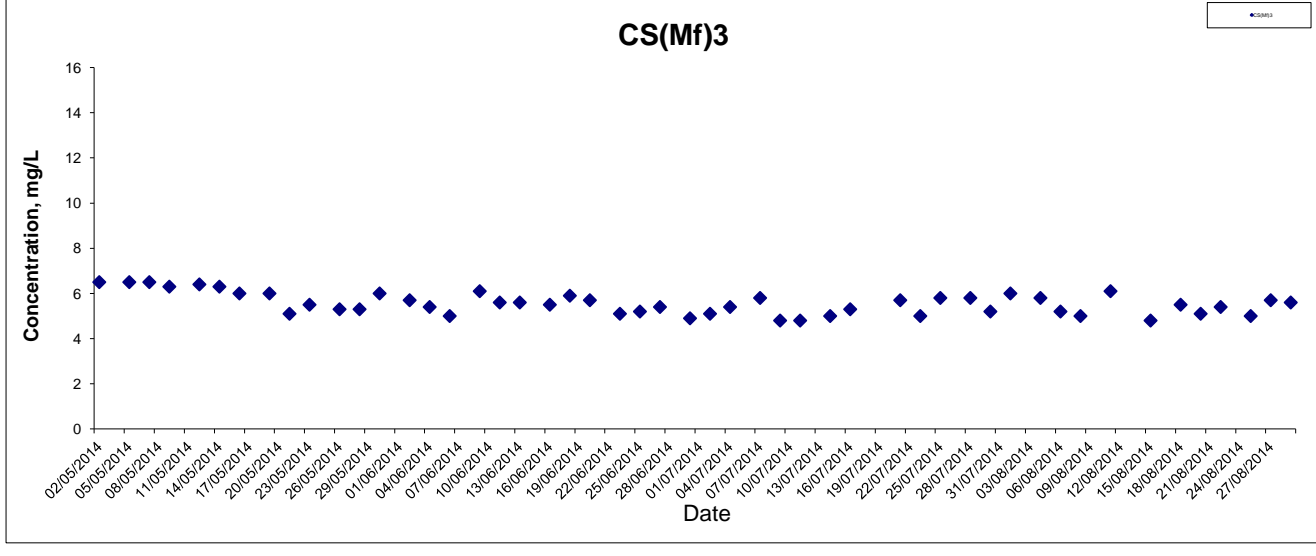
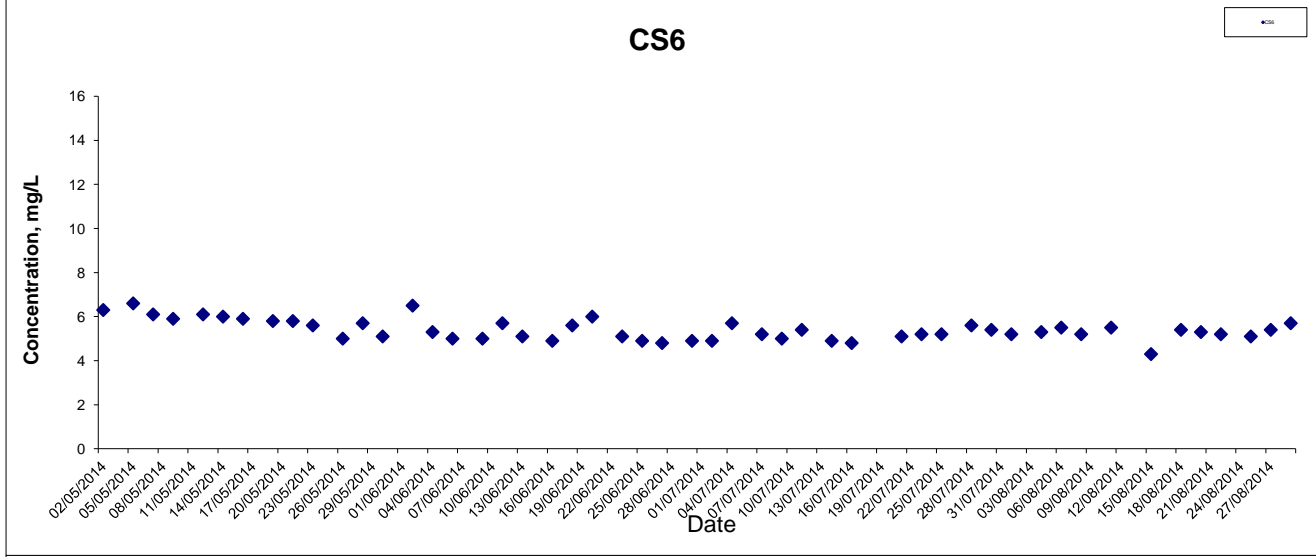
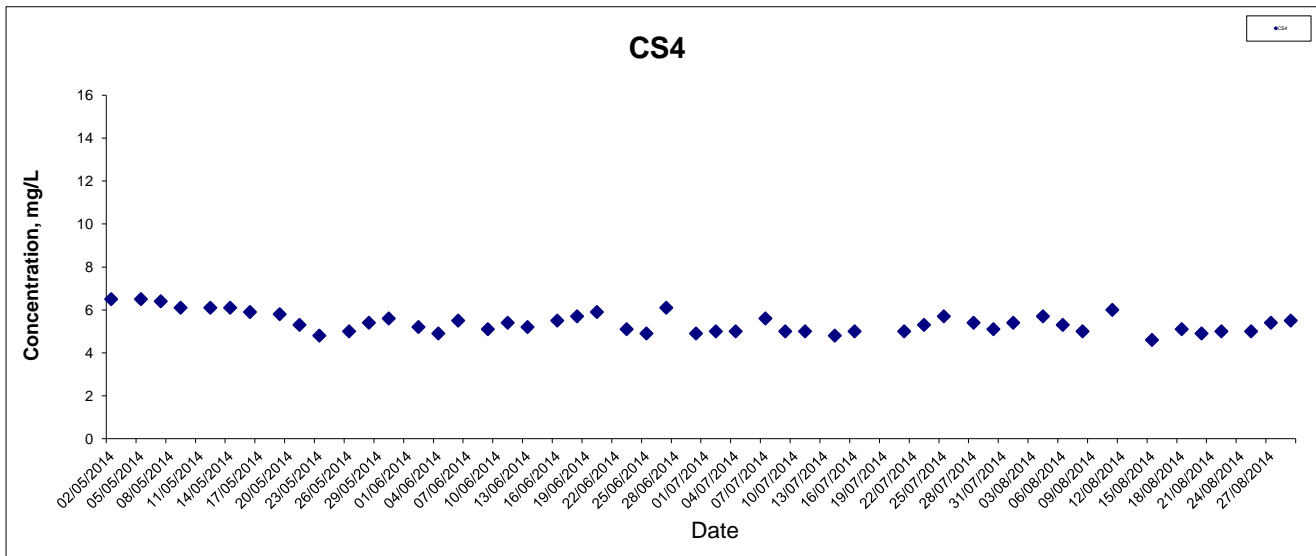
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

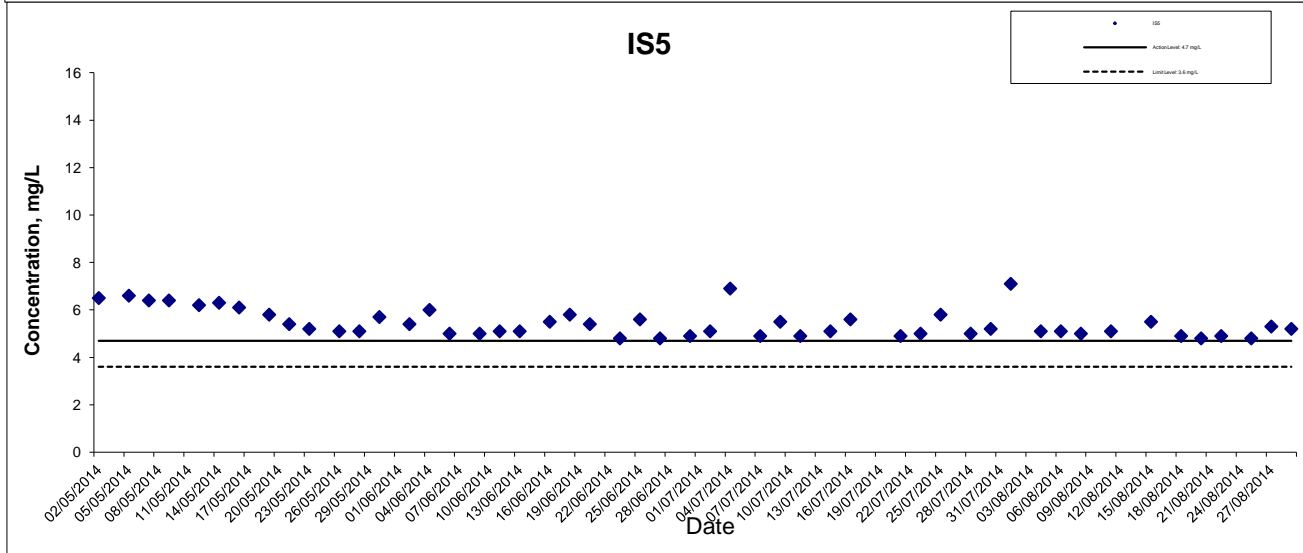
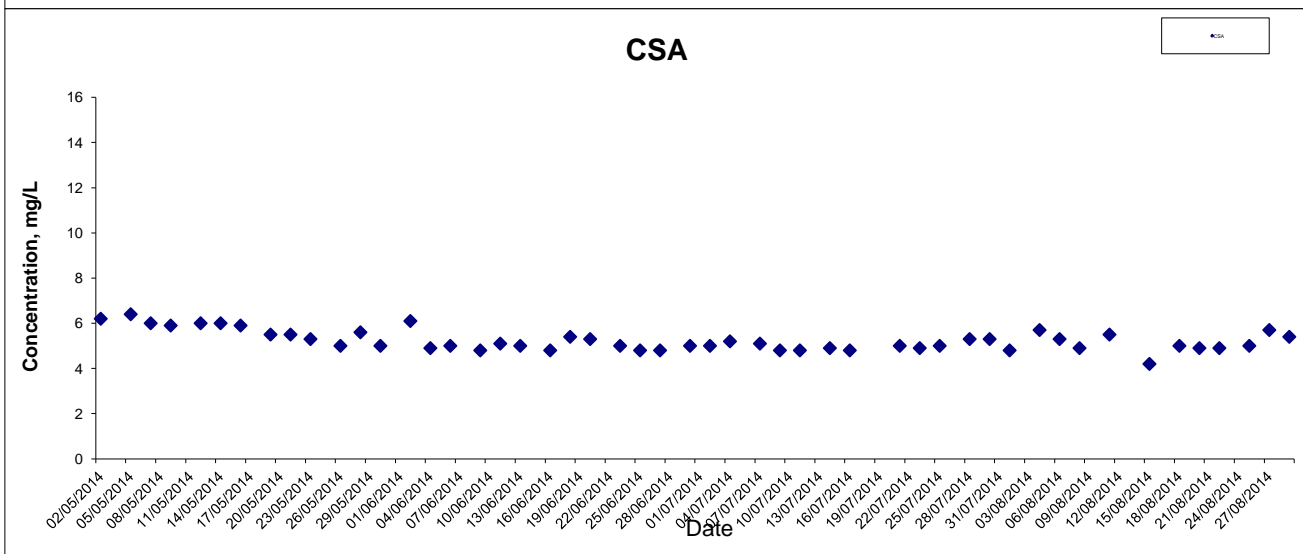
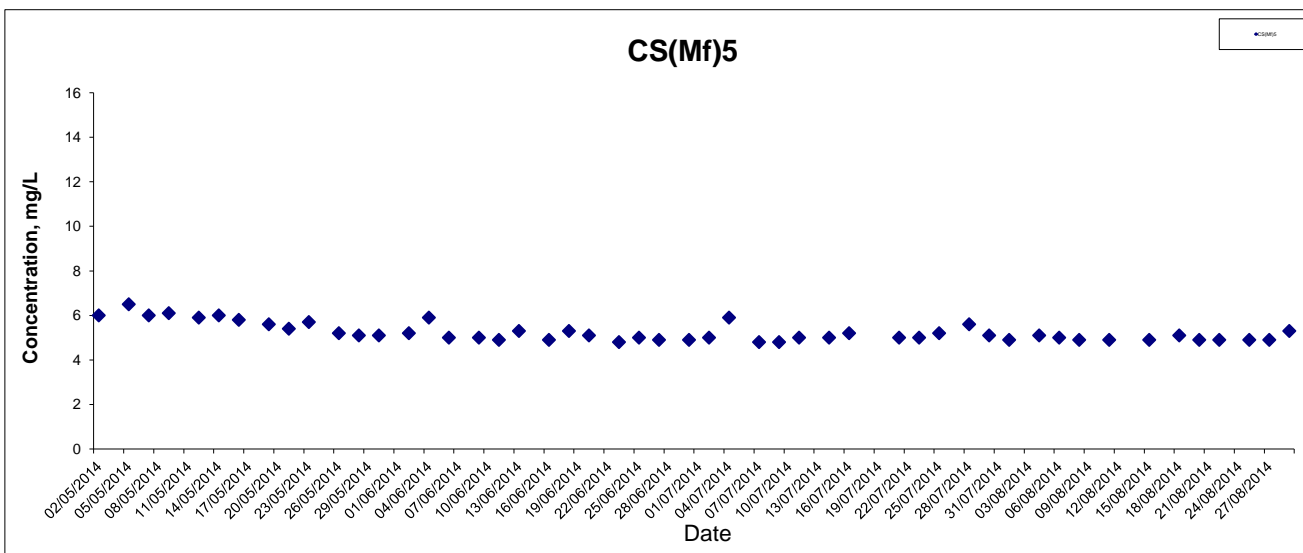
### Dissolved Oxygen (Bottom) at Mid-Ebb Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

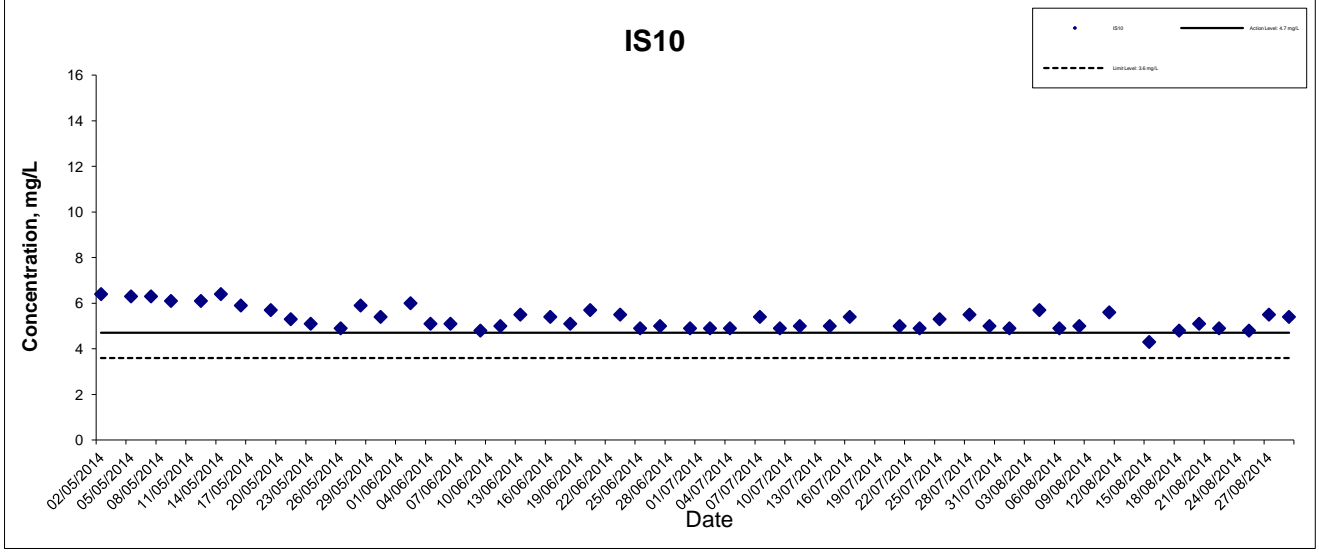
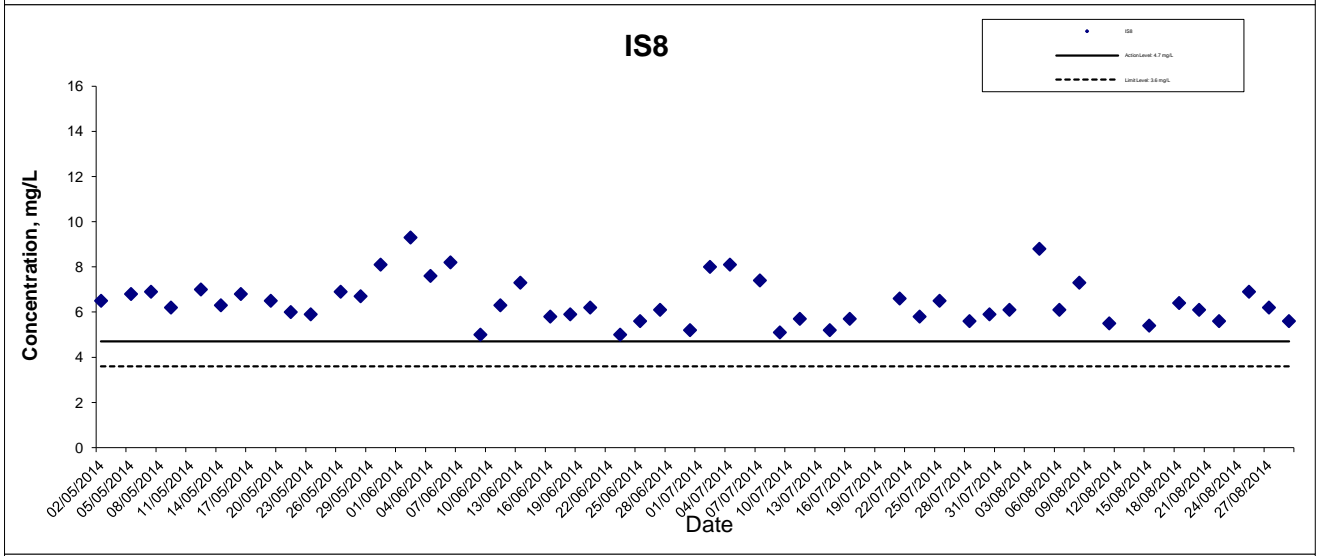
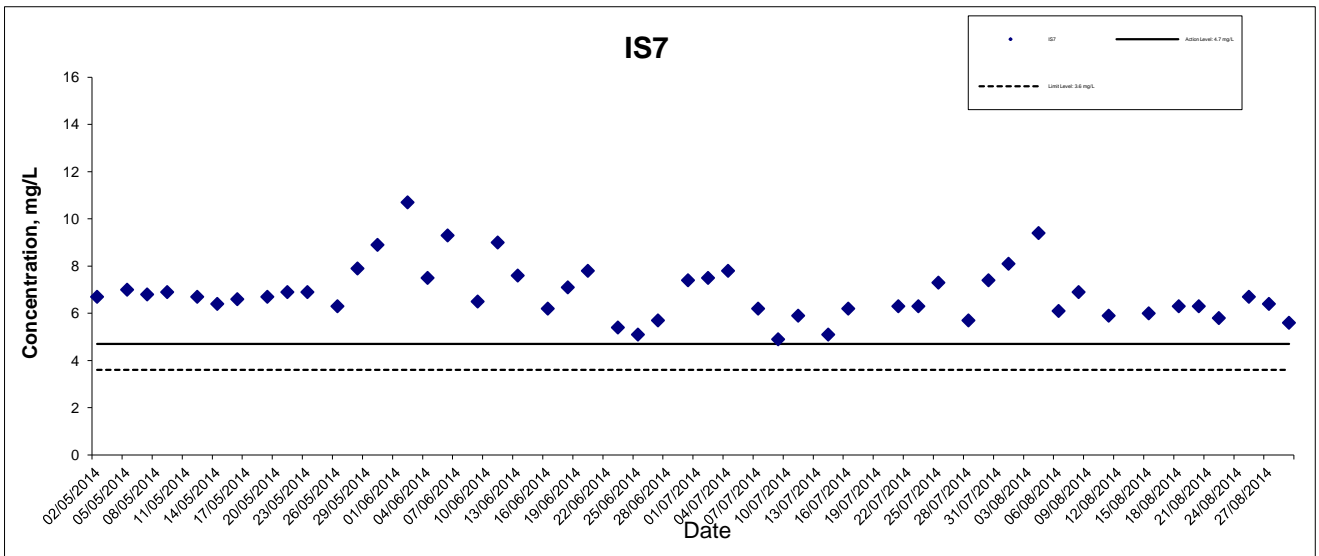


### Dissolved Oxygen (Bottom) at Mid-Ebb Tide



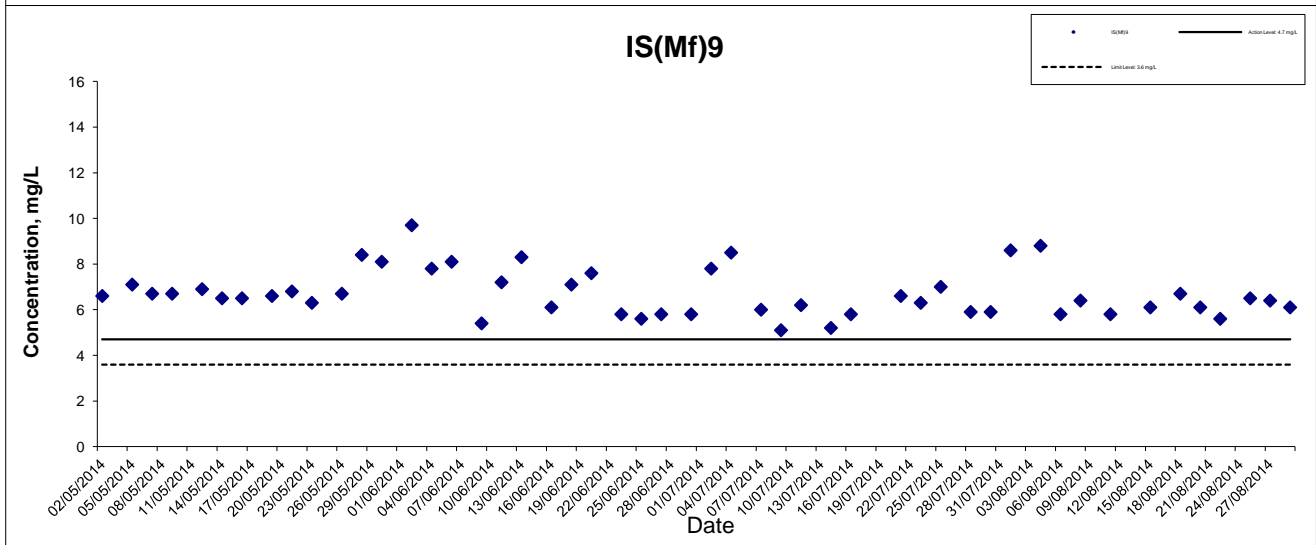
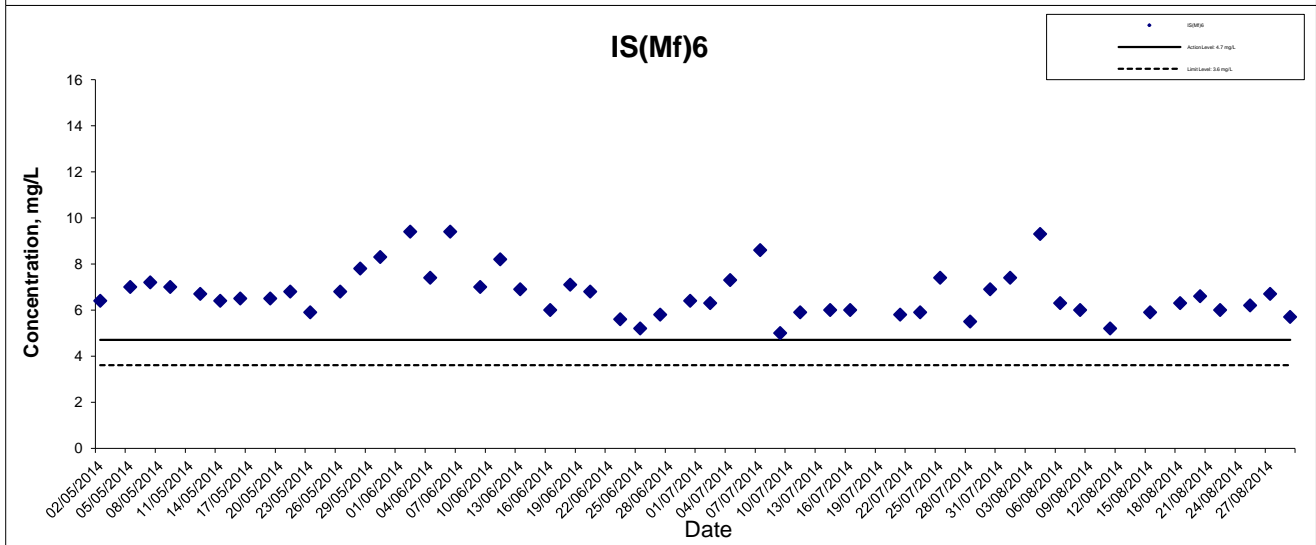
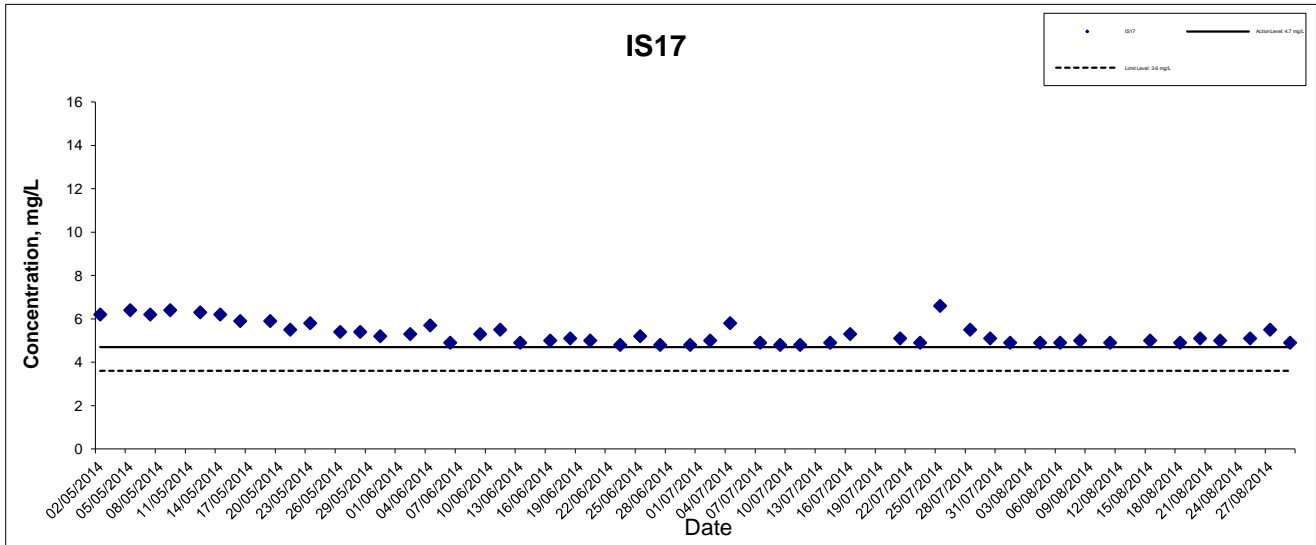
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



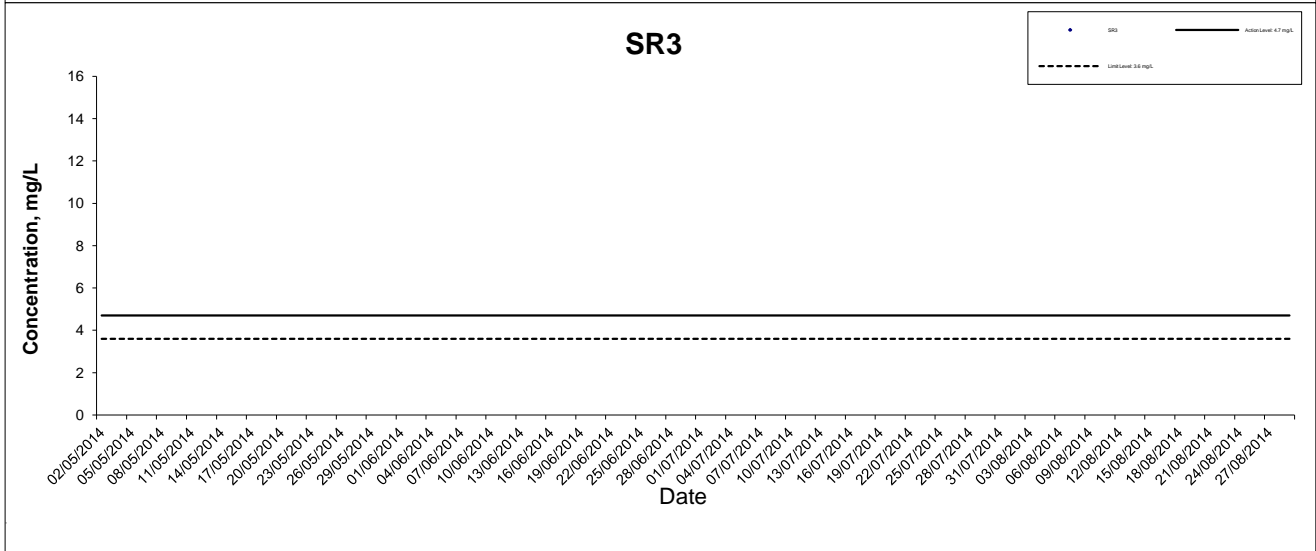
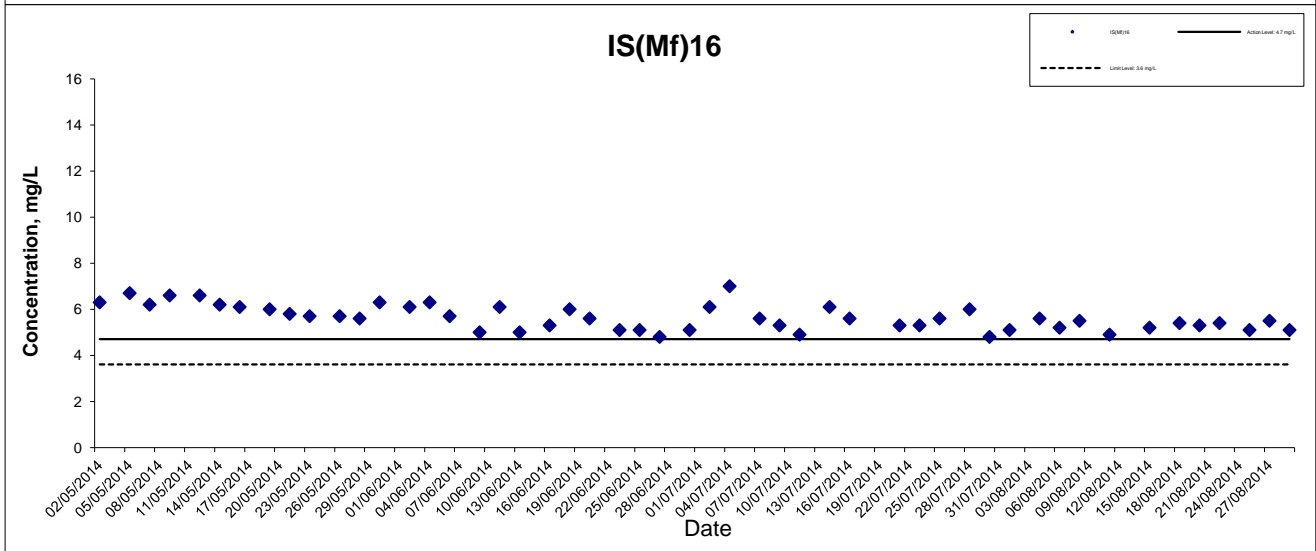
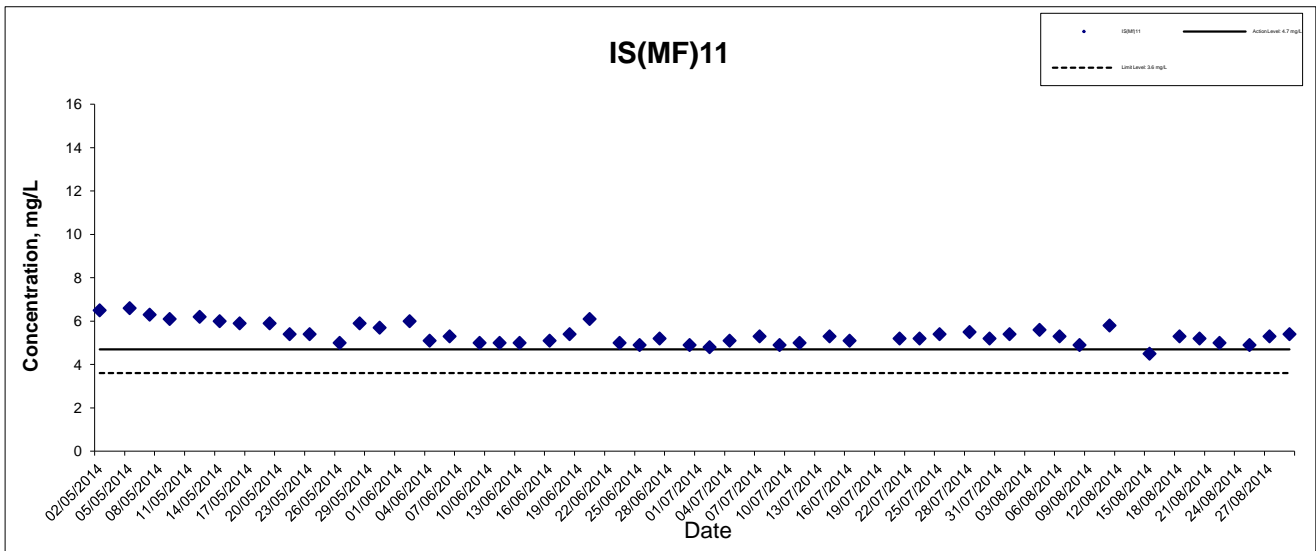
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



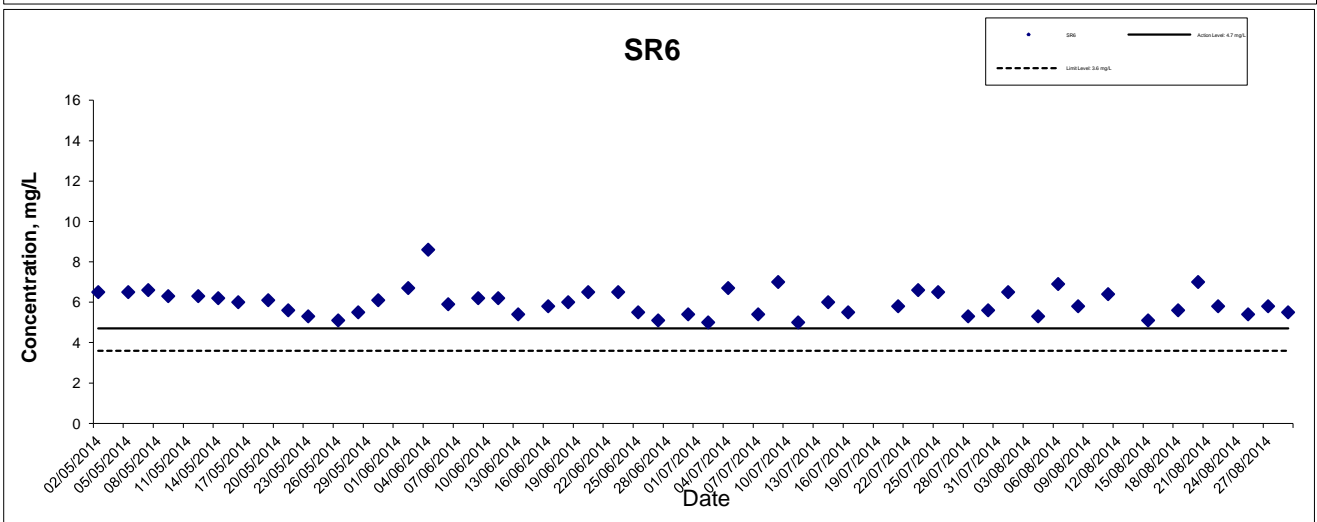
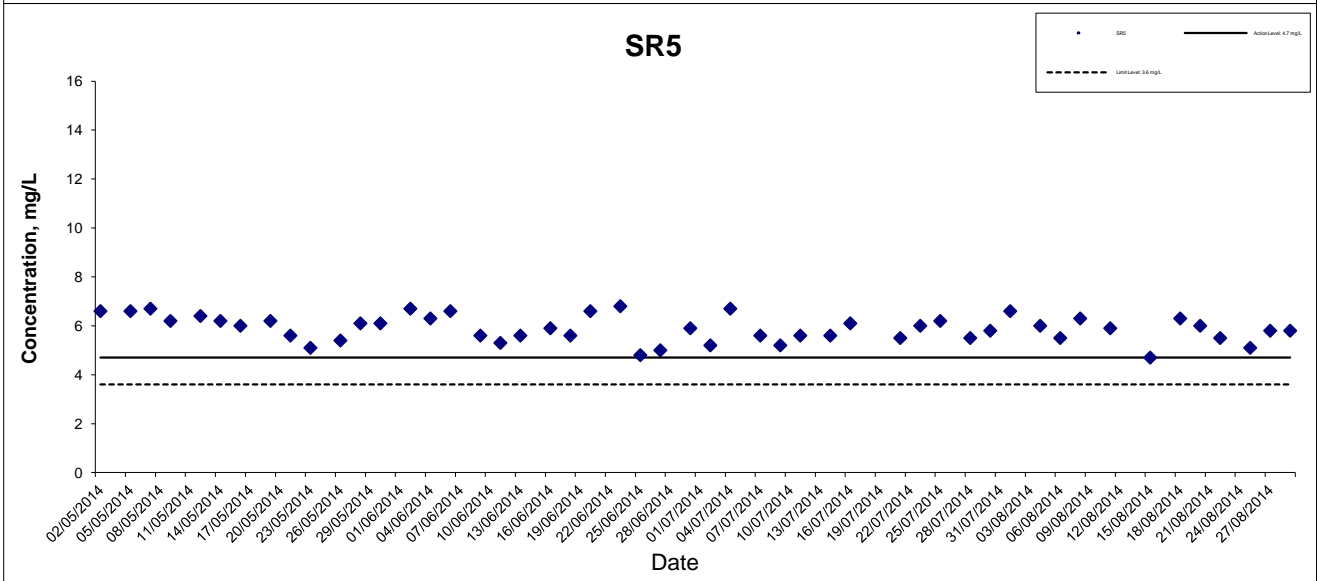
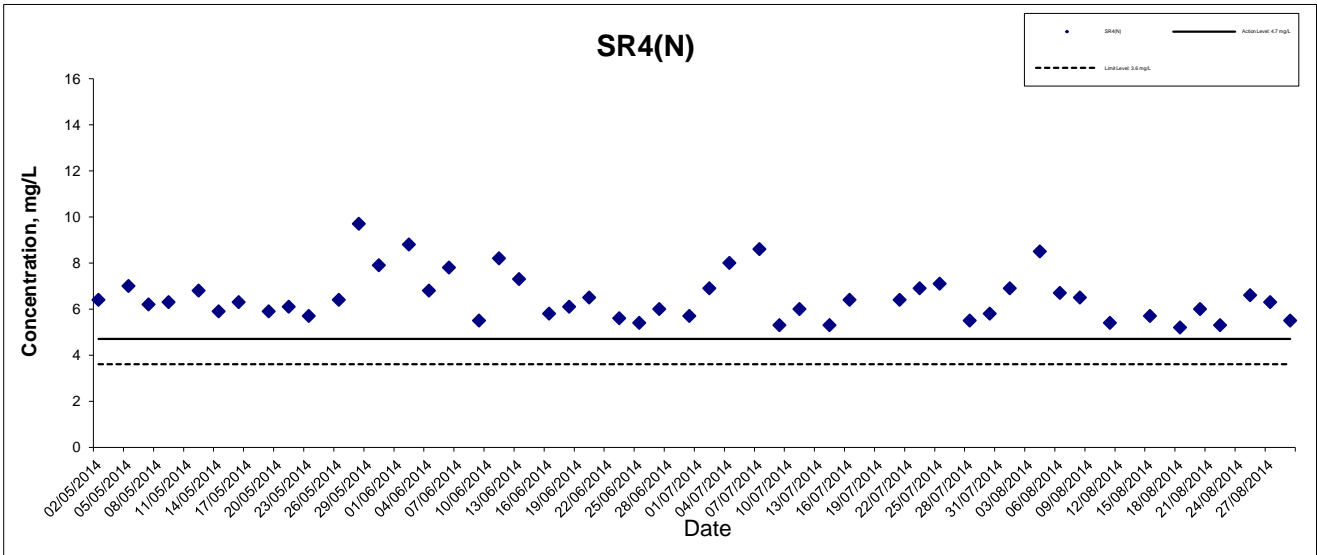
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



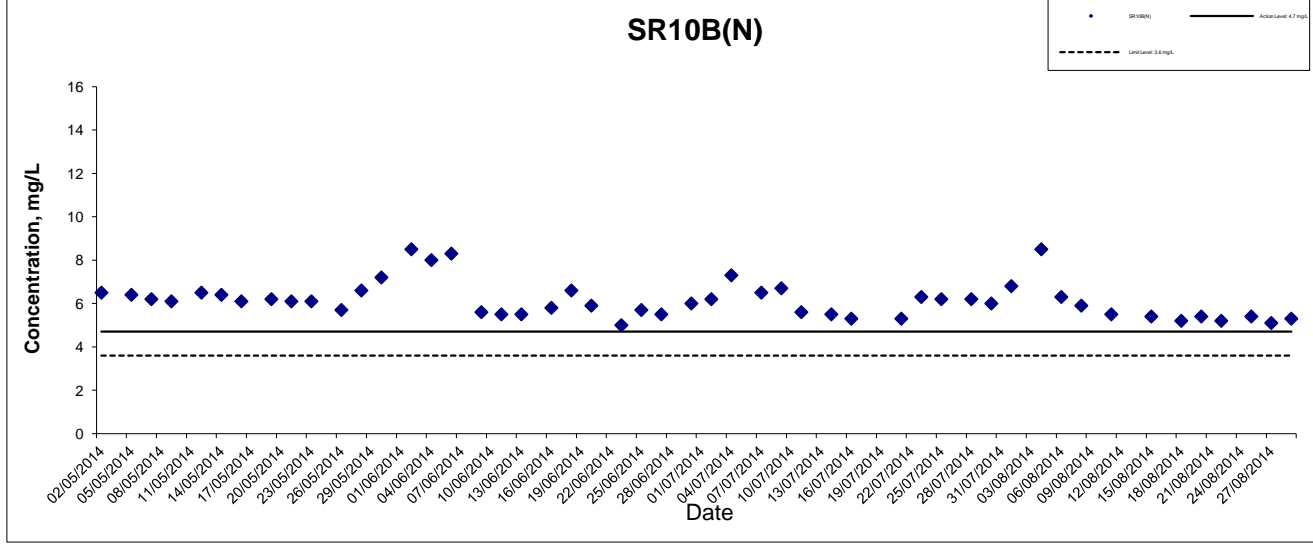
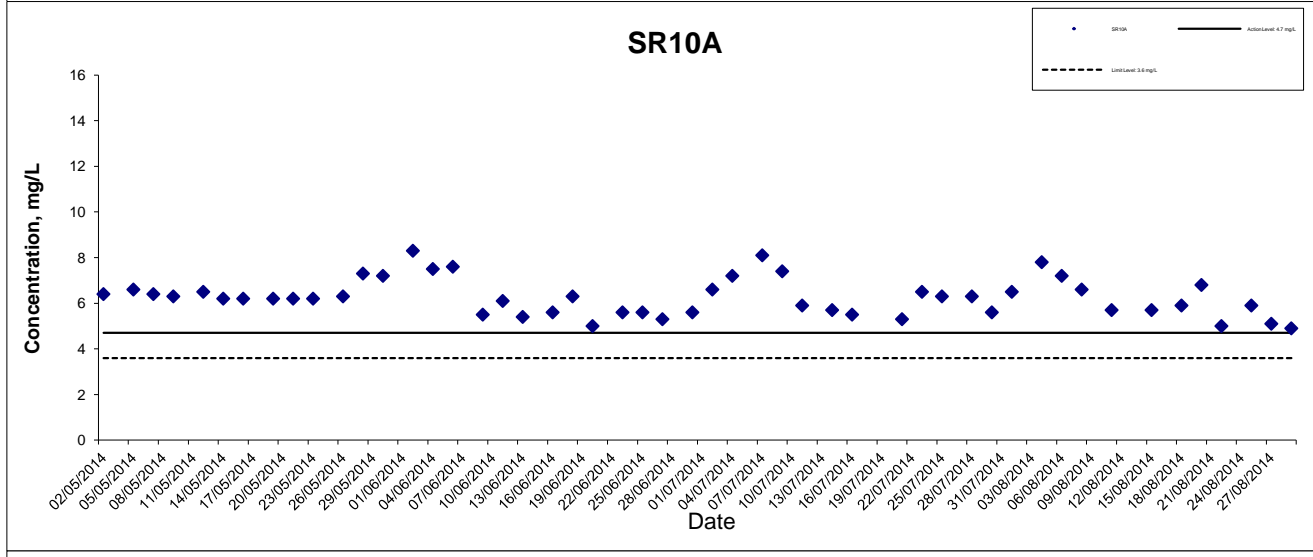
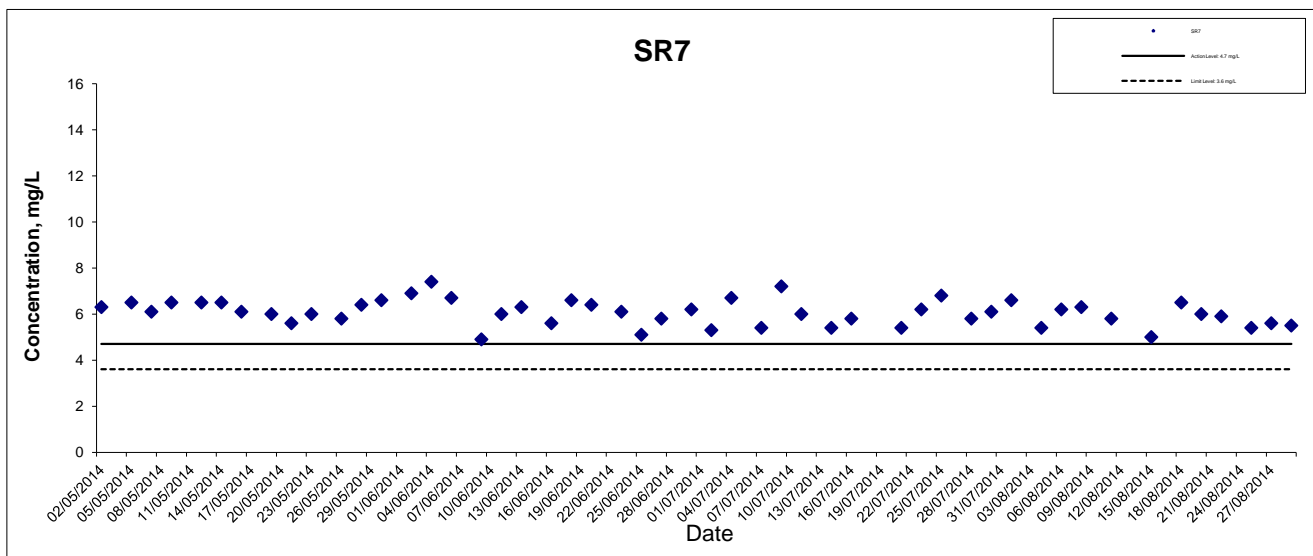
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



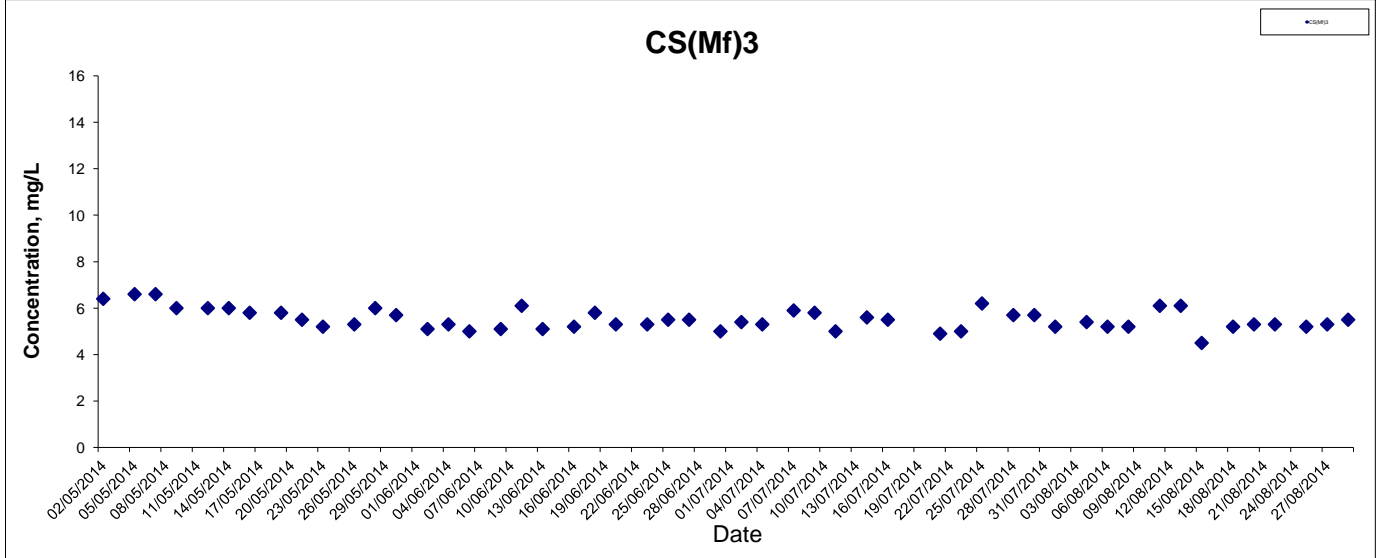
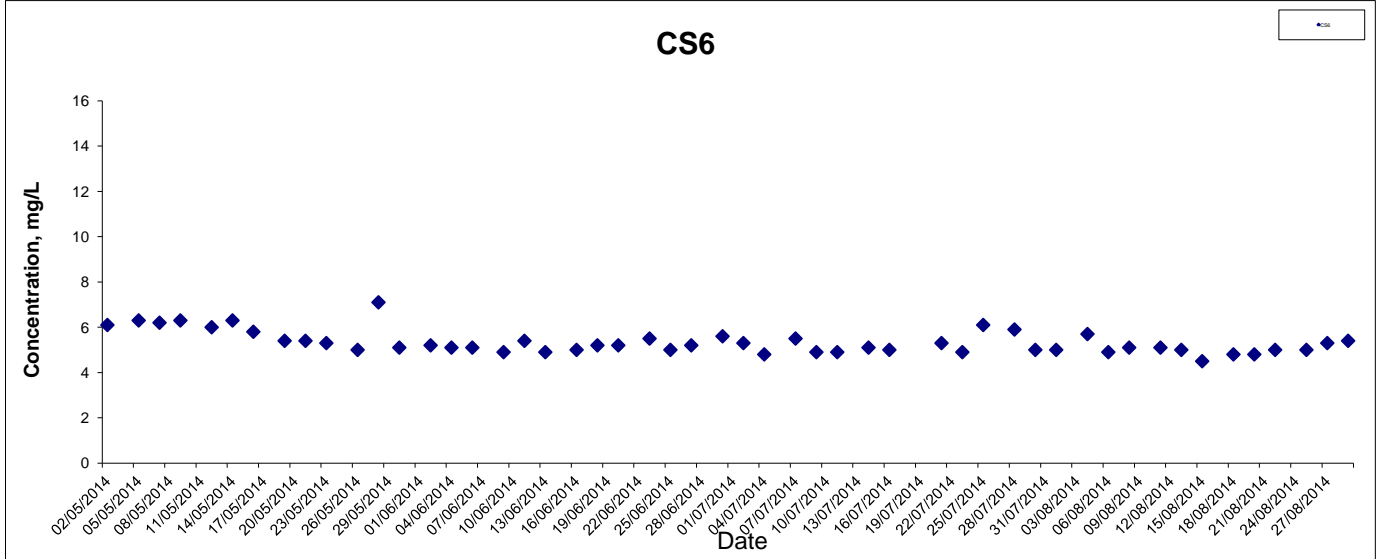
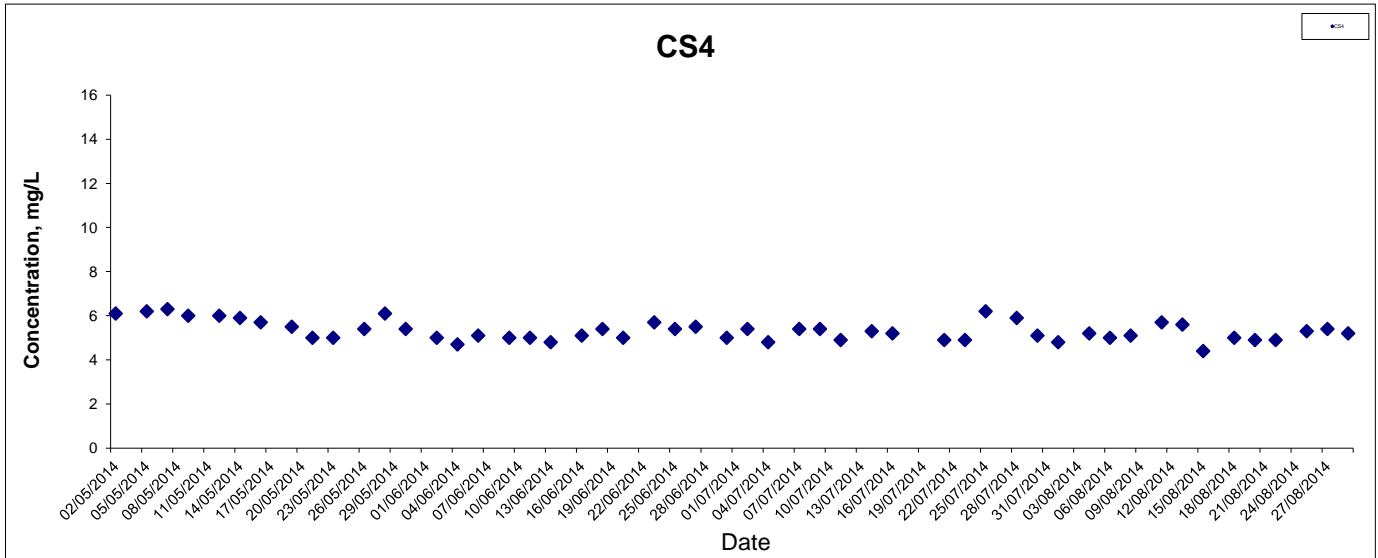
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



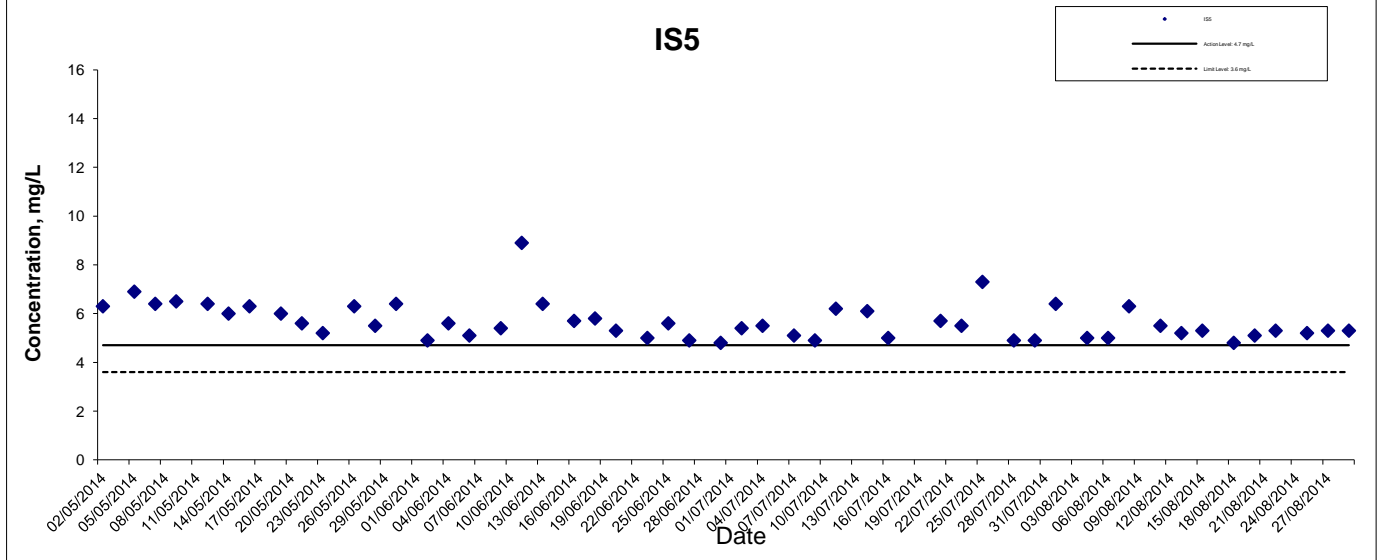
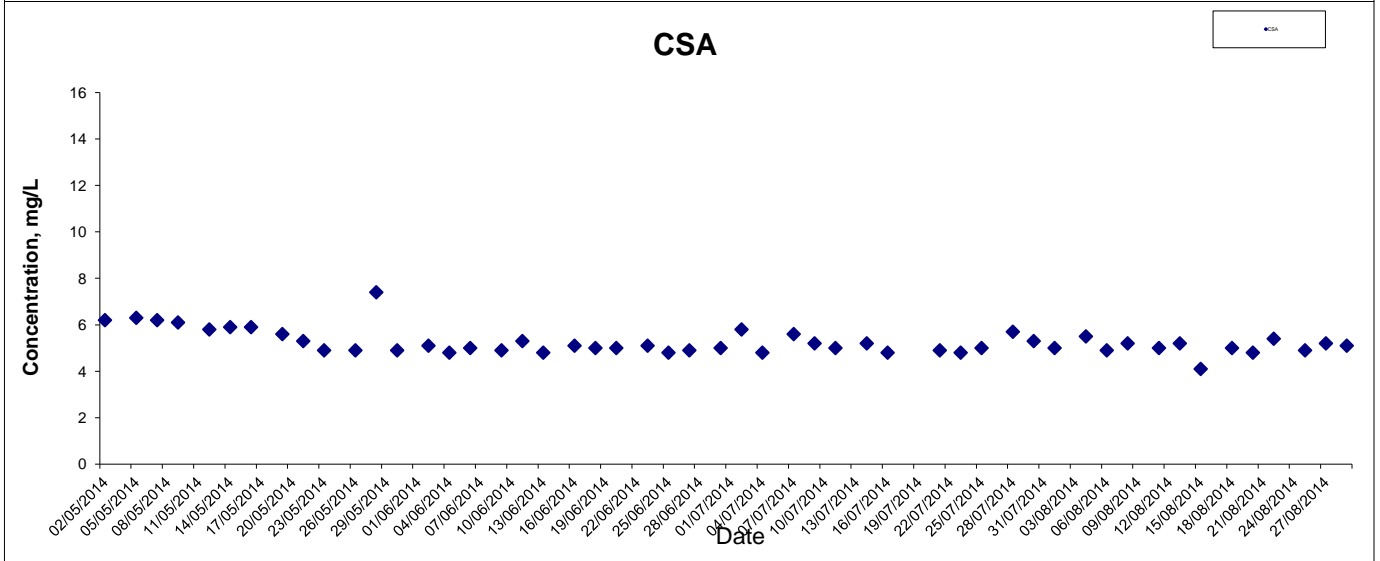
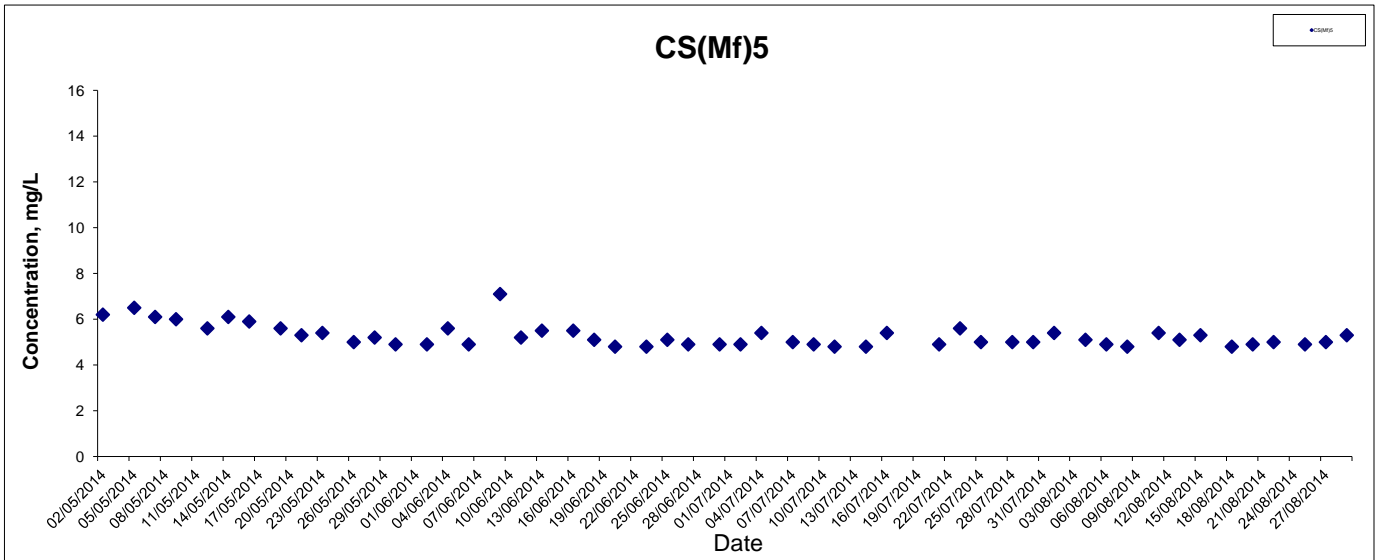
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

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



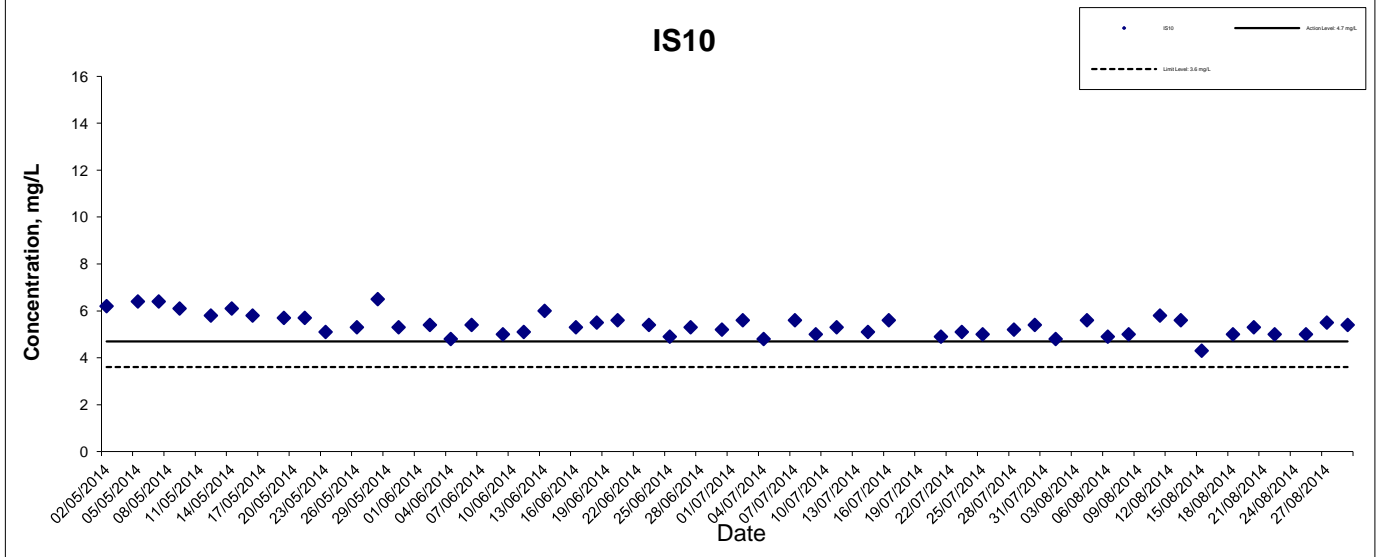
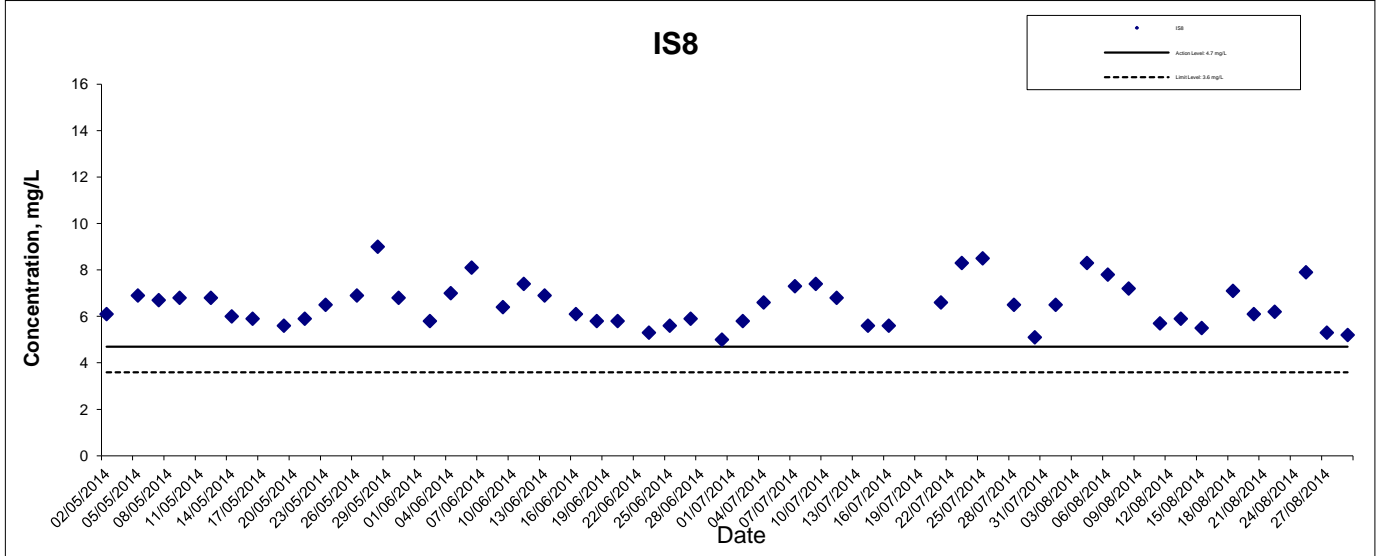
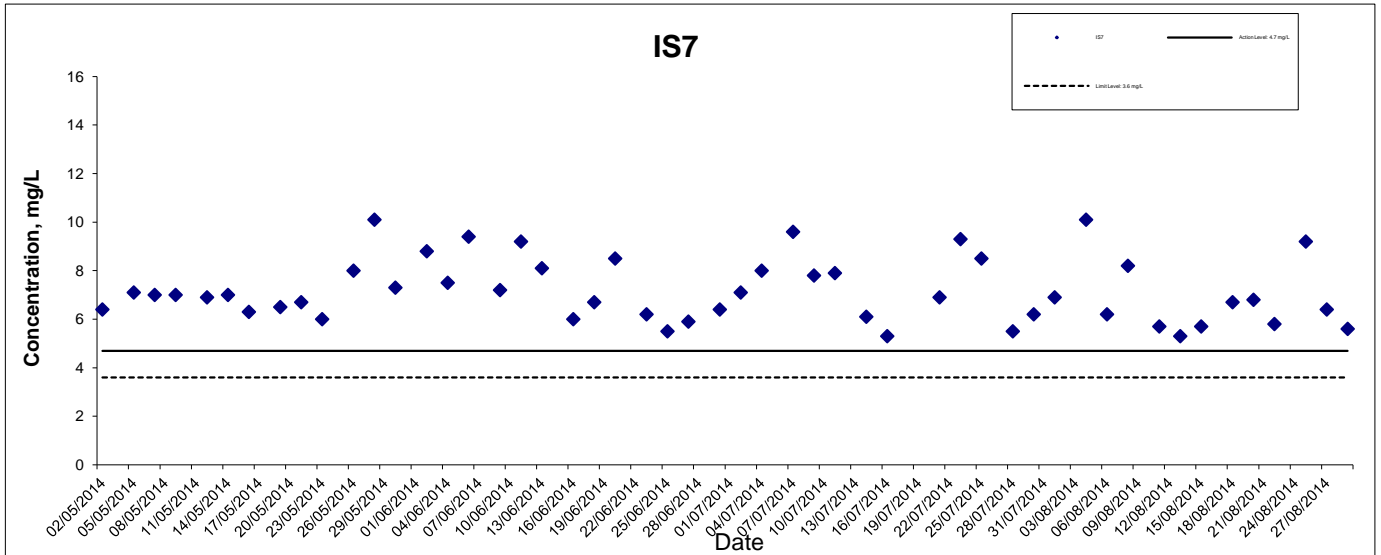
Project No.: 60249820

Date: Sep 2014

Appendix G

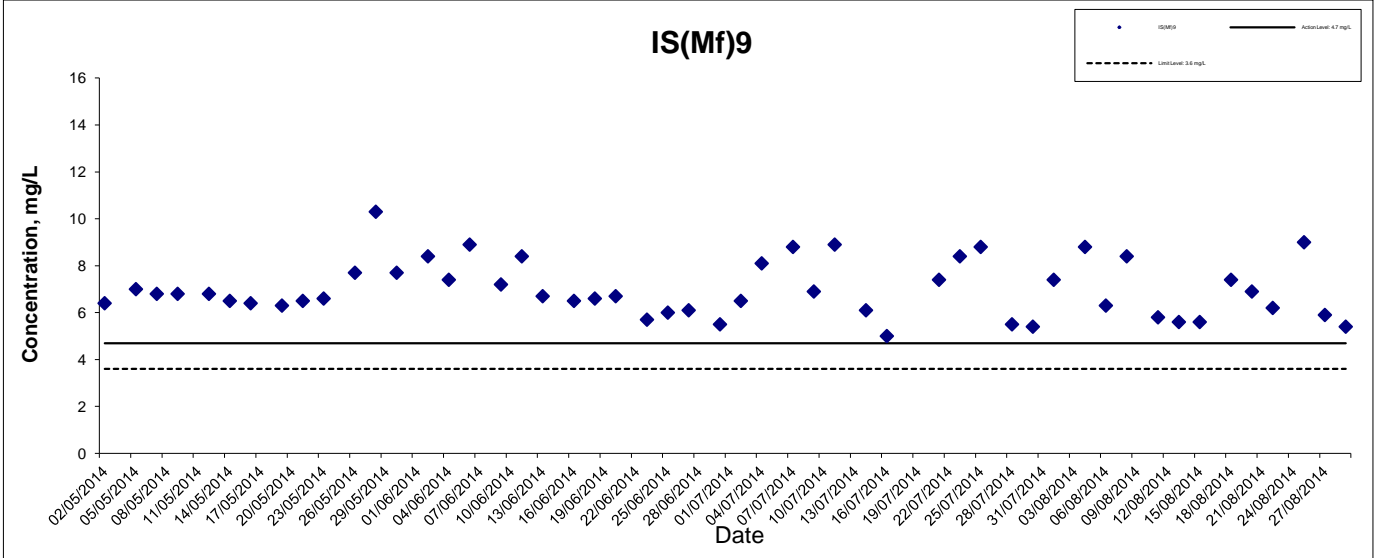
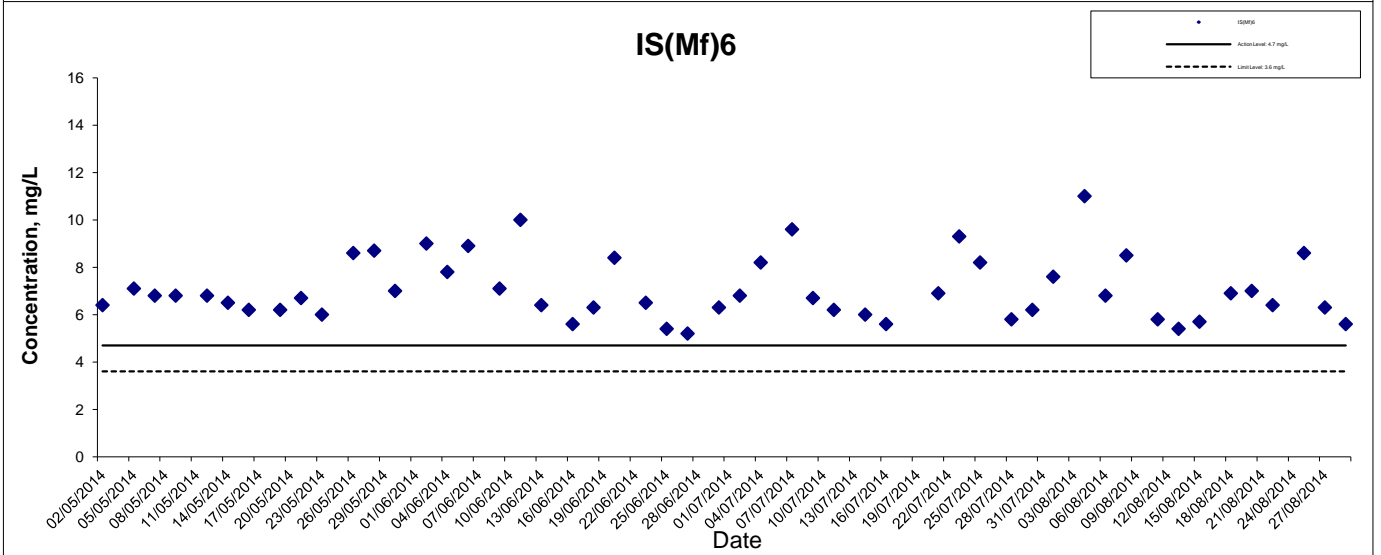
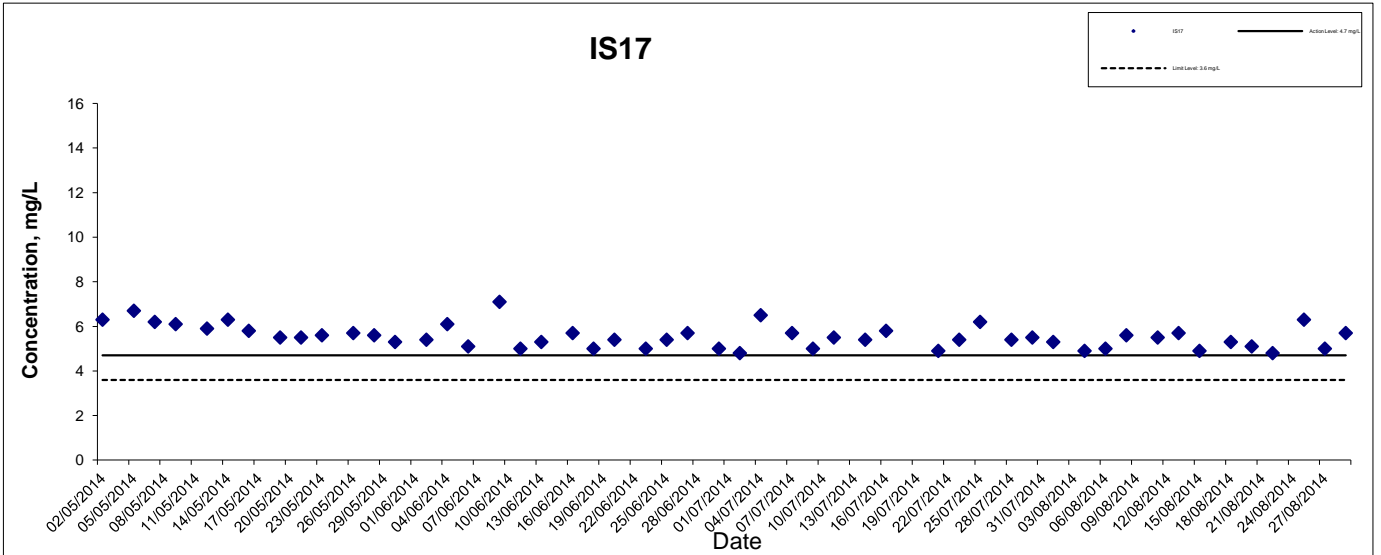


## Dissolved Oxygen (Bottom) at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



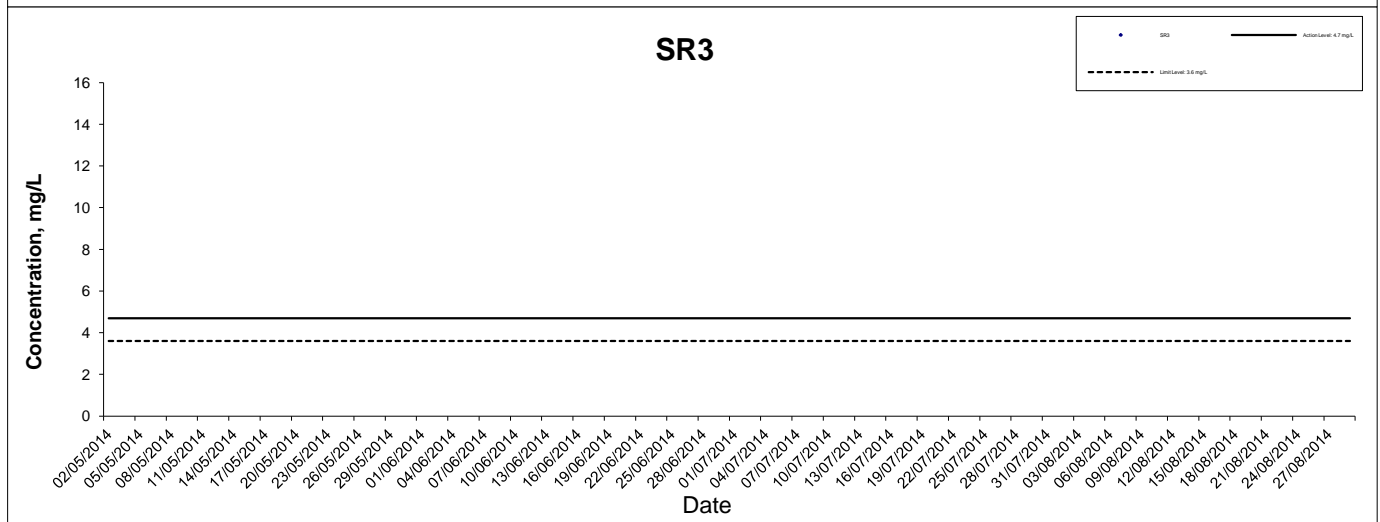
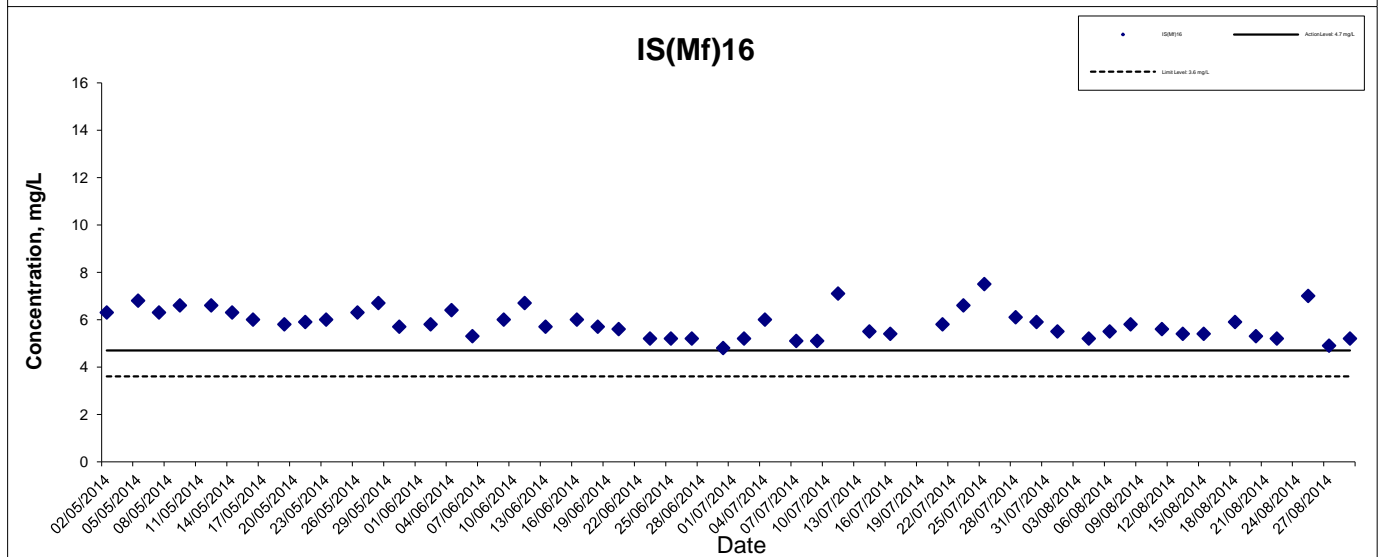
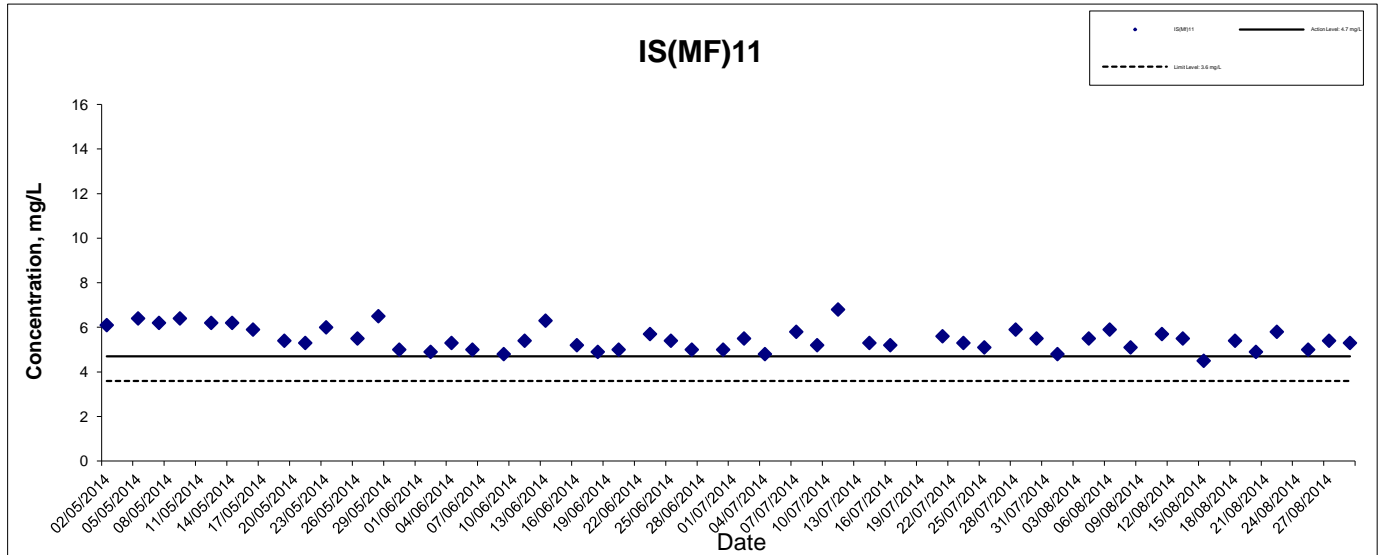
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

**Project No.: 60249820**

**Date: Sep 2014**

**Appendix G**

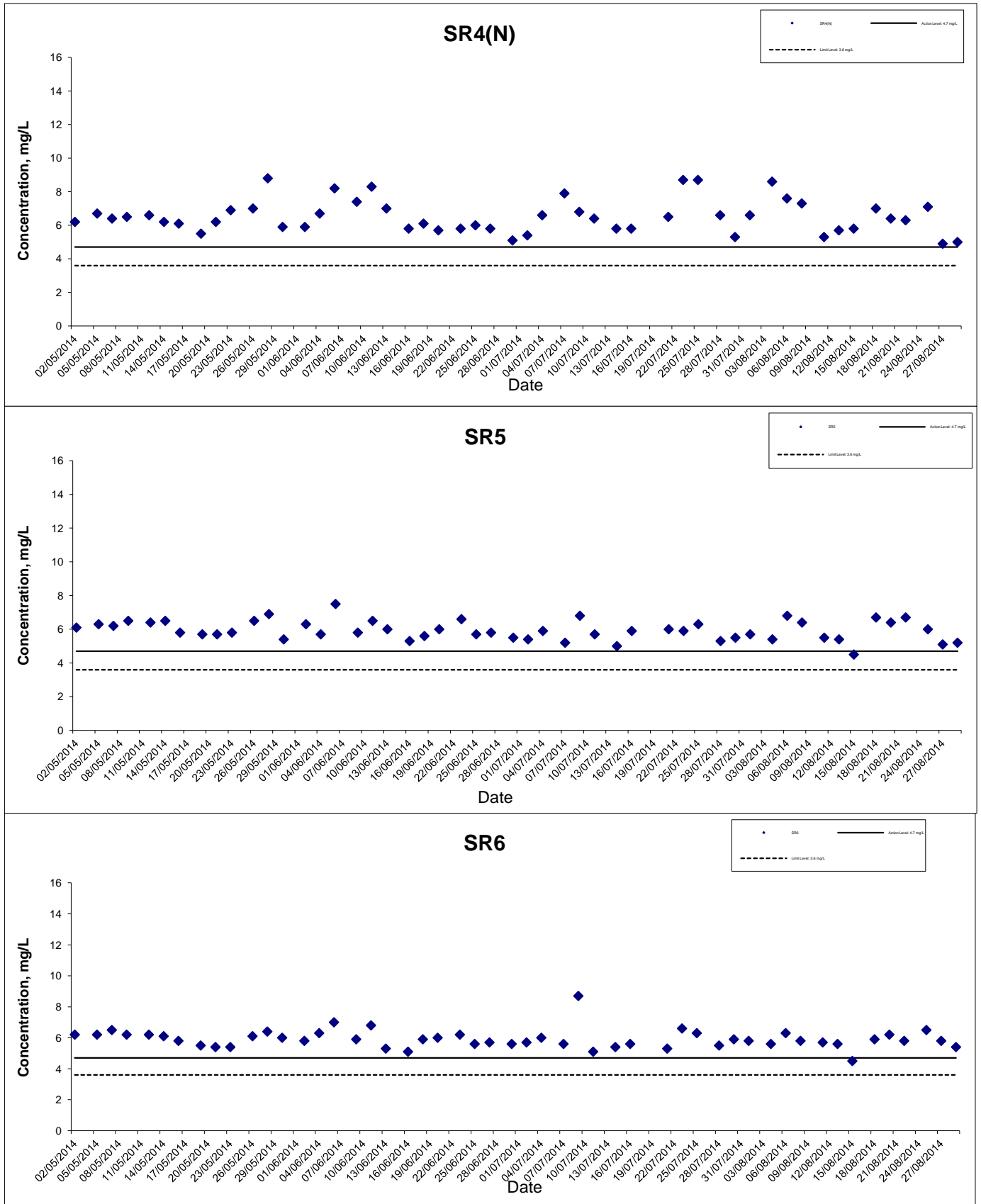
## Dissolved Oxygen (Bottom) at Mid-Flood Tide



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

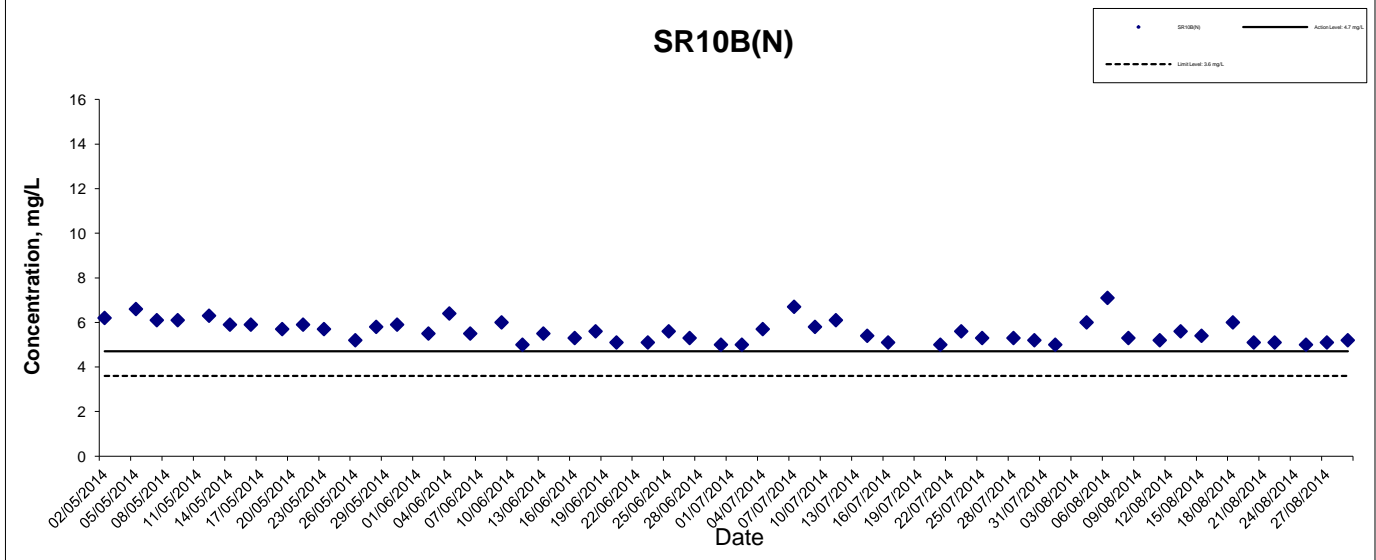
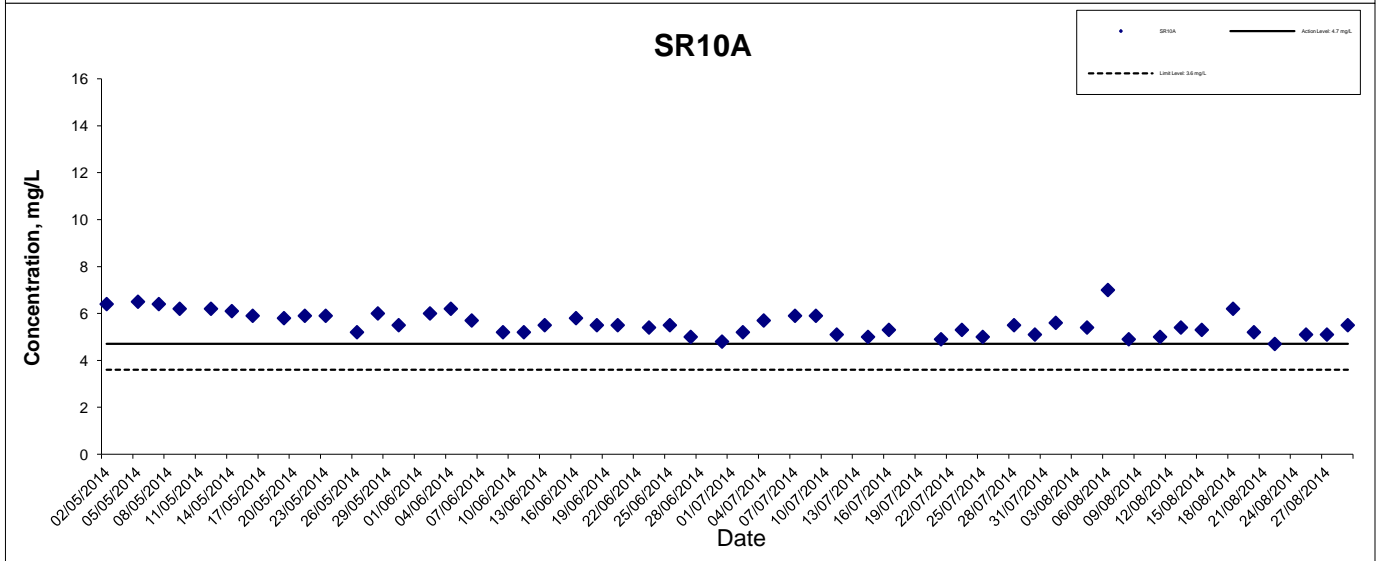
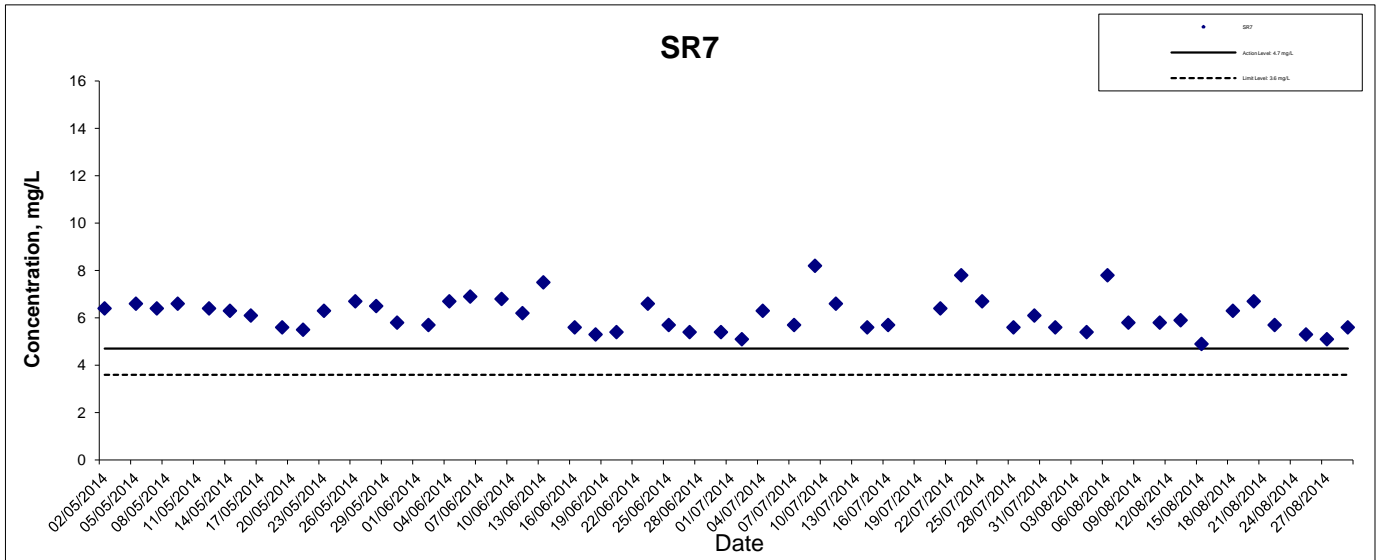
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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



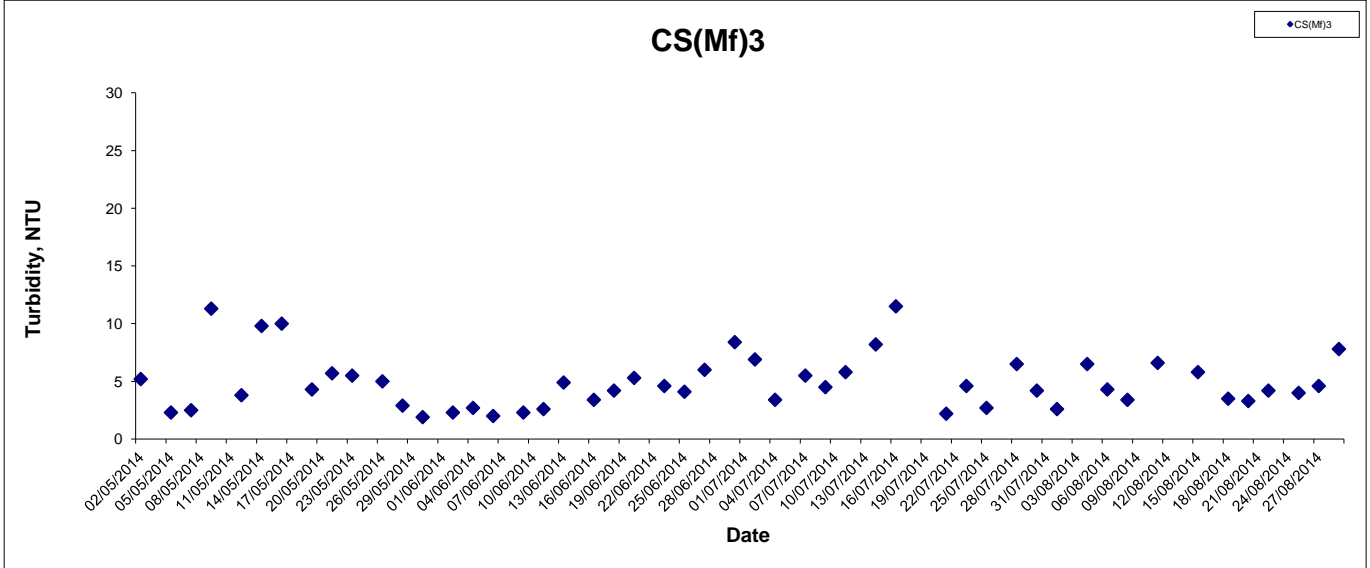
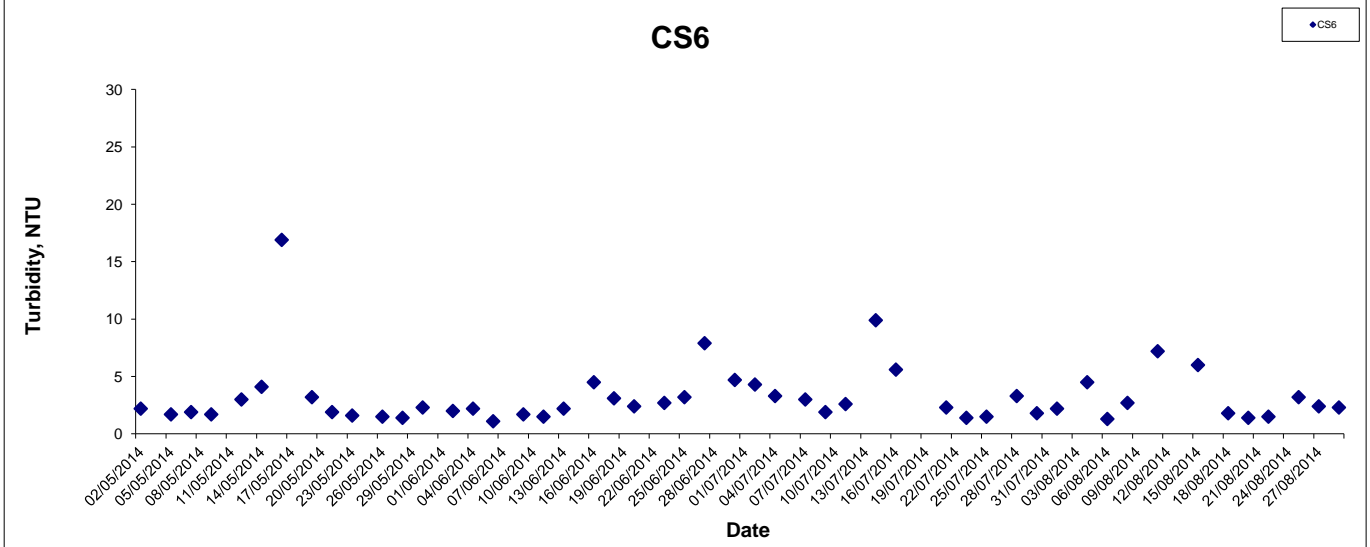
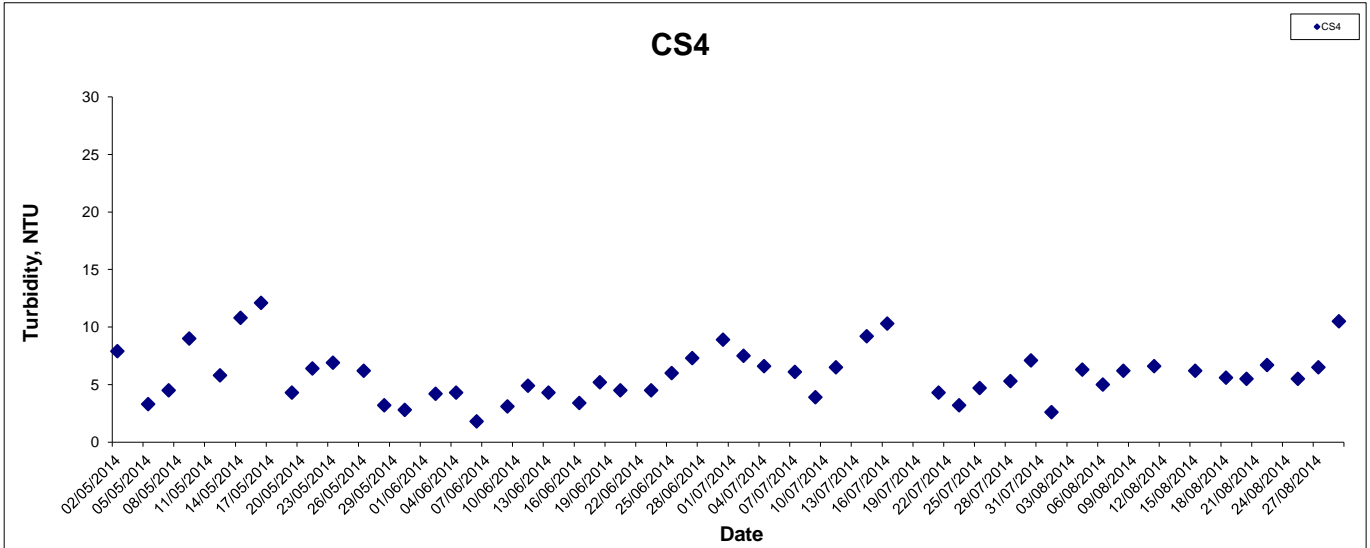
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

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

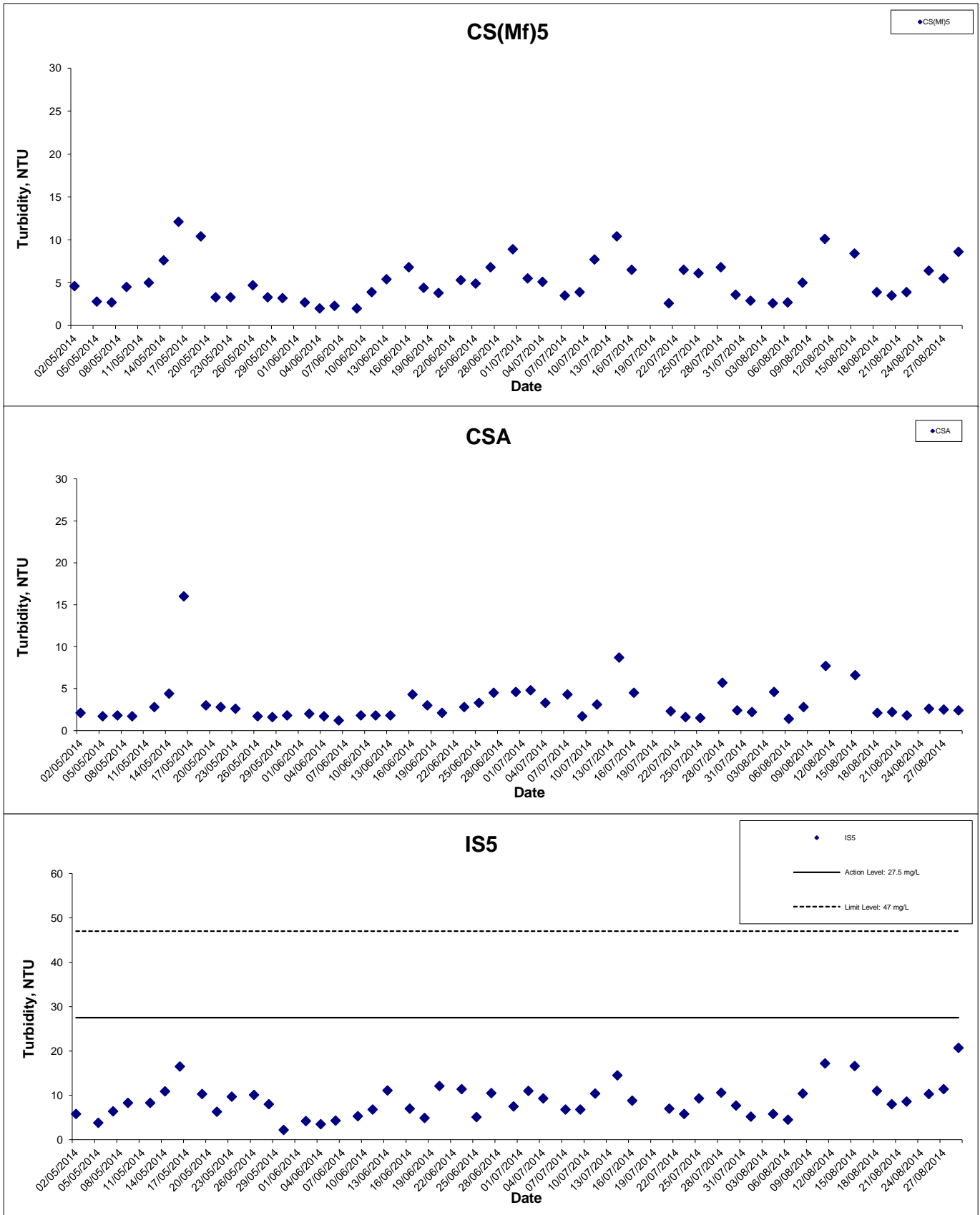


## Turbidity at Mid-Ebb Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Ebb Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

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



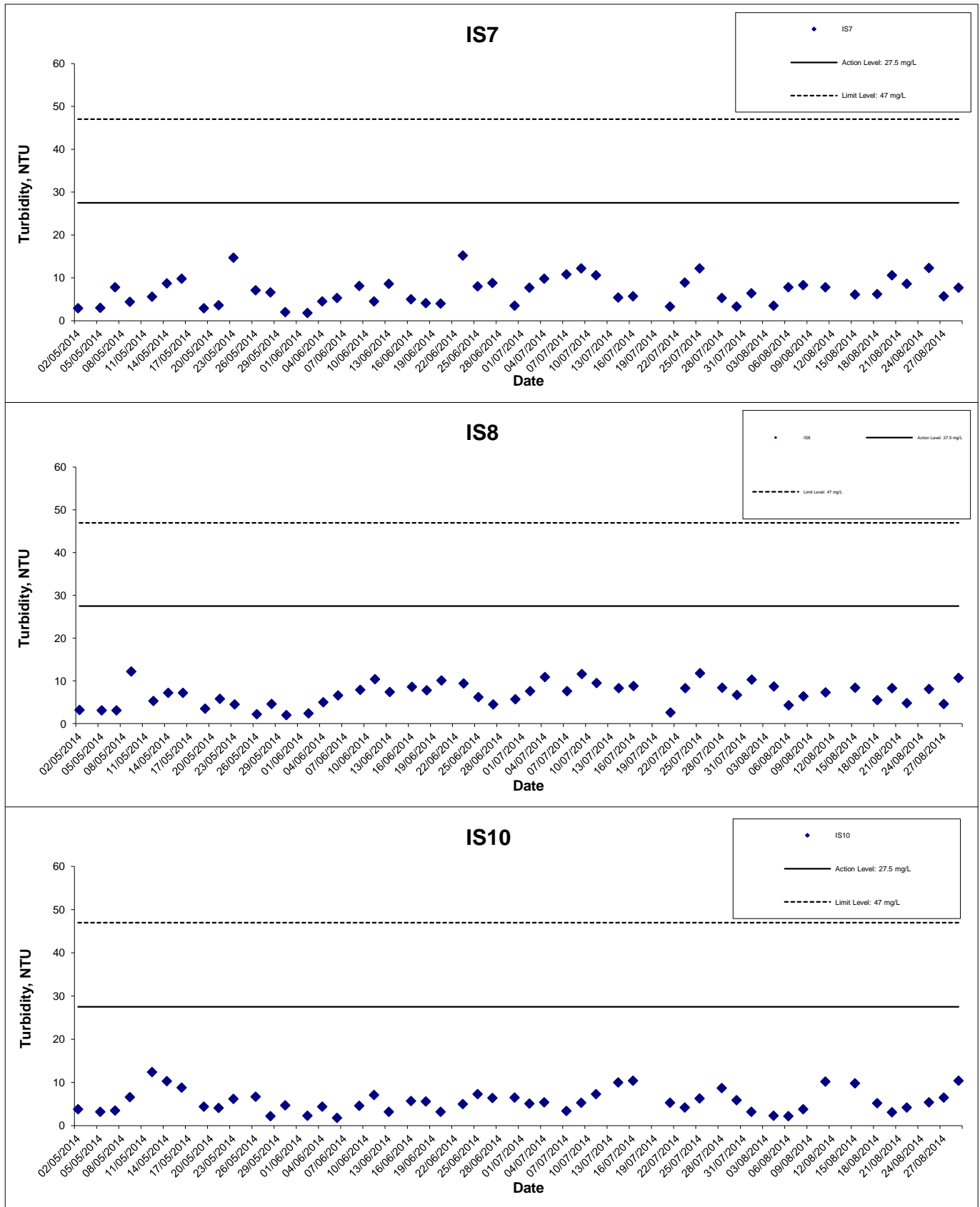
Project No.: 60249820

Date: Sep 2014

Appendix G



## Turbidity at Mid-Ebb Tide



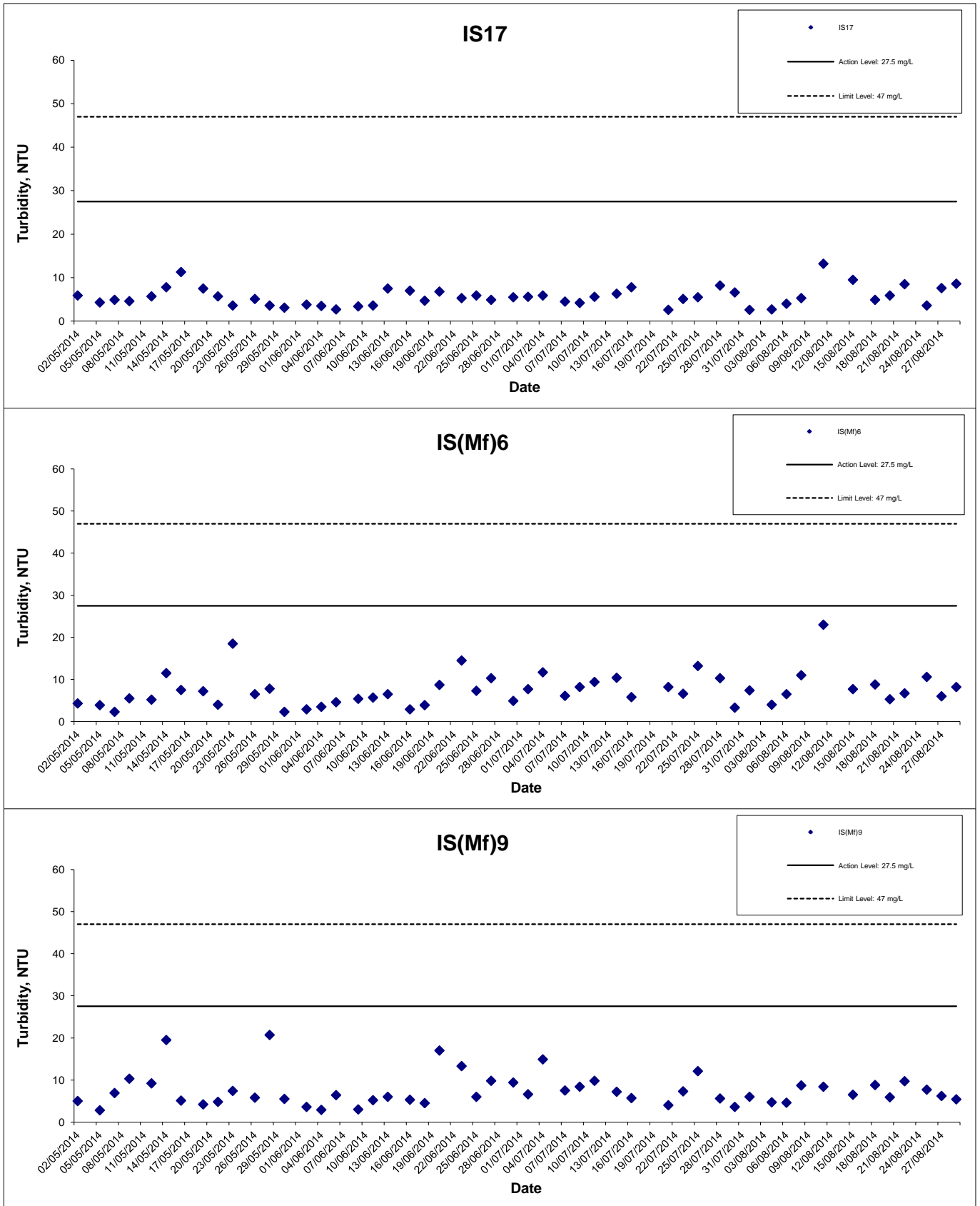
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

Graphical Presentation of Impact Water Quality  
 Monitoring Results

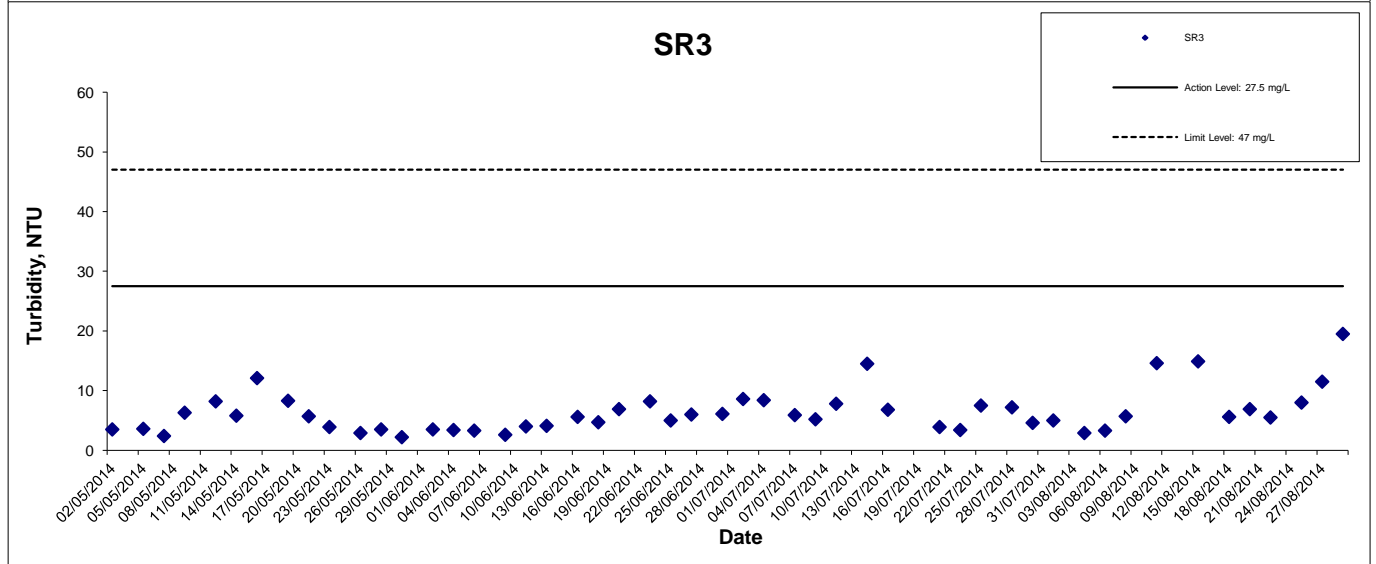
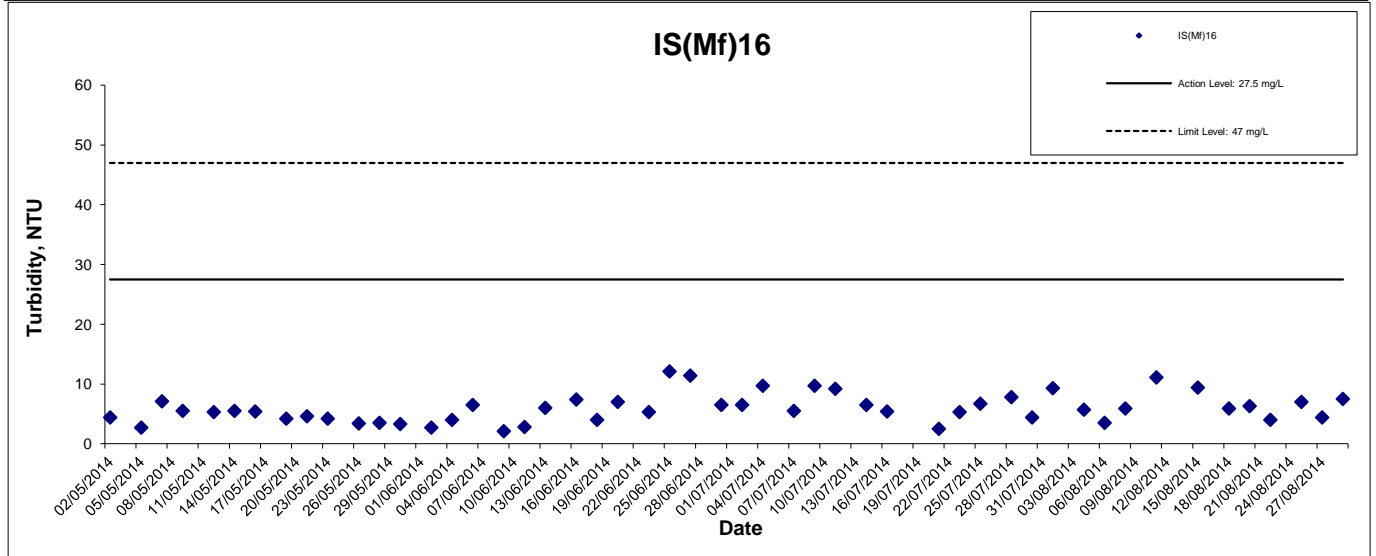
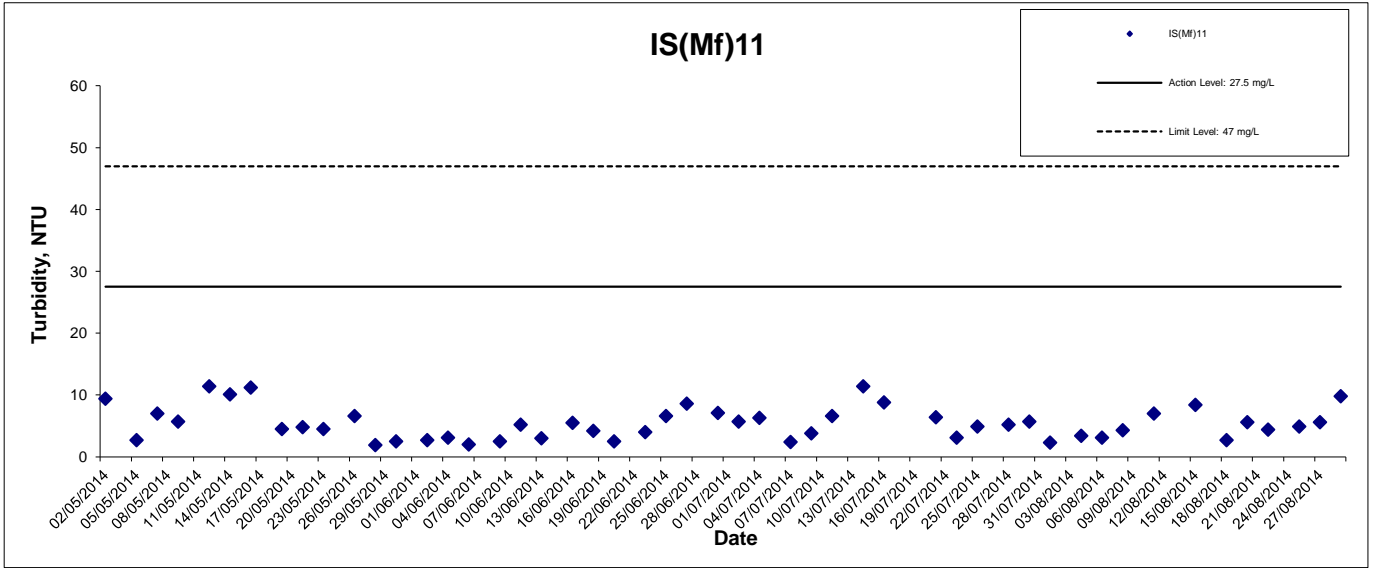


## Turbidity at Mid-Ebb Tide



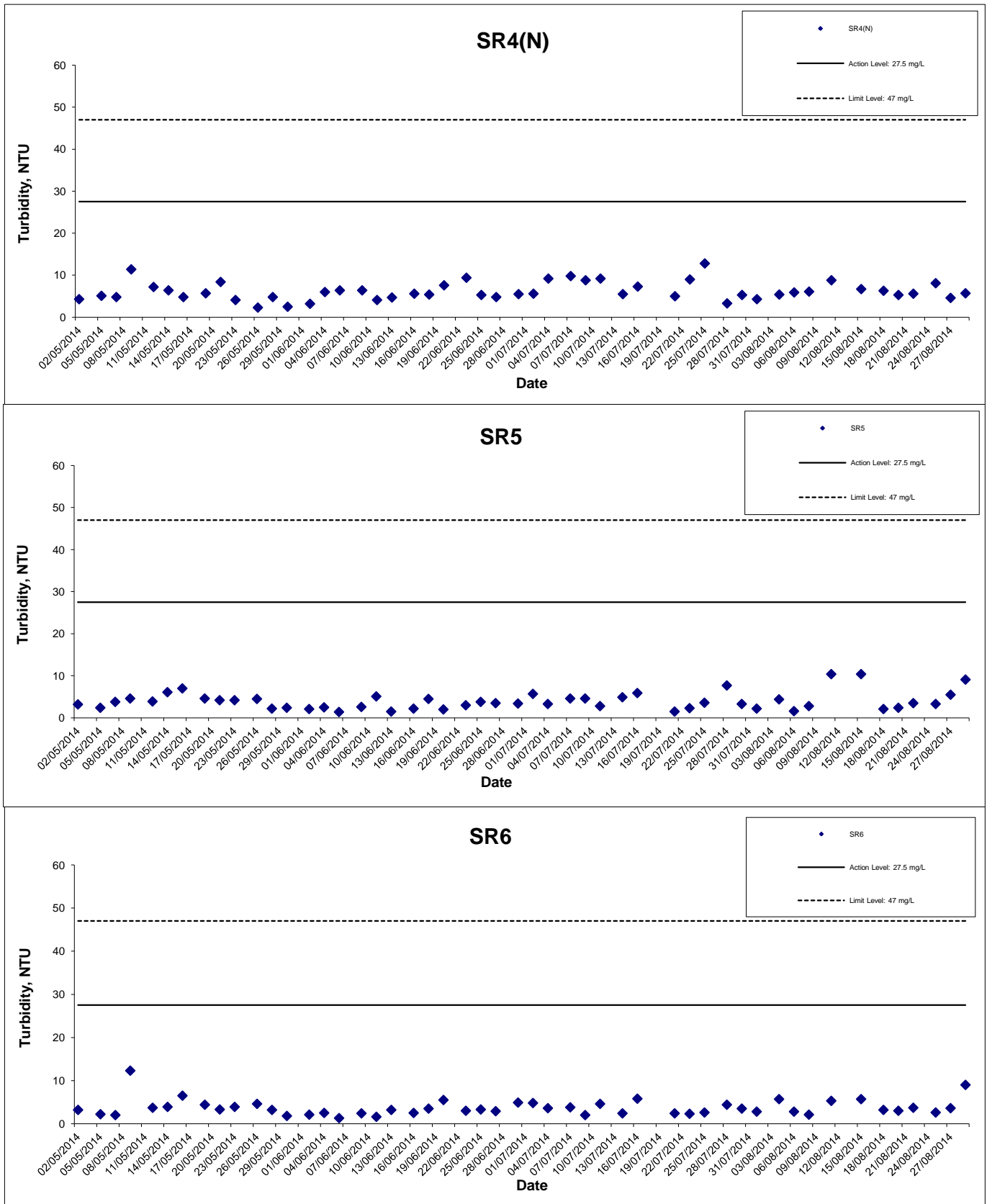
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Ebb Tide



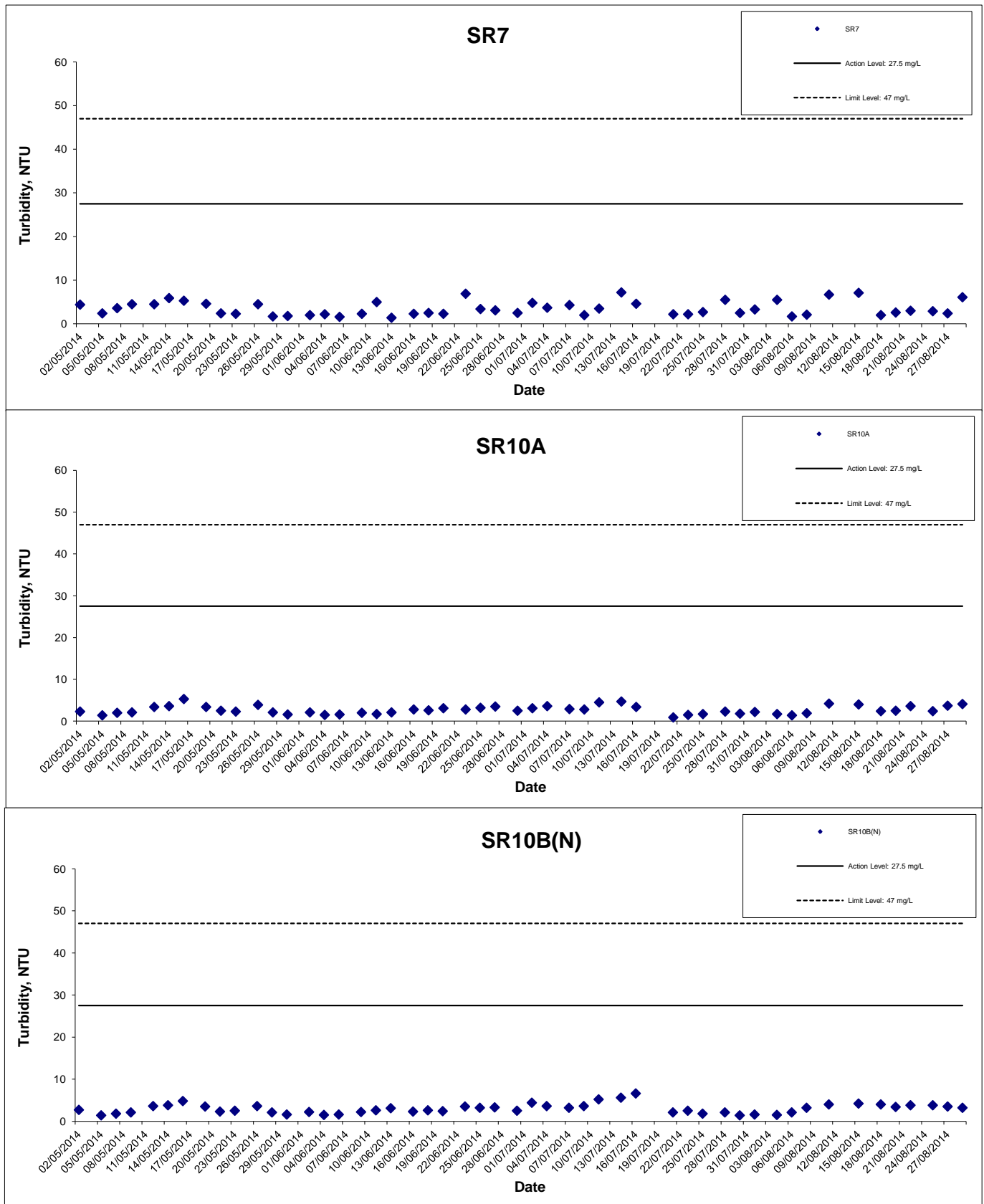
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Ebb Tide



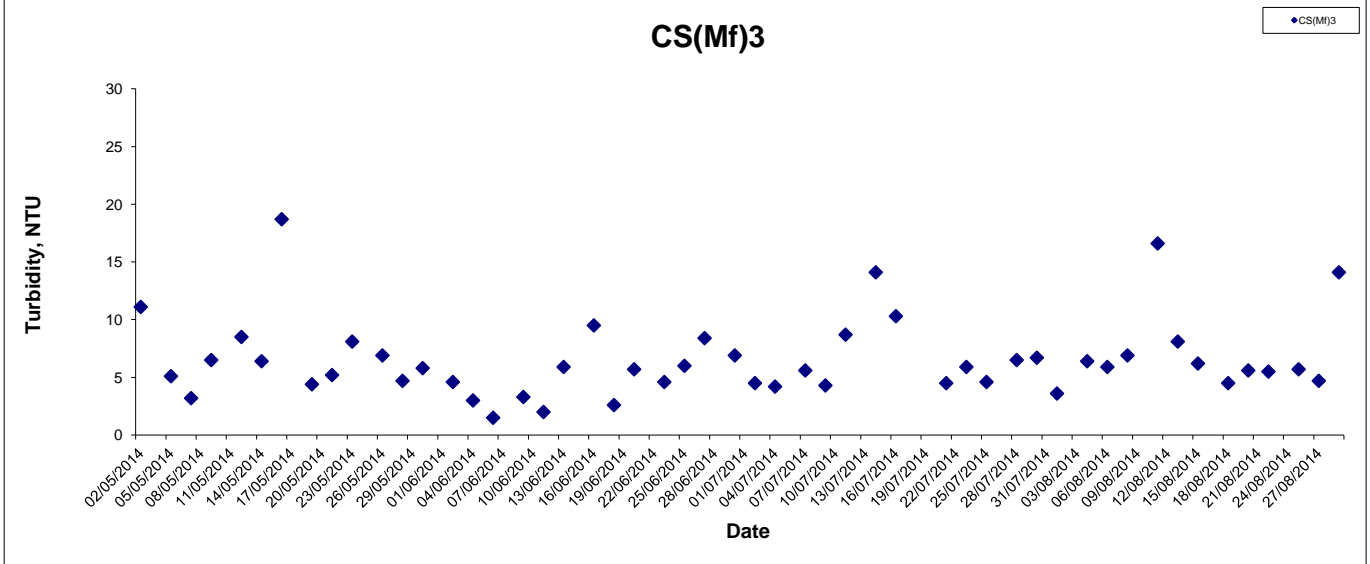
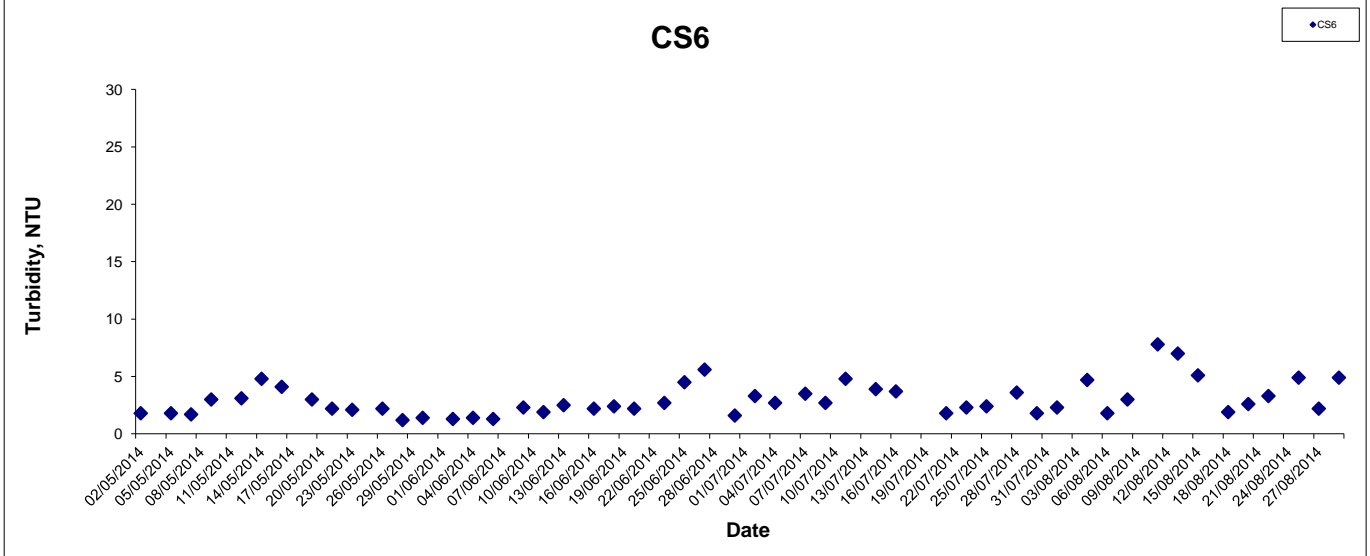
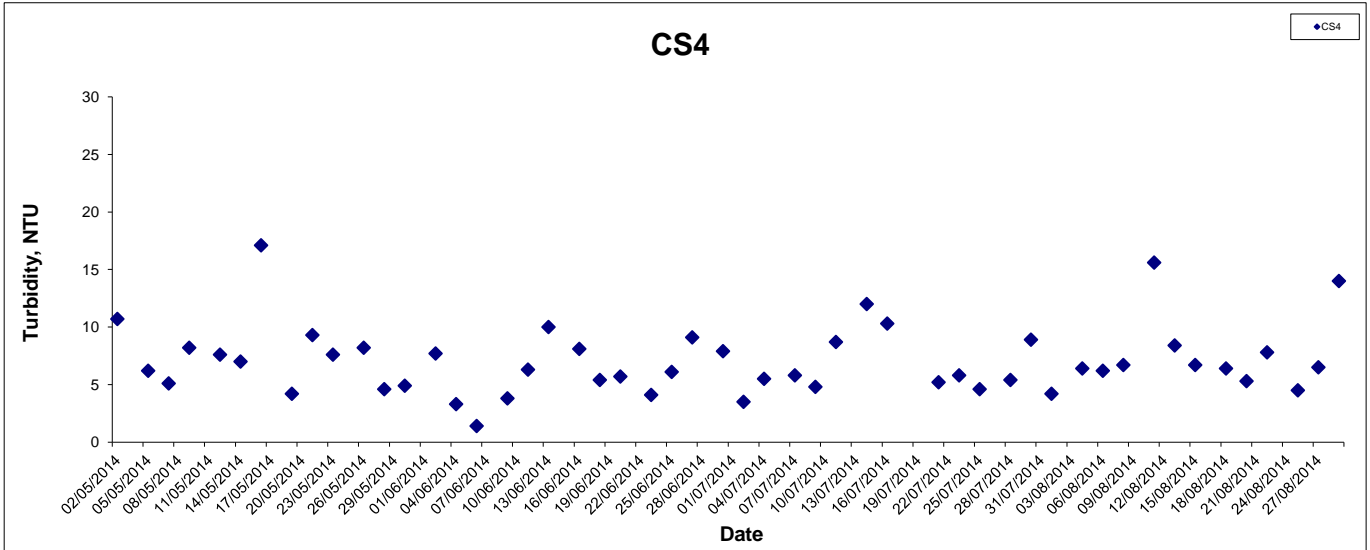
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Ebb Tide



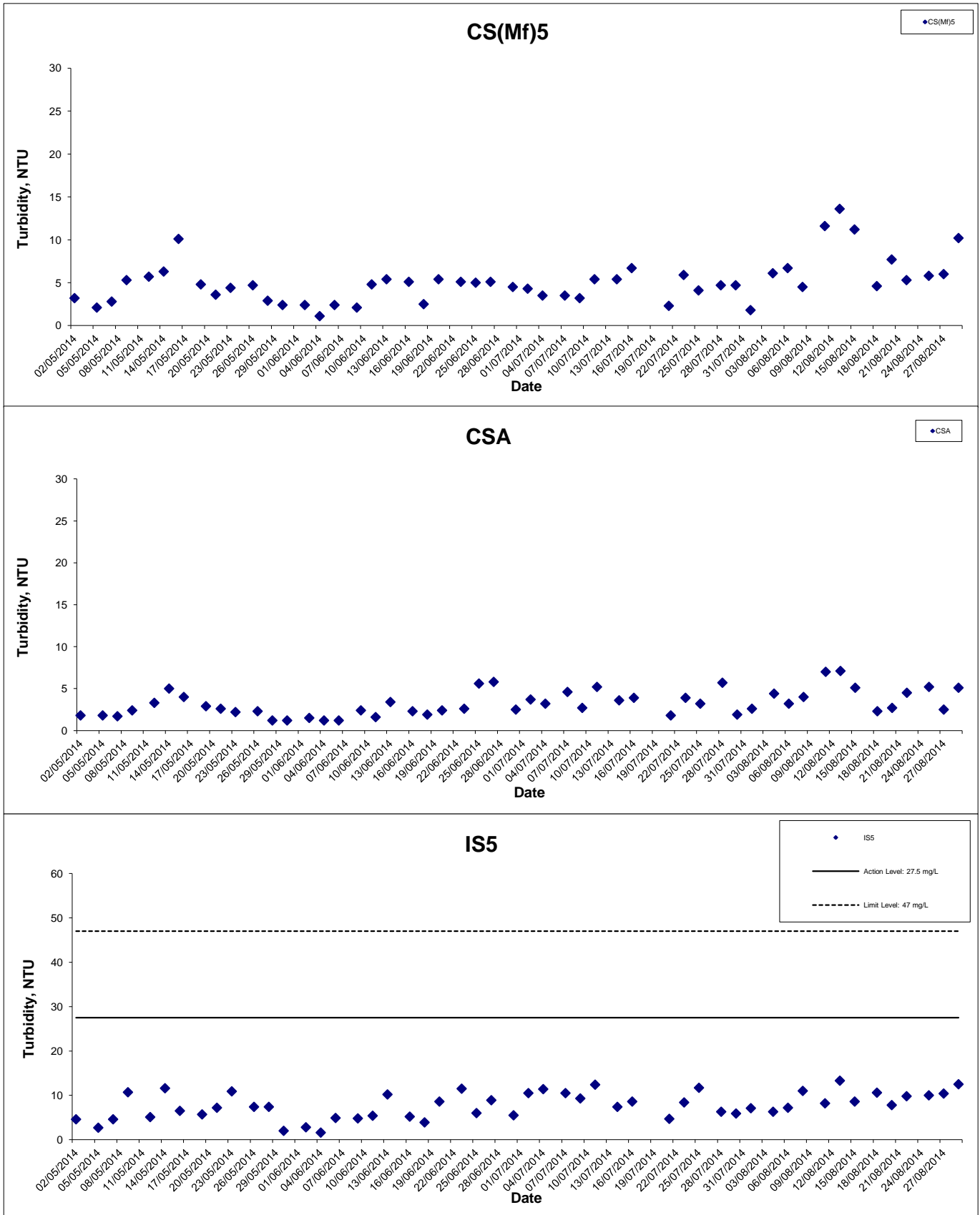
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Flood Tide



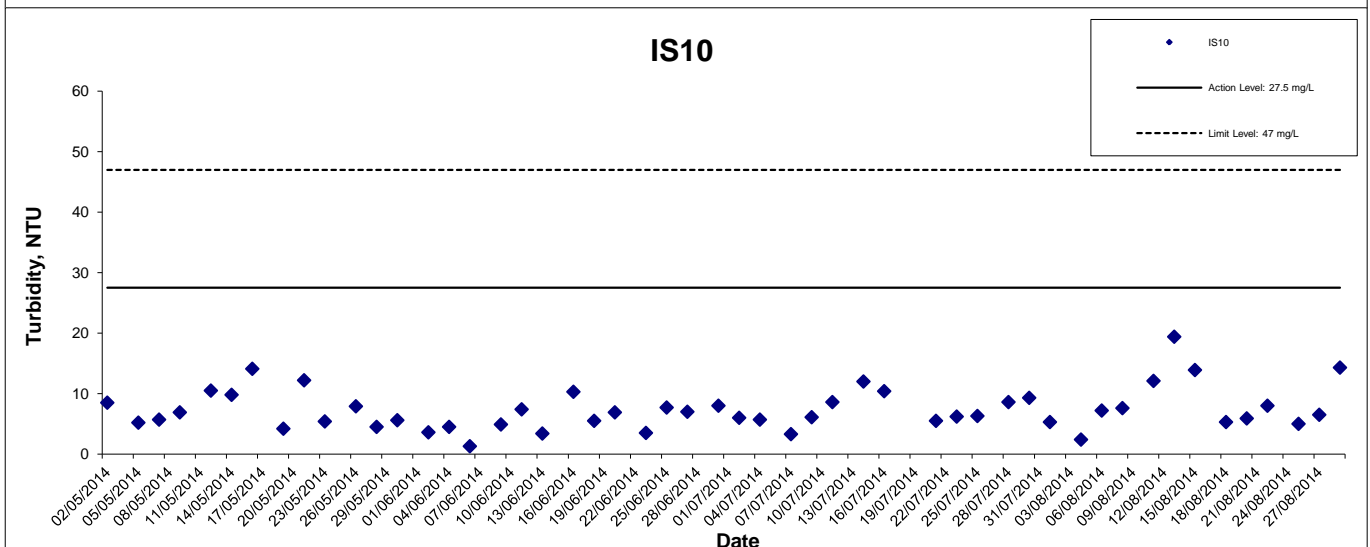
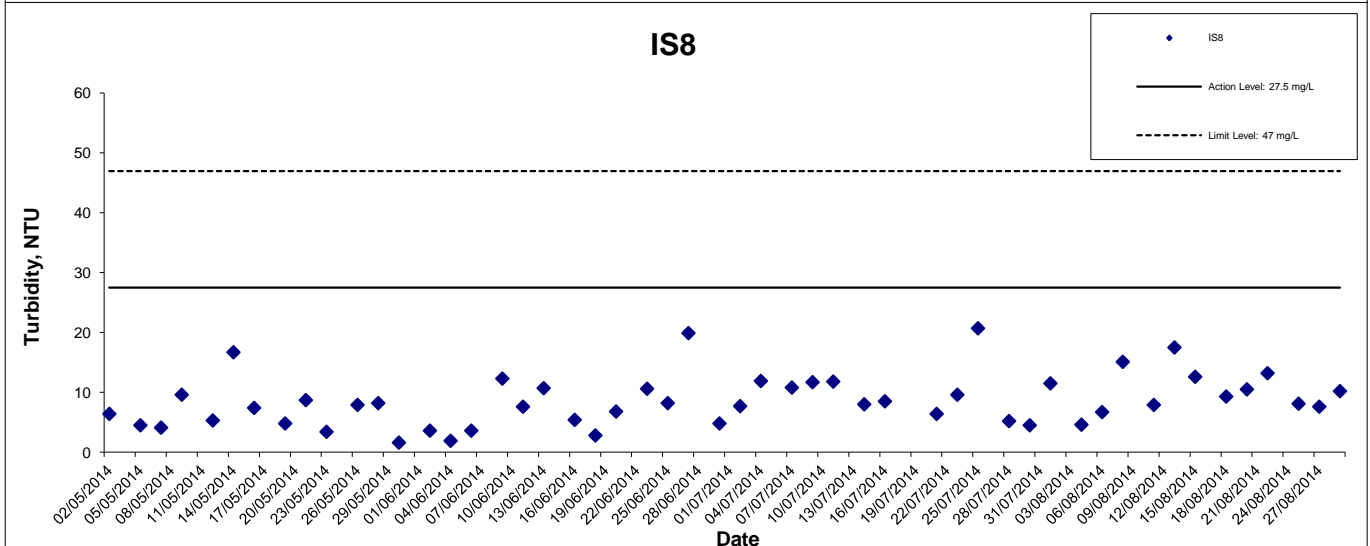
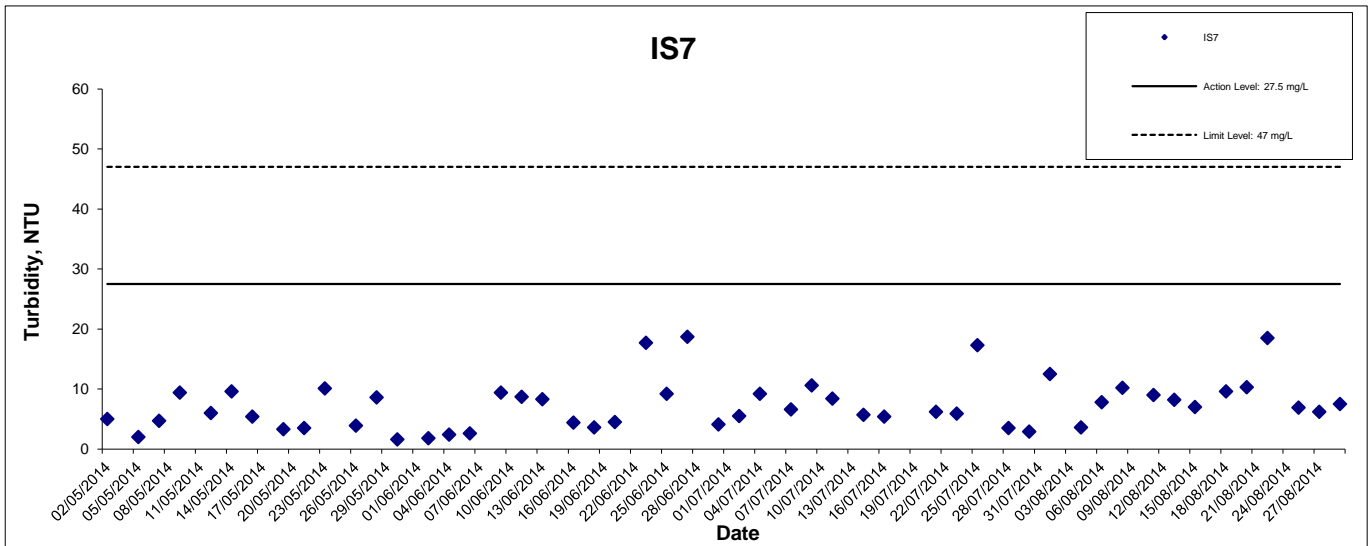
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

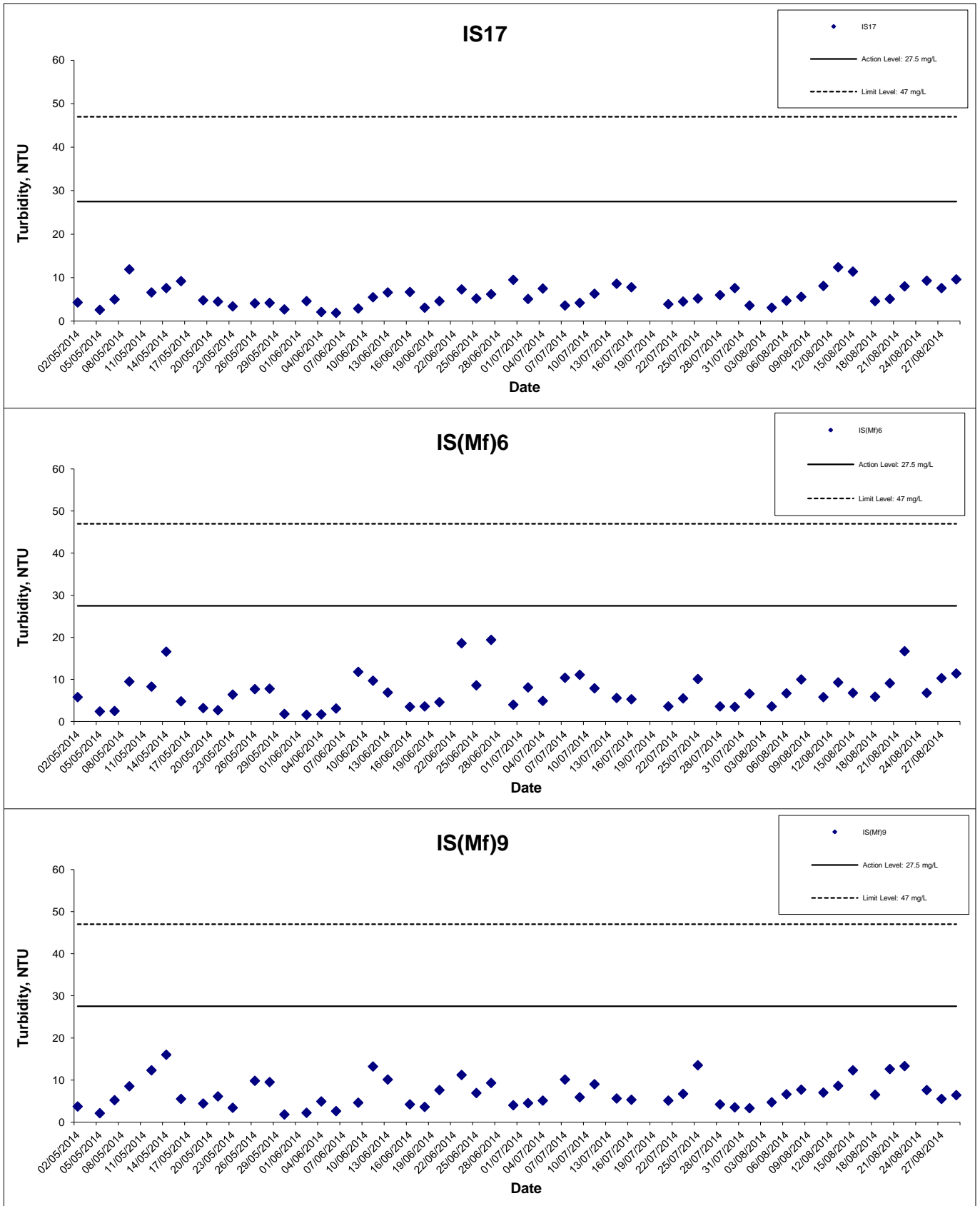
## Turbidity at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

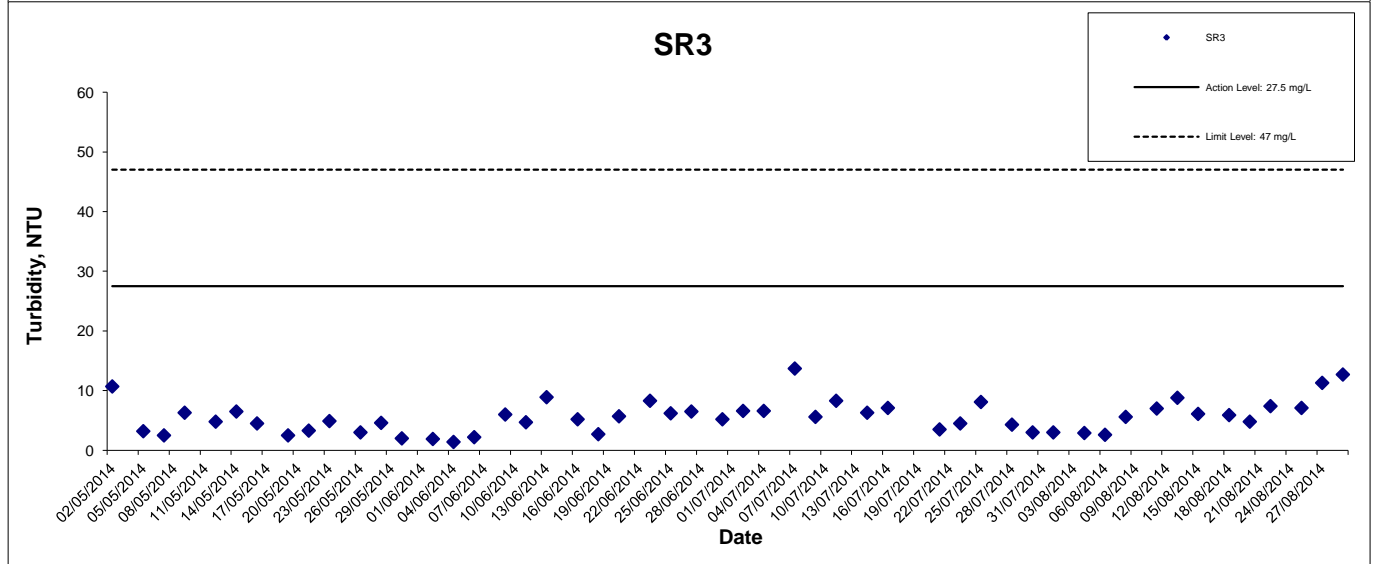
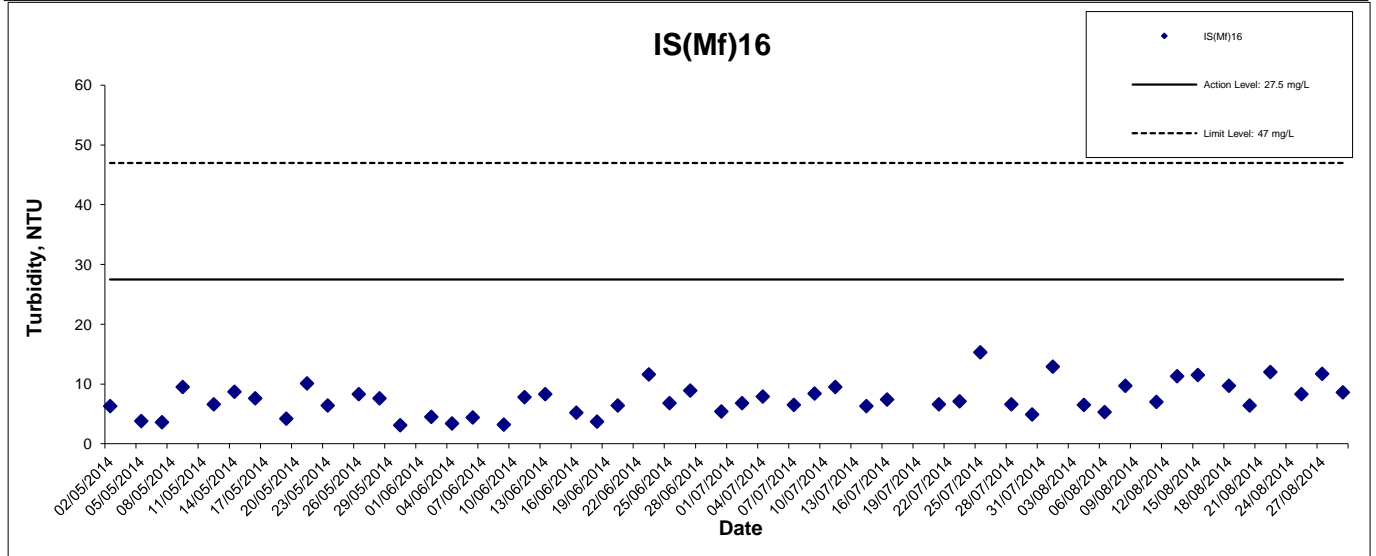
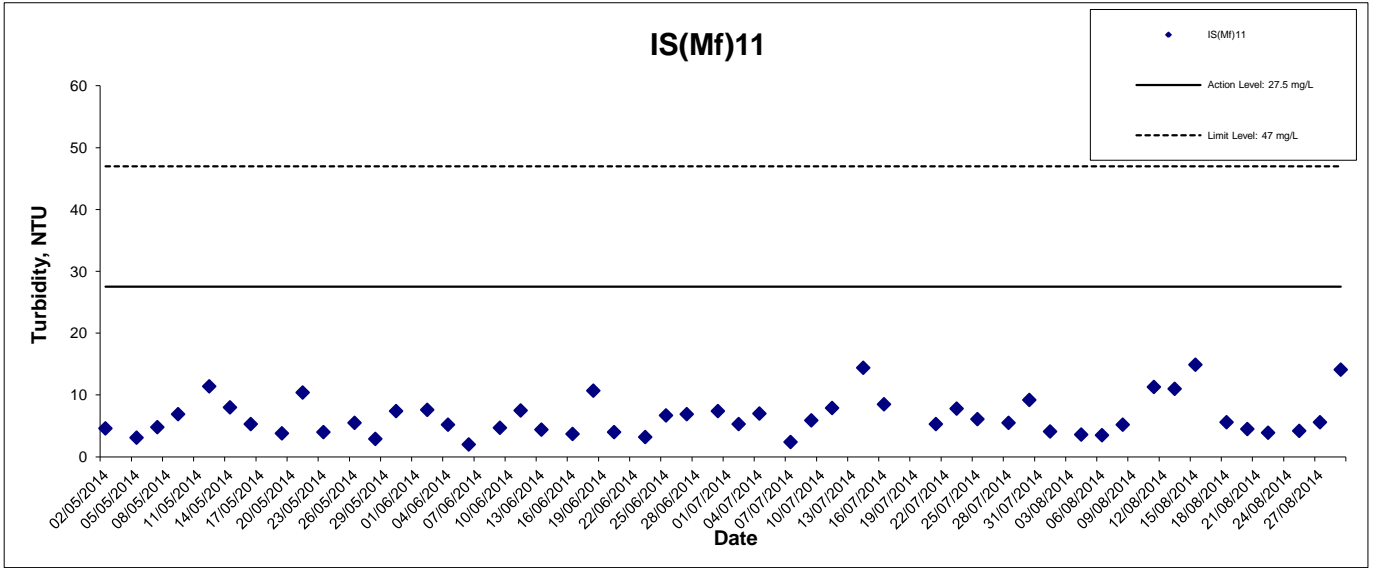


## Turbidity at Mid-Flood Tide



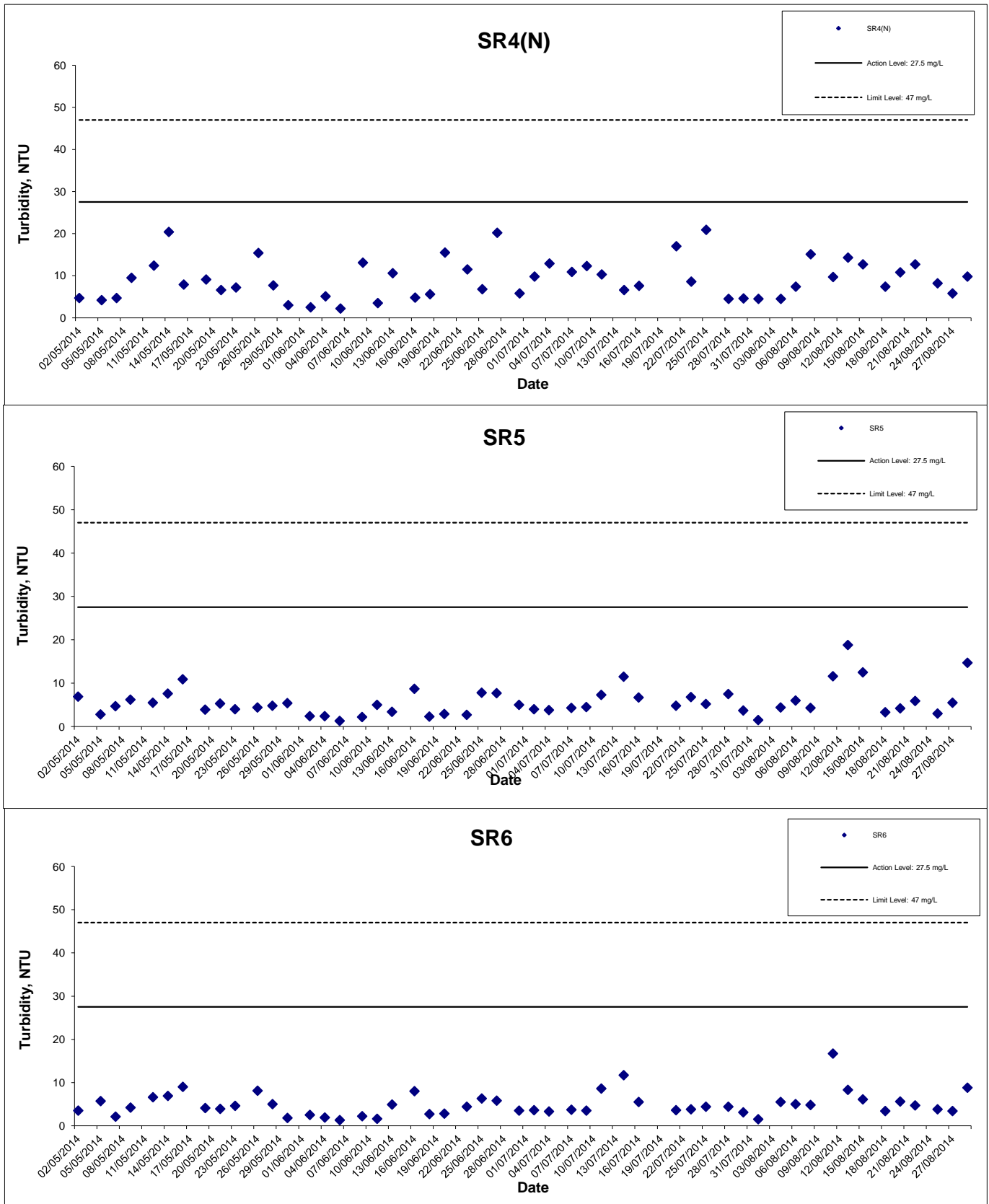
This Drawing has been prepared for the use of AECOM's client. It is not to be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It is not to be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Turbidity at Mid-Flood Tide



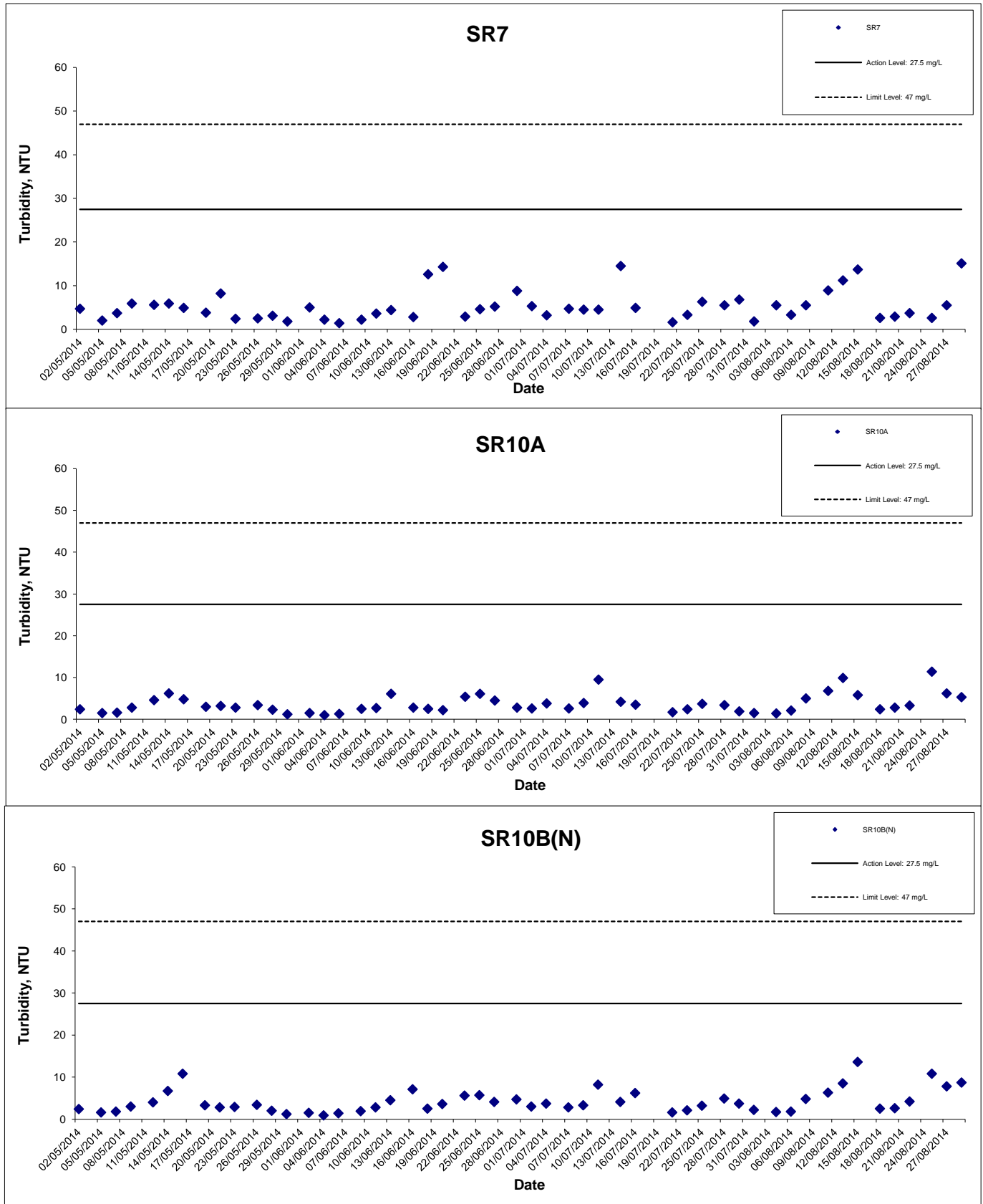
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

Graphical Presentation of Impact Water Quality  
 Monitoring Results

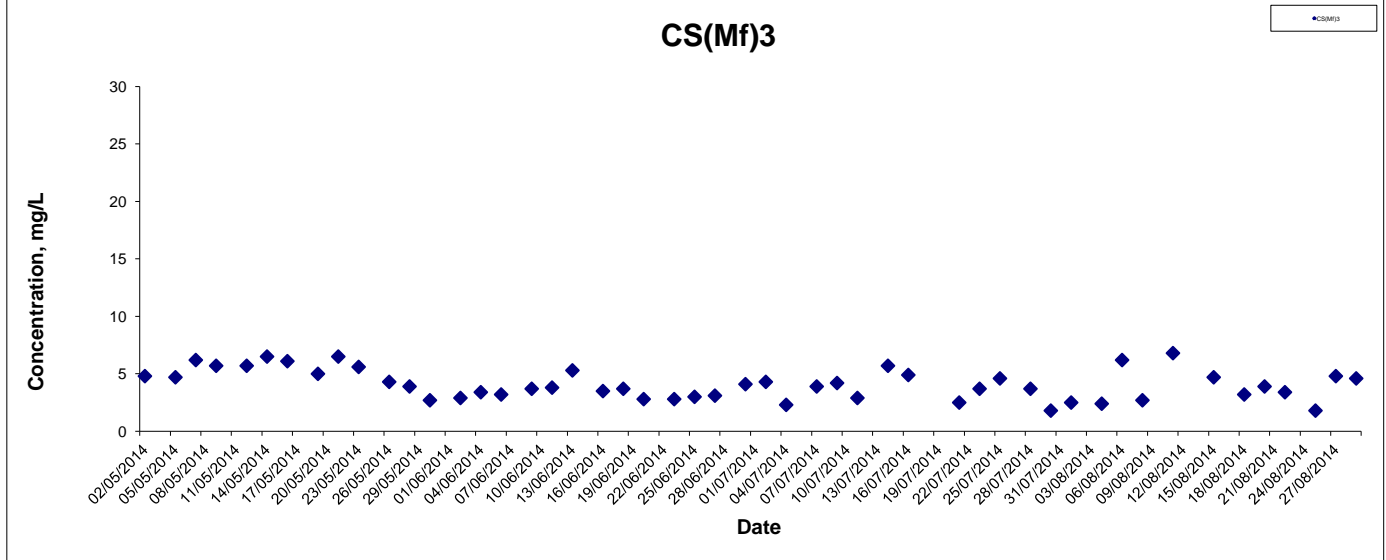
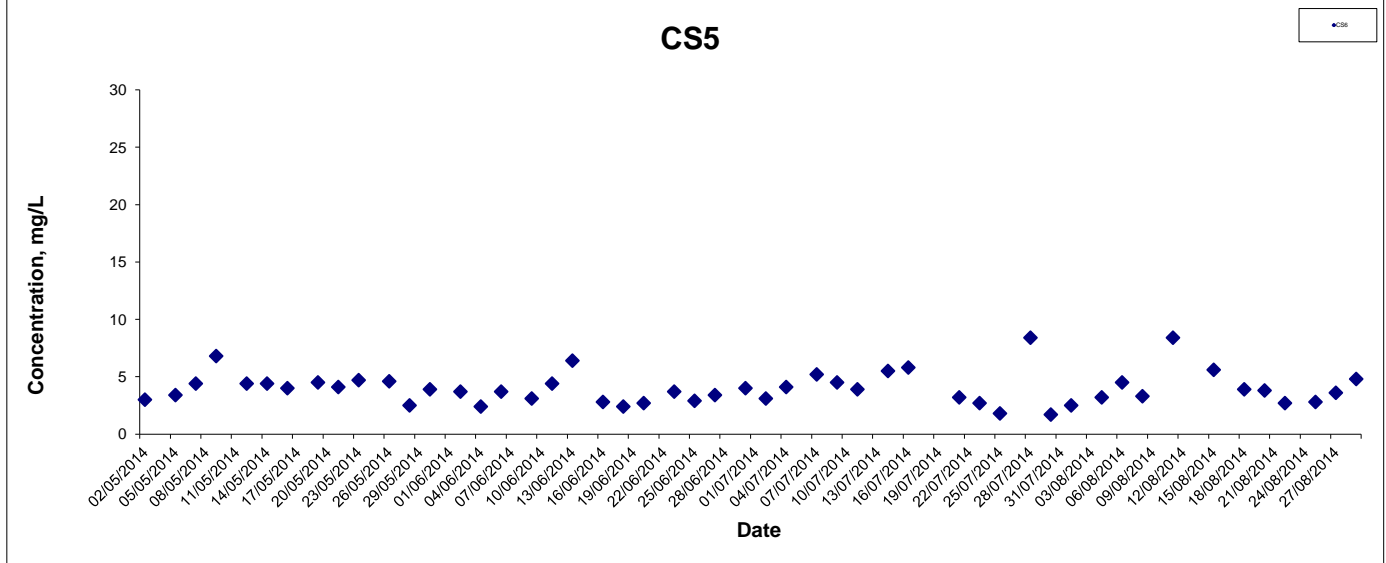
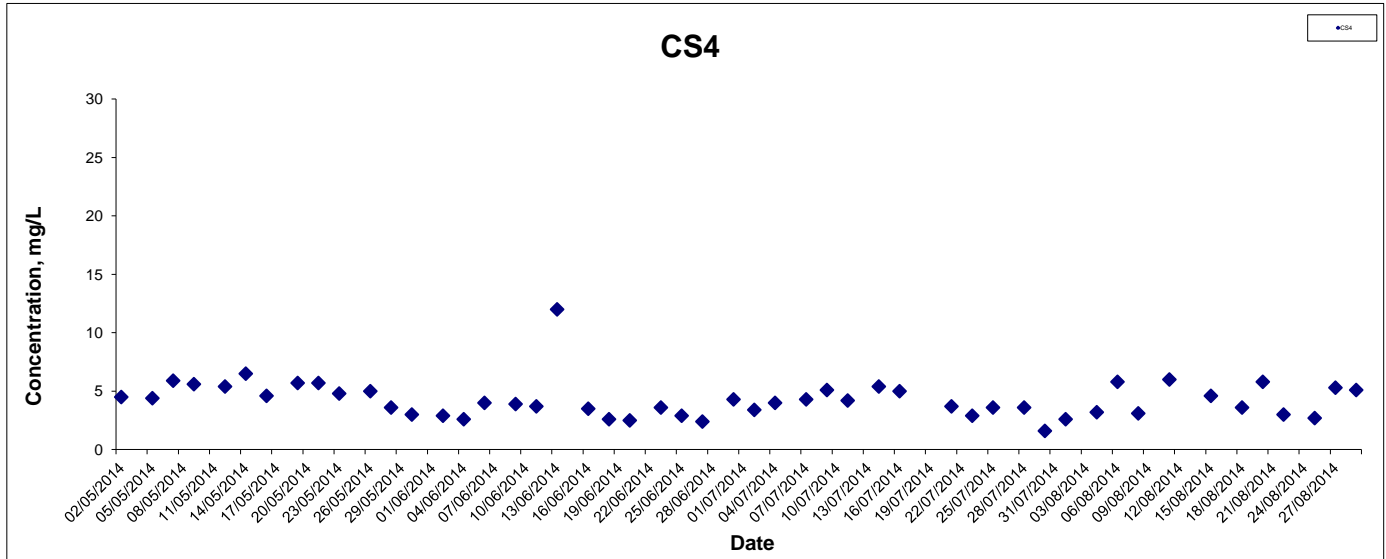


## Turbidity at Mid-Flood Tide



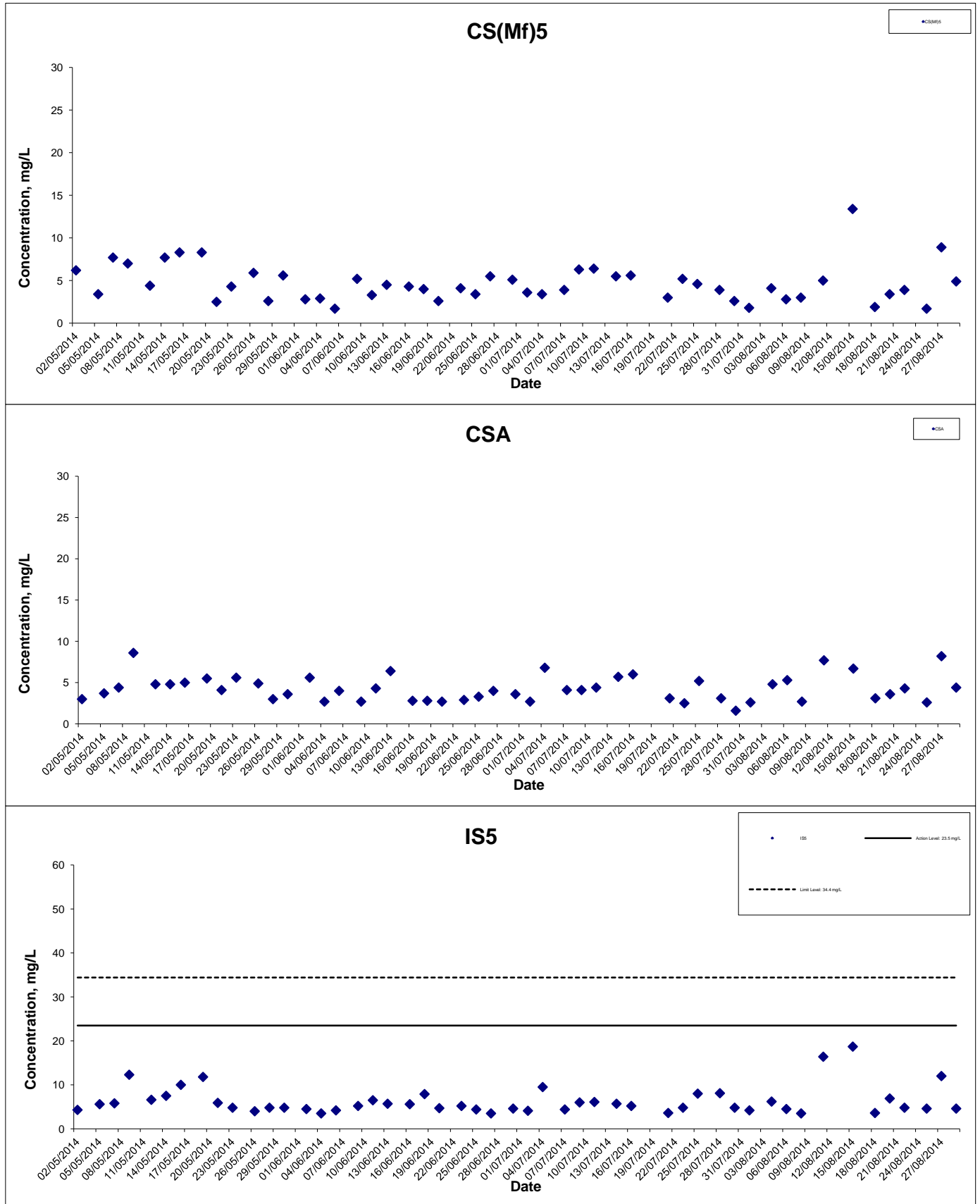
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Ebb Tide



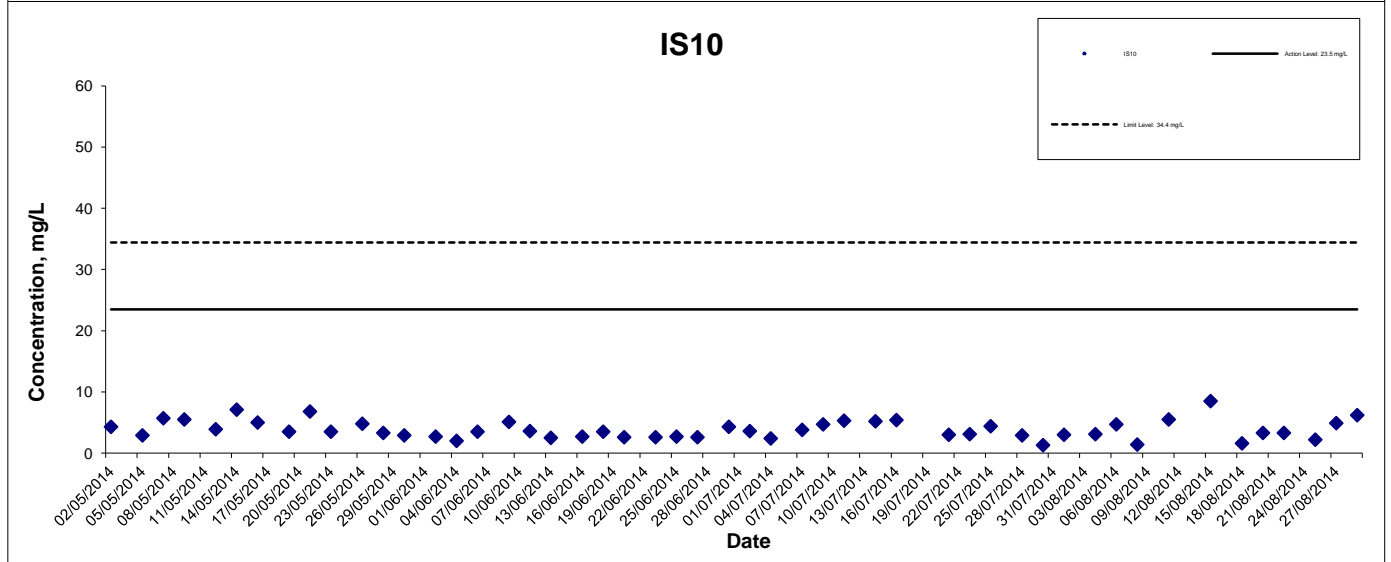
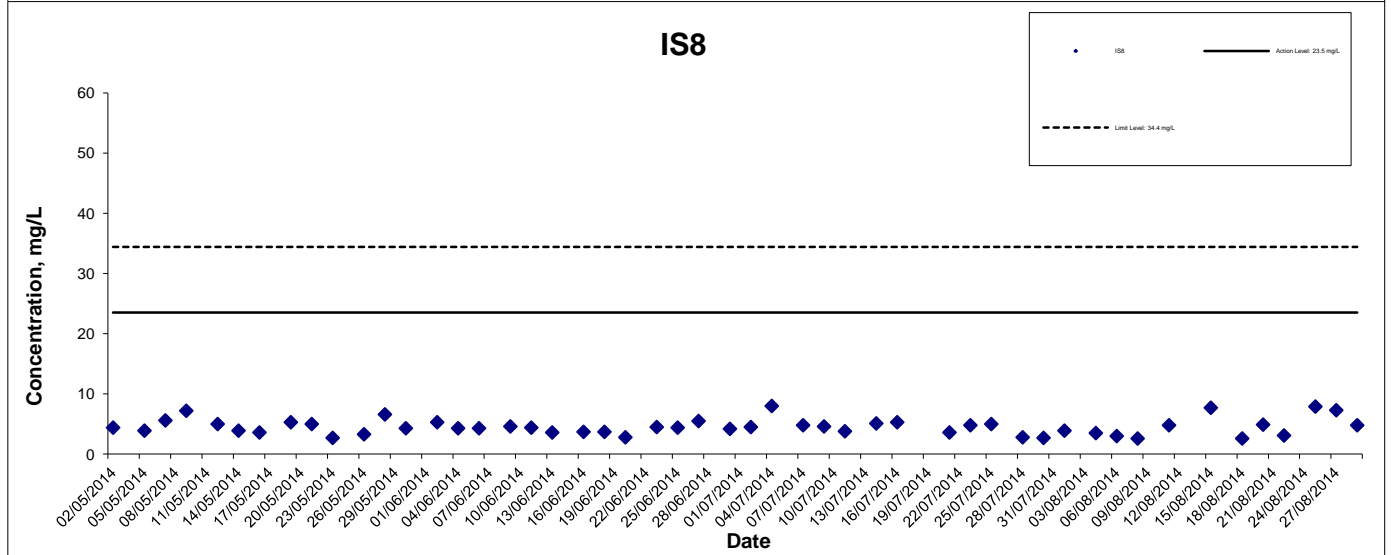
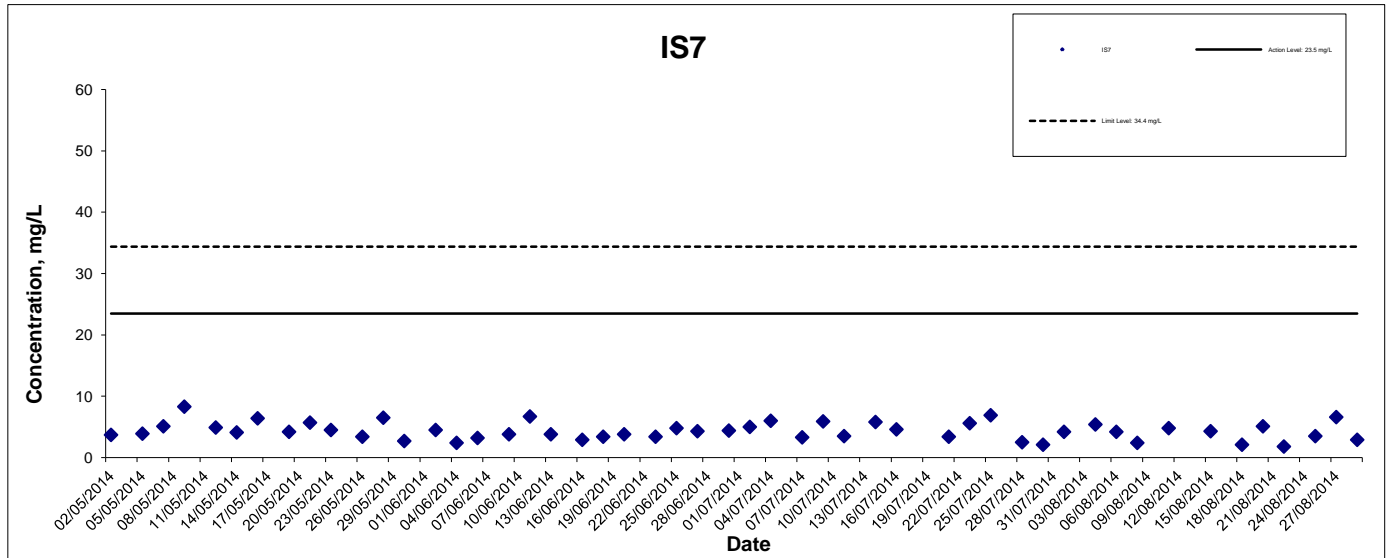
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Ebb Tide



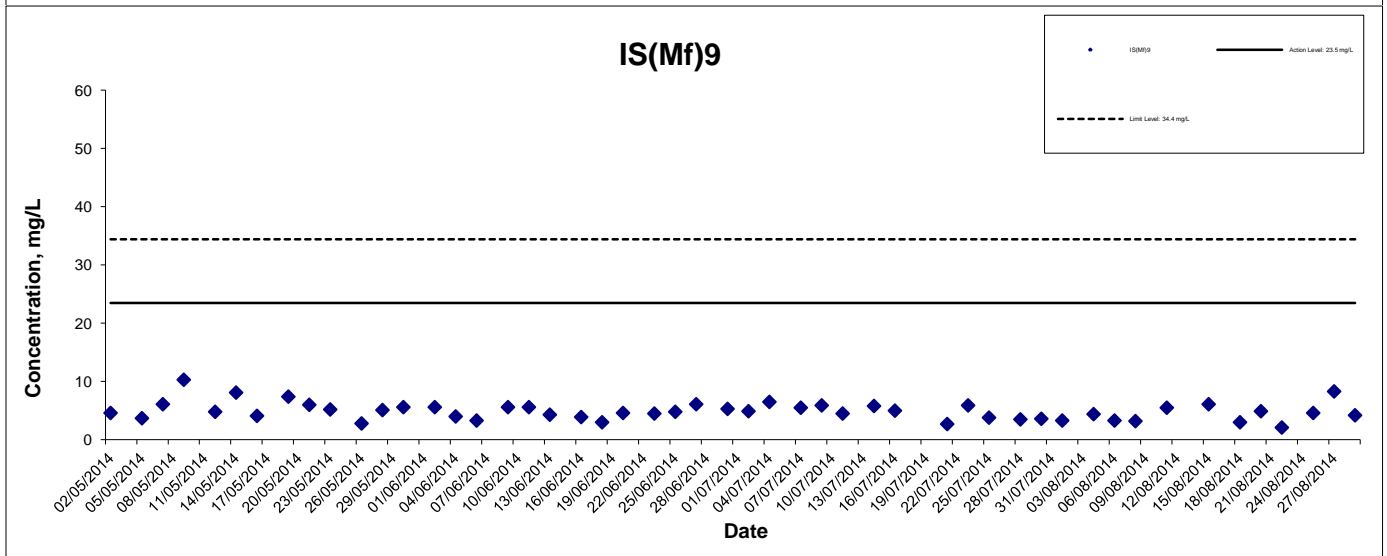
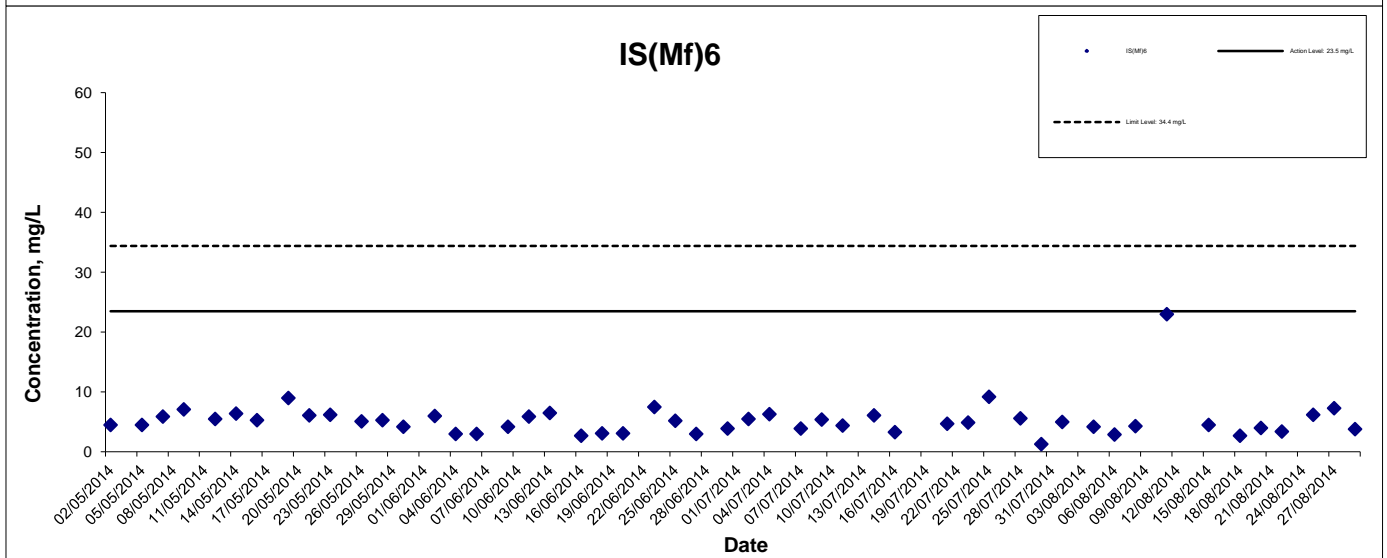
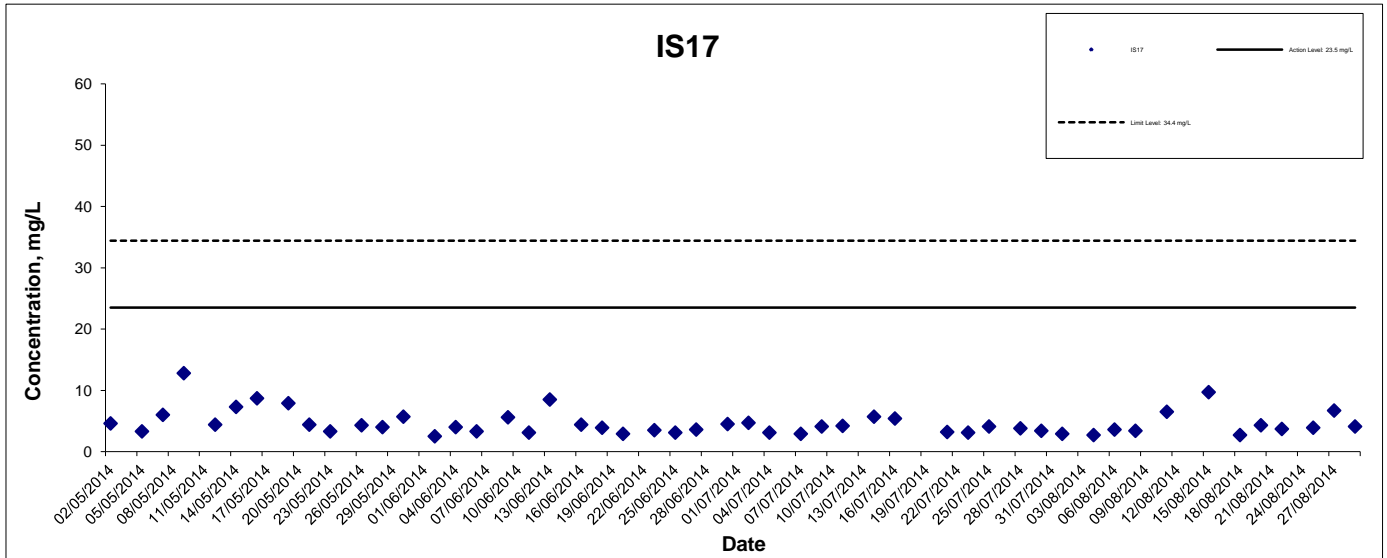
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Ebb Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

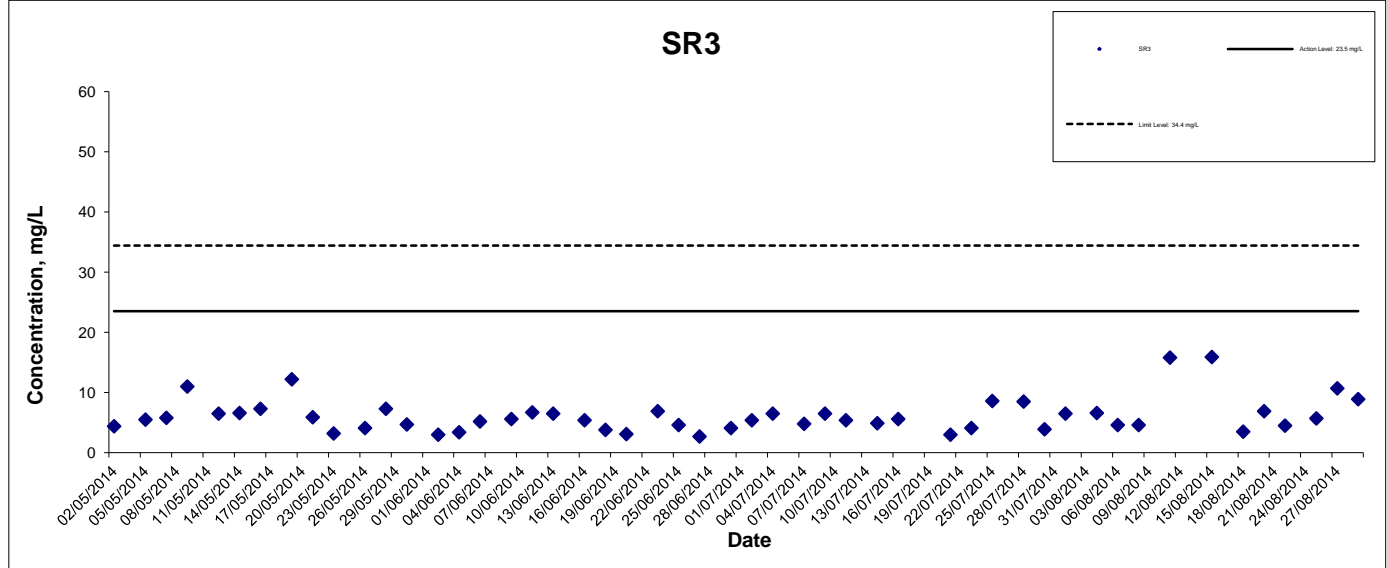
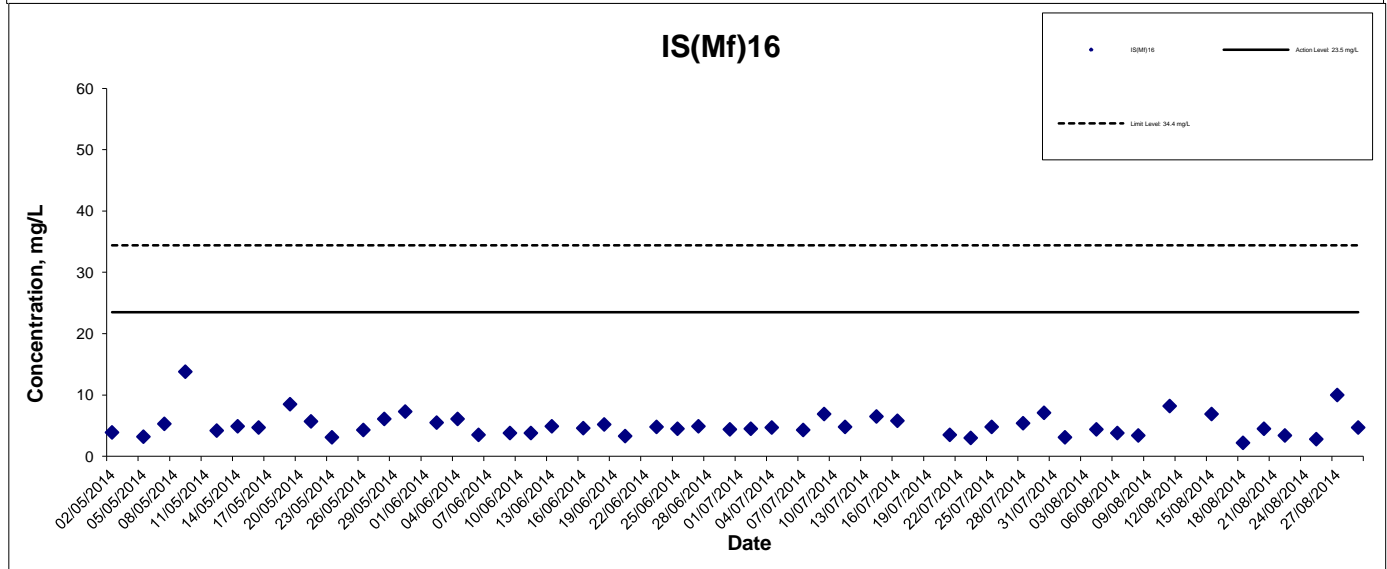
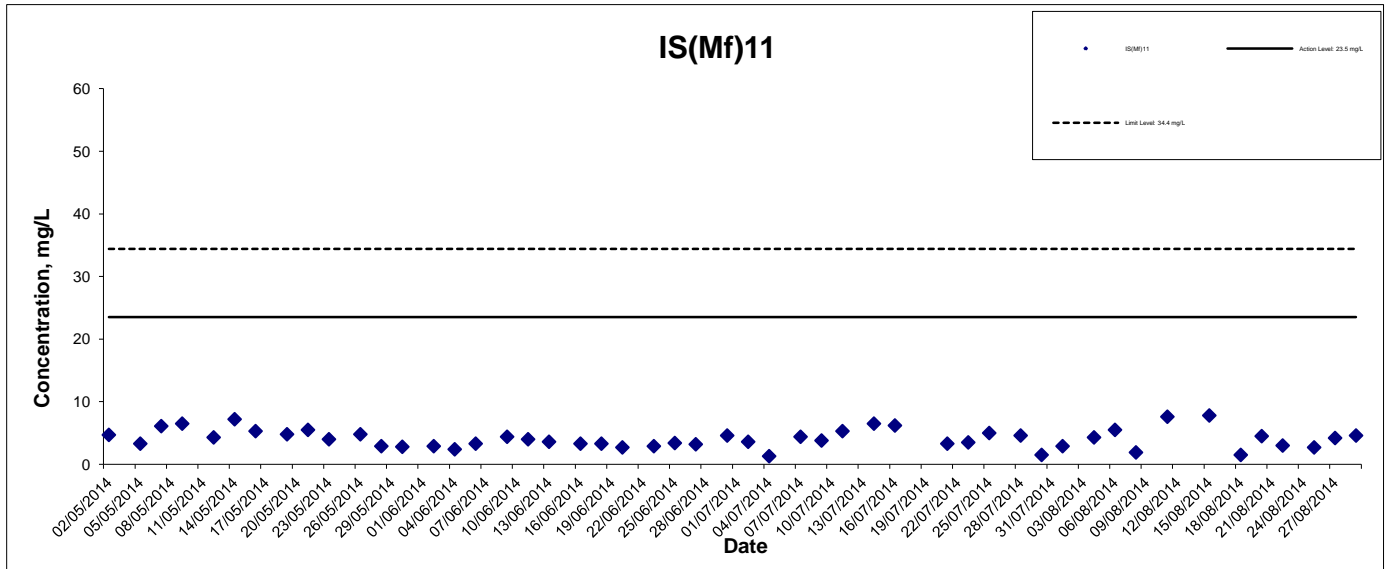
## Suspended Solids at Mid-Ebb Tide



This Drawing has been prepared for the use of AECOM's client. It does not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

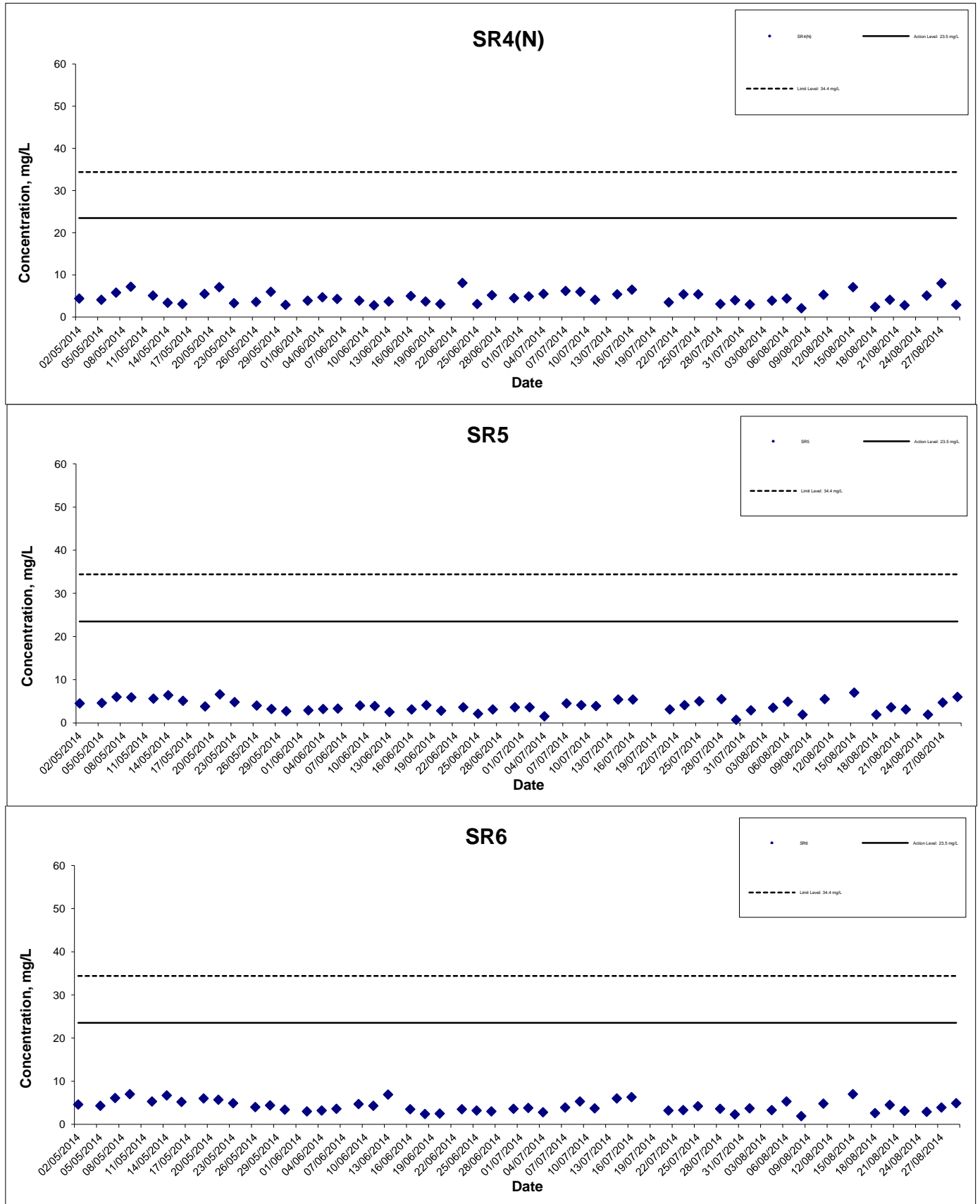


## Suspended Solids at Mid-Ebb Tide



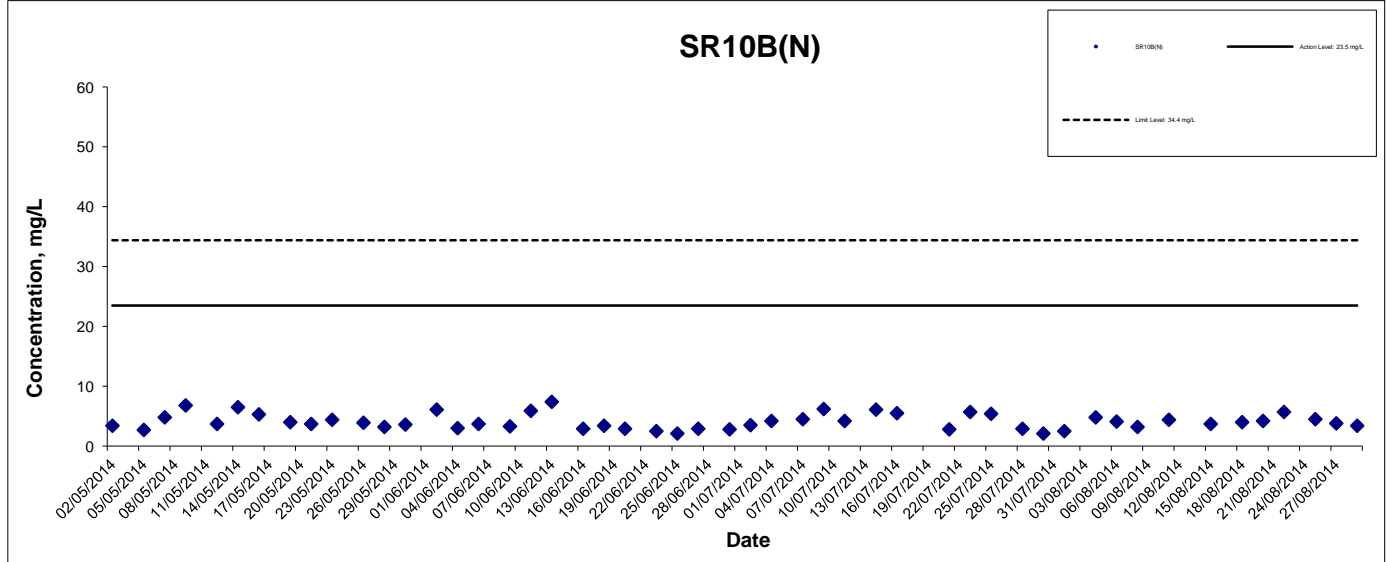
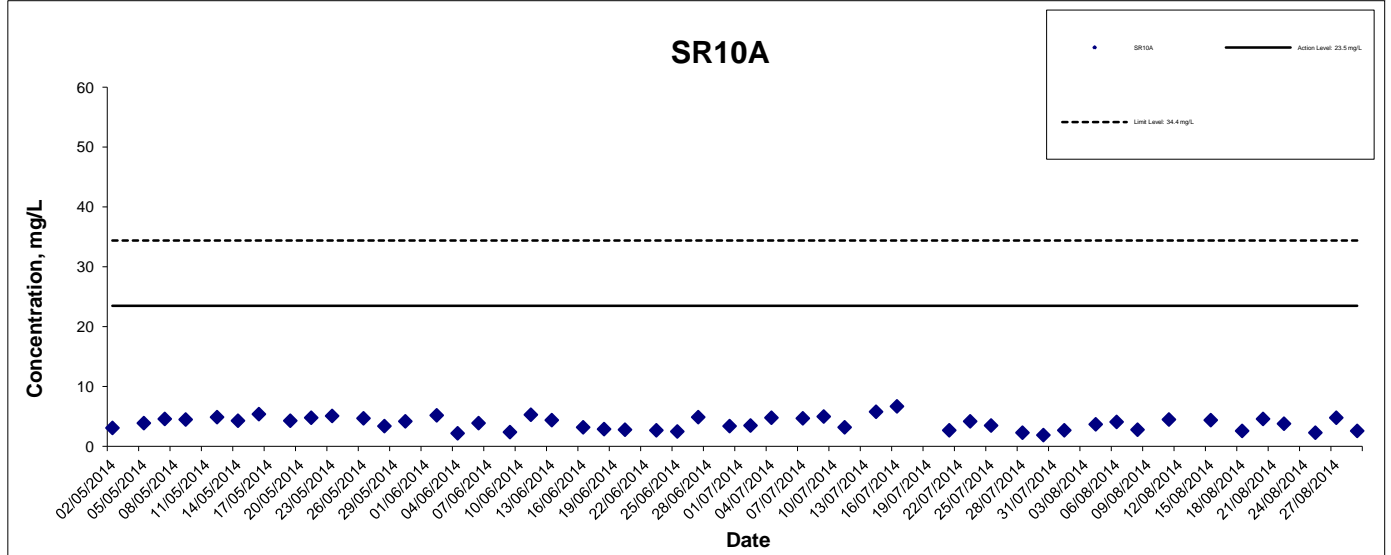
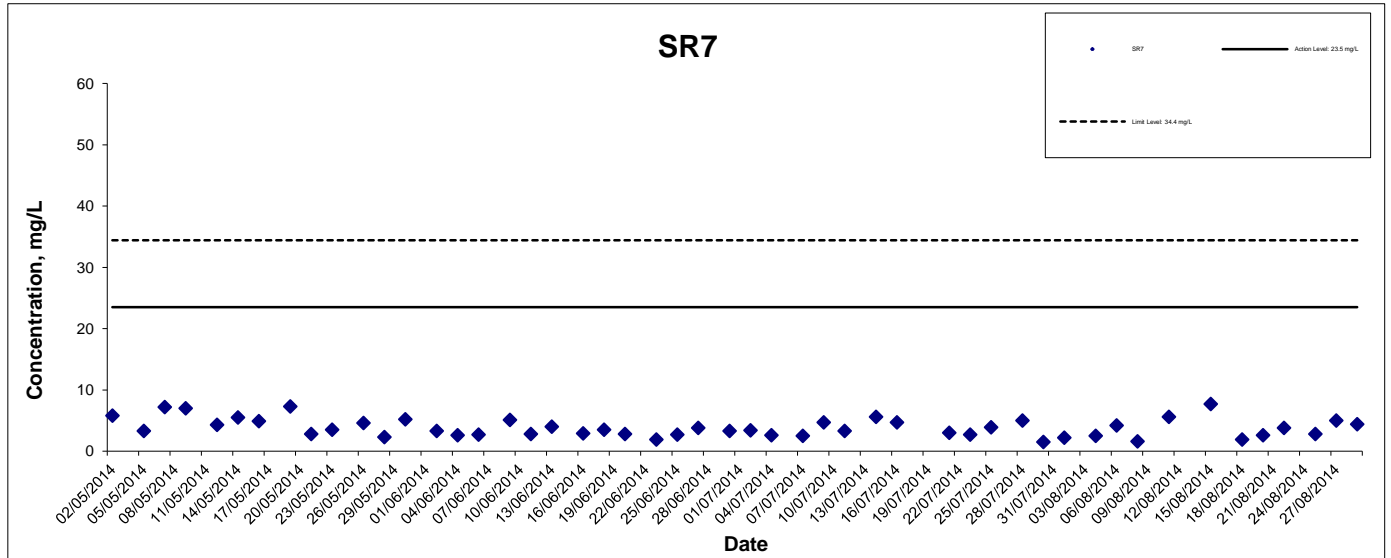
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Ebb Tide



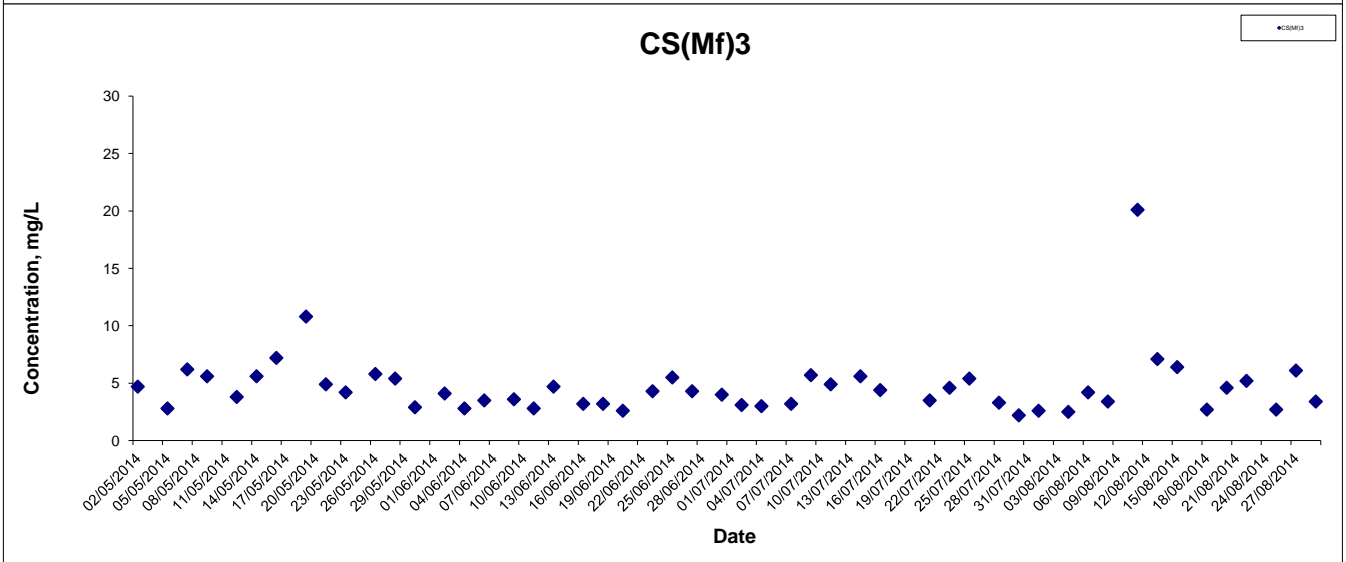
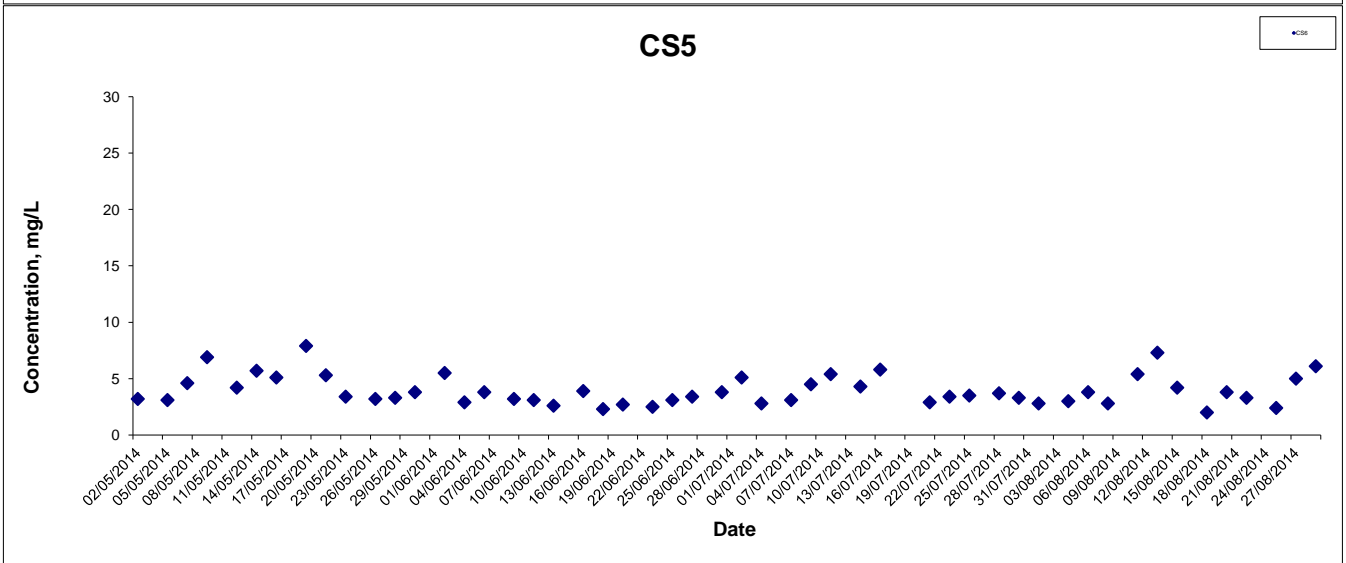
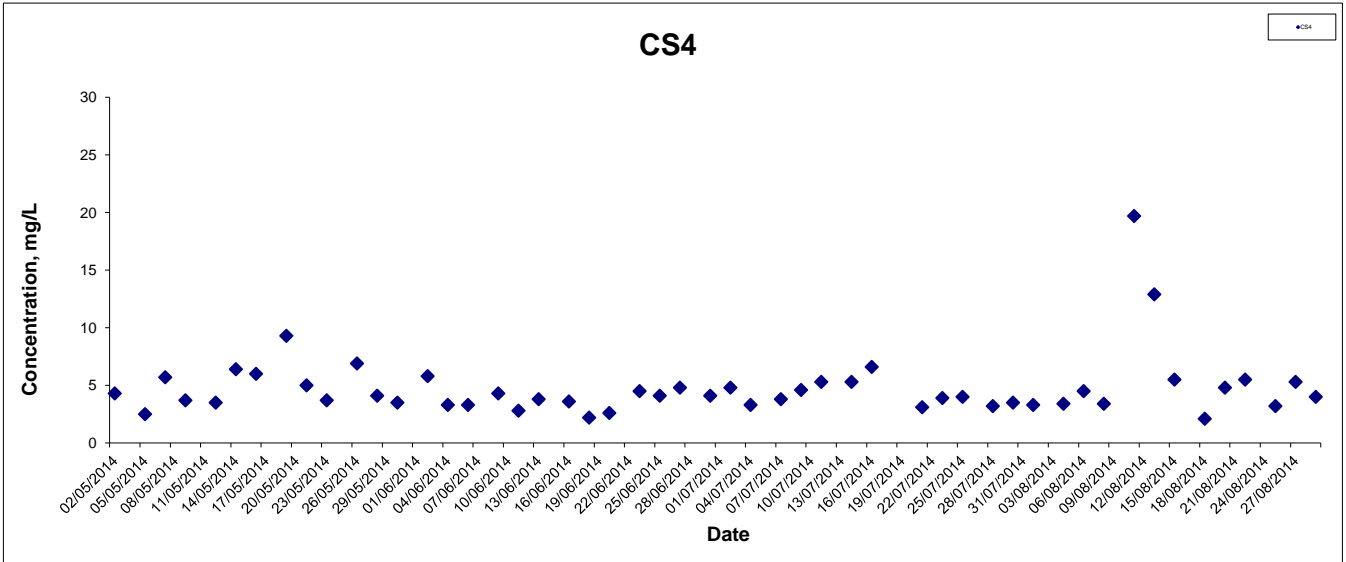
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Ebb Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Flood Tide



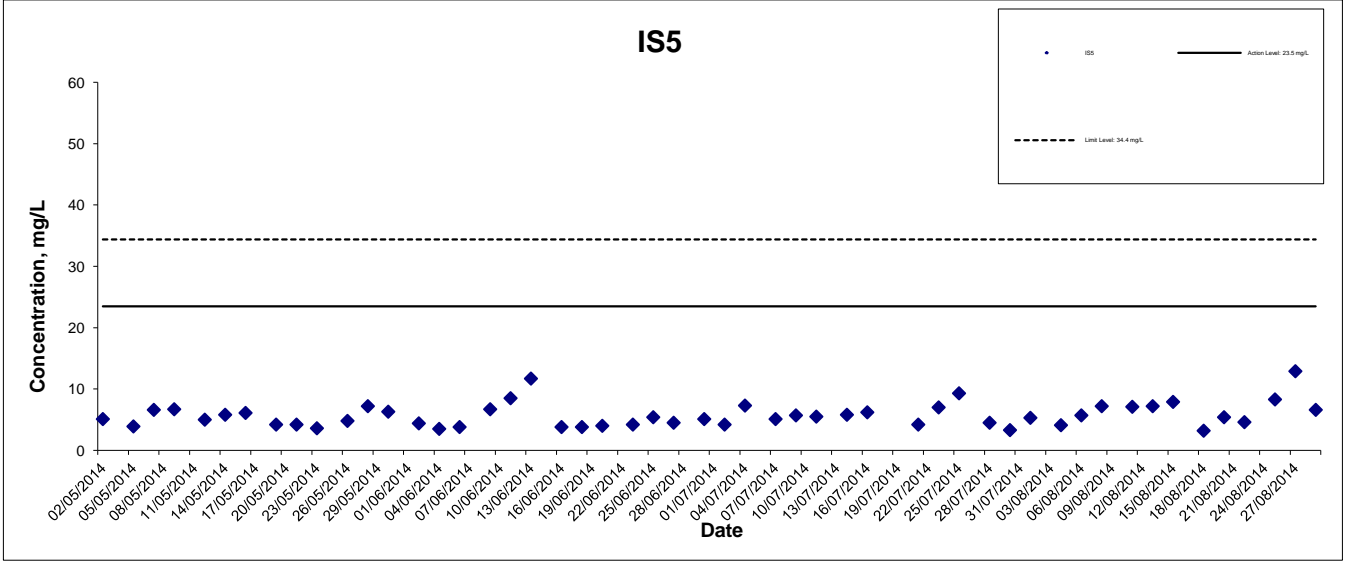
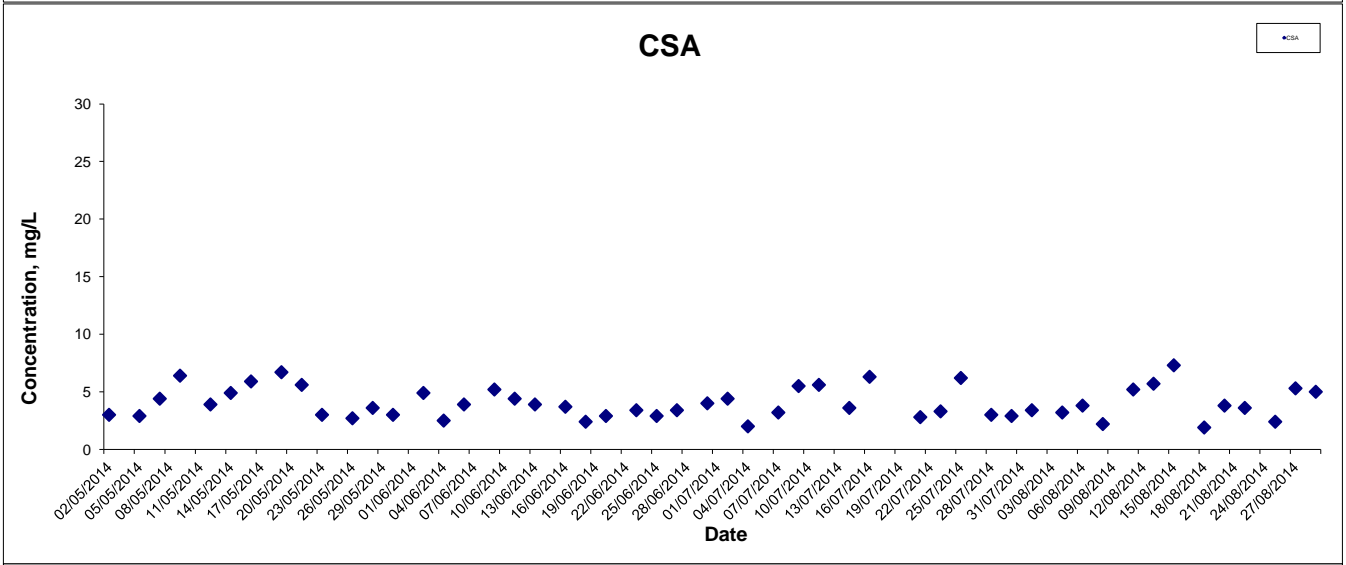
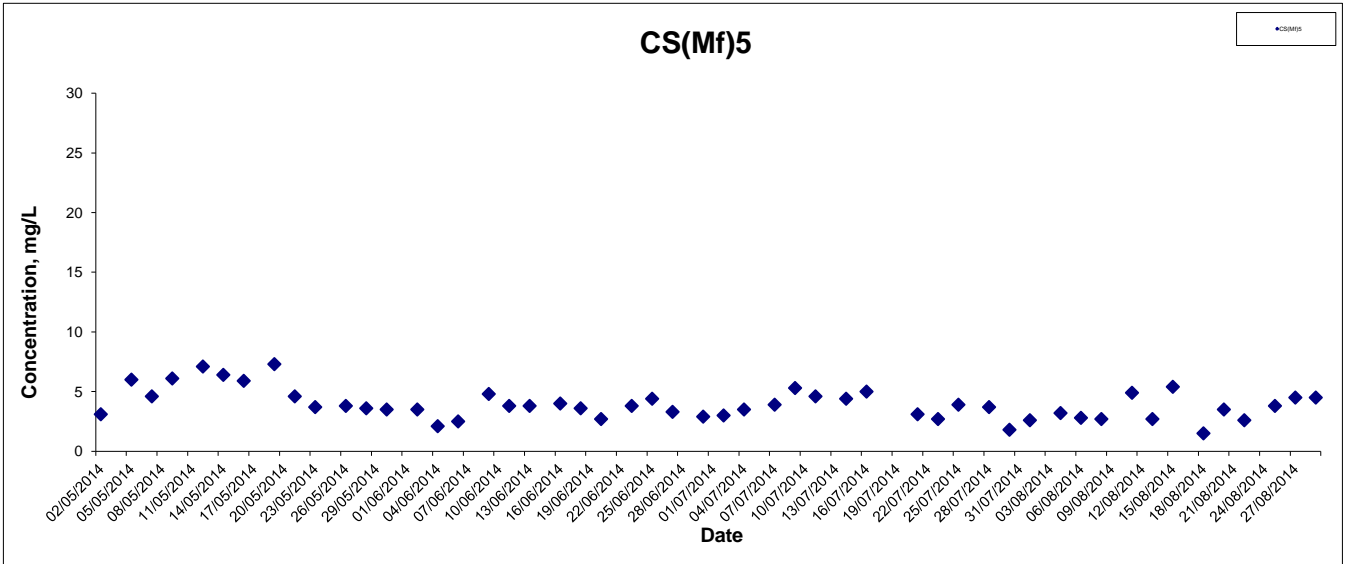
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM'S express written consent.

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

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



## Suspended Solids at Mid-Flood Tide



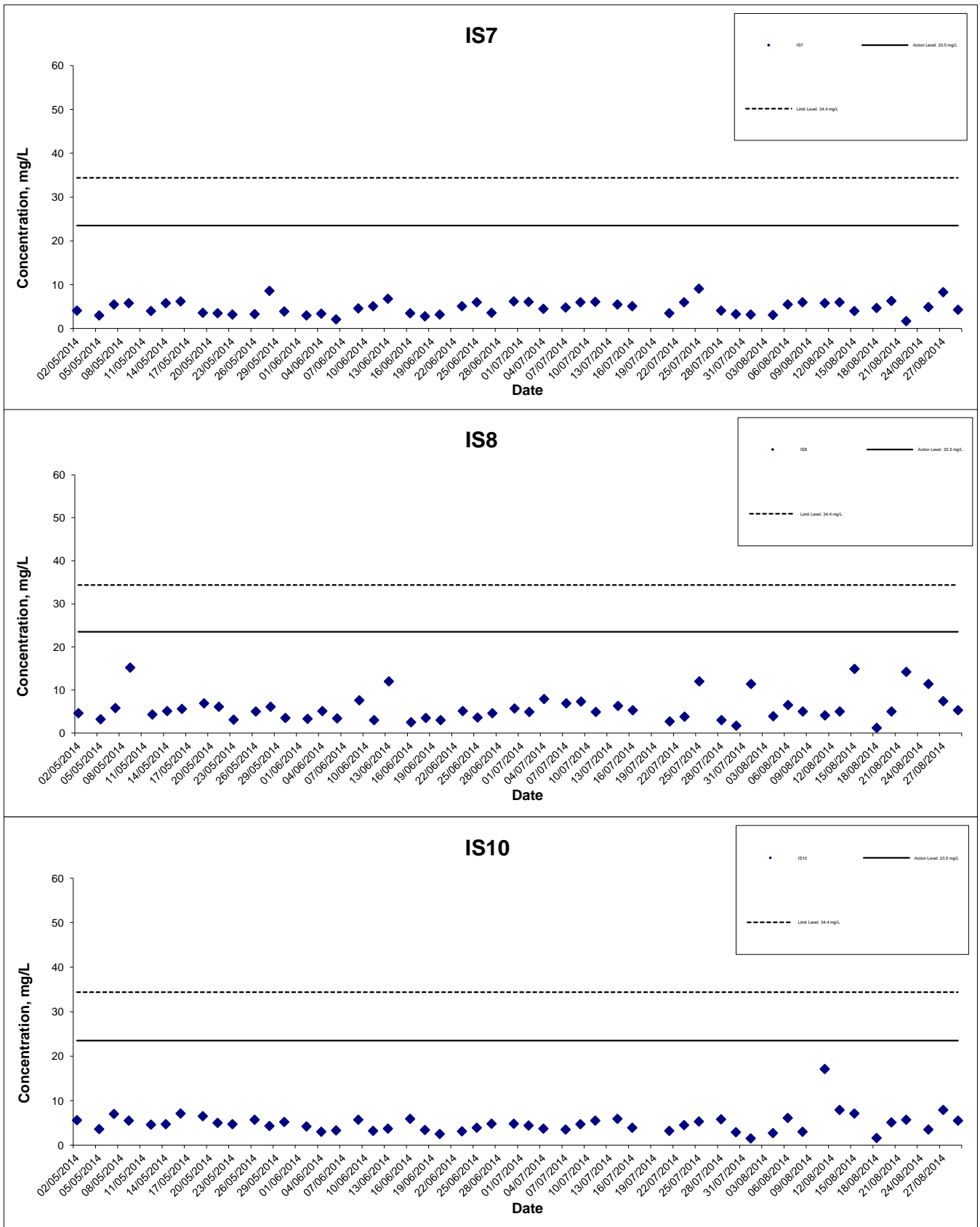
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

Graphical Presentation of Impact Water Quality  
 Monitoring Results



## Suspended Solids at Mid-Flood Tide



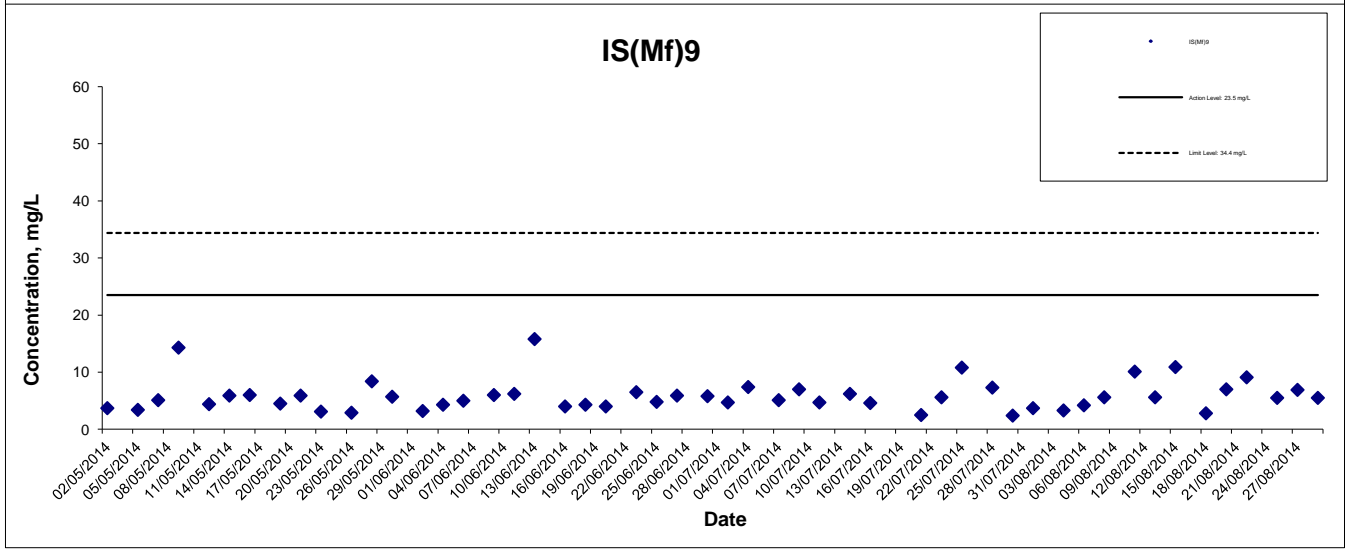
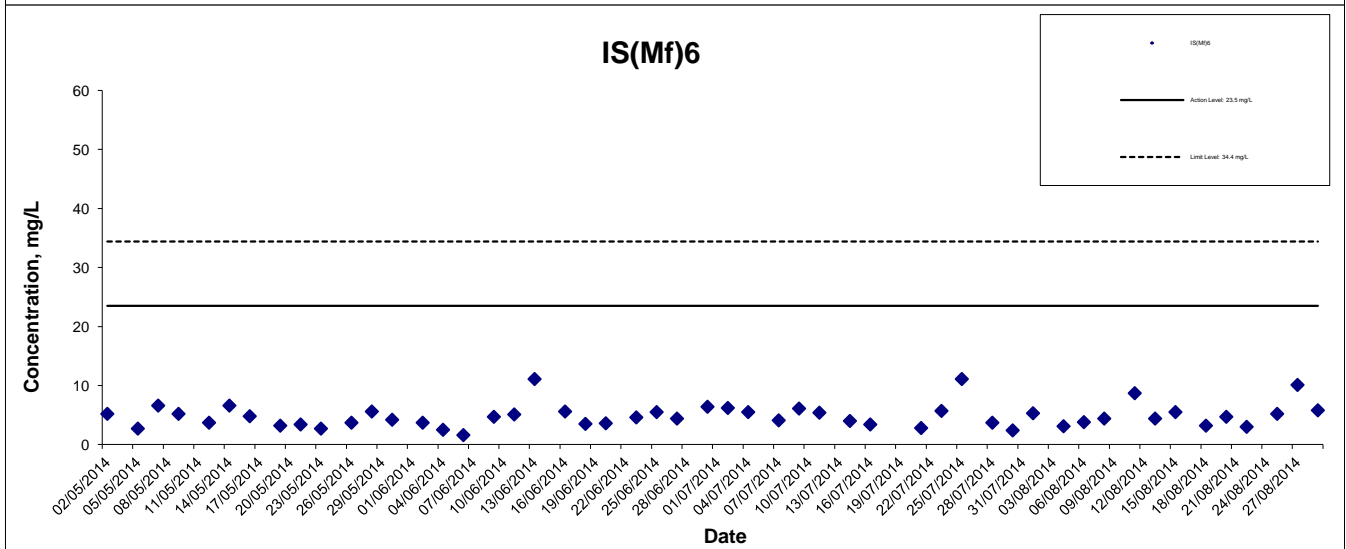
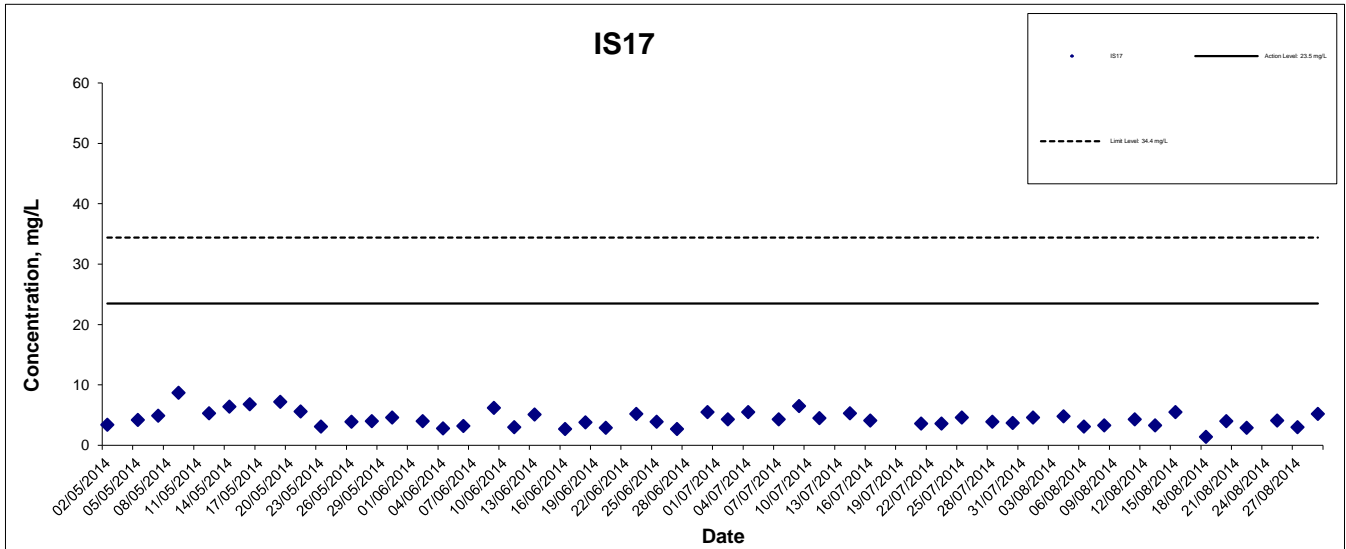
This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

Graphical Presentation of Impact Water Quality  
 Monitoring Results

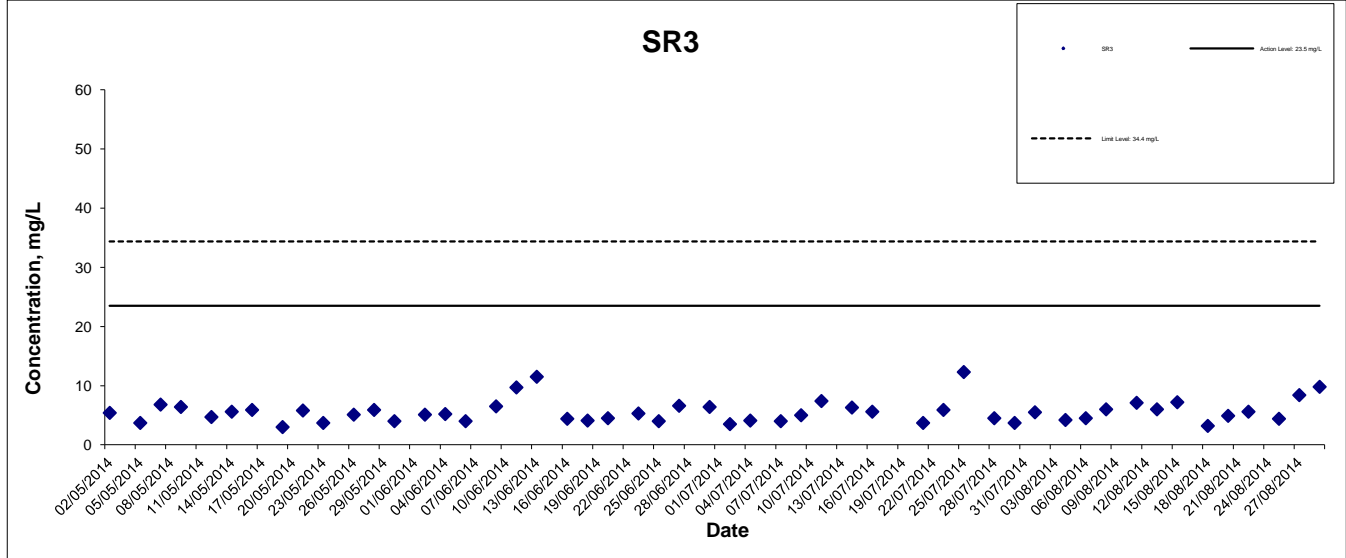
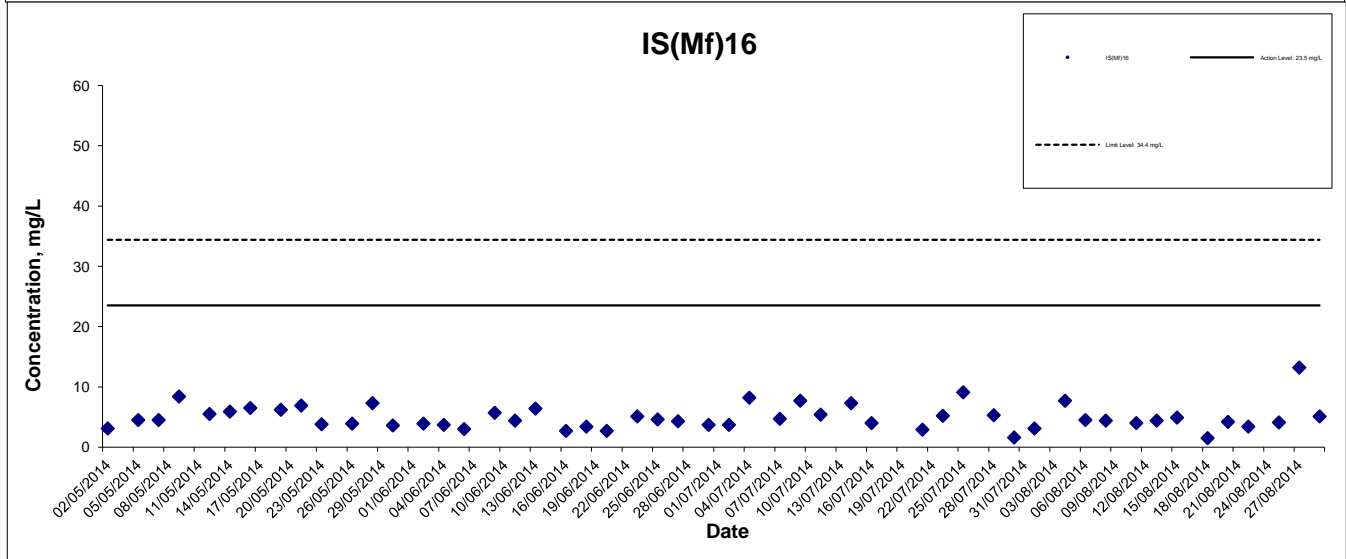
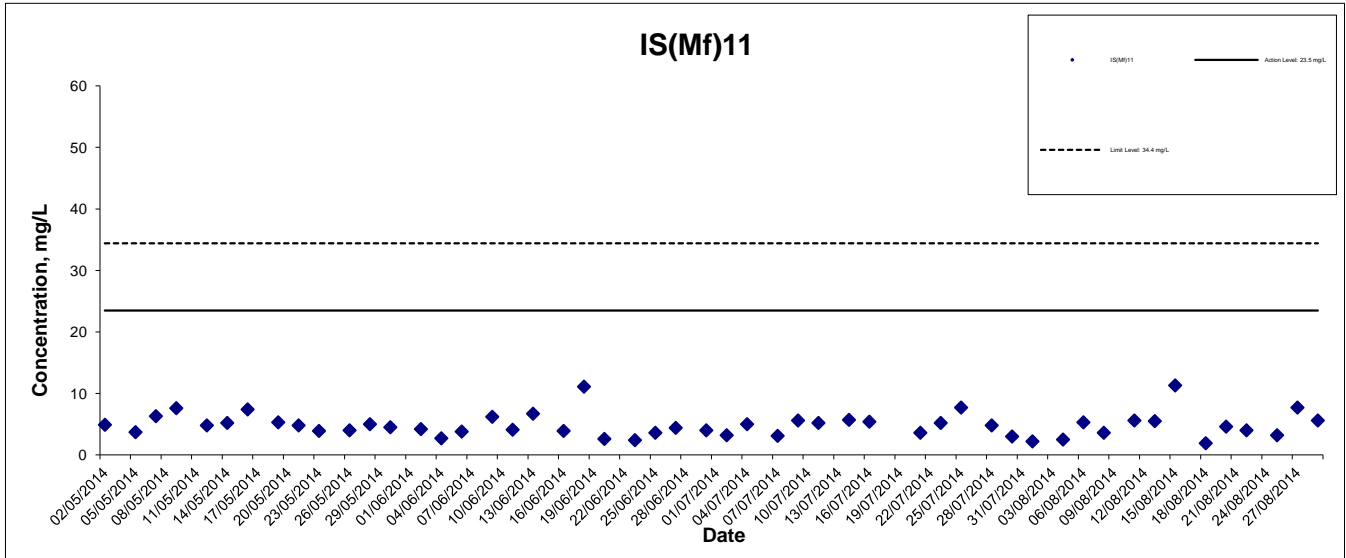


## Suspended Solids at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It does not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM'S express written consent.

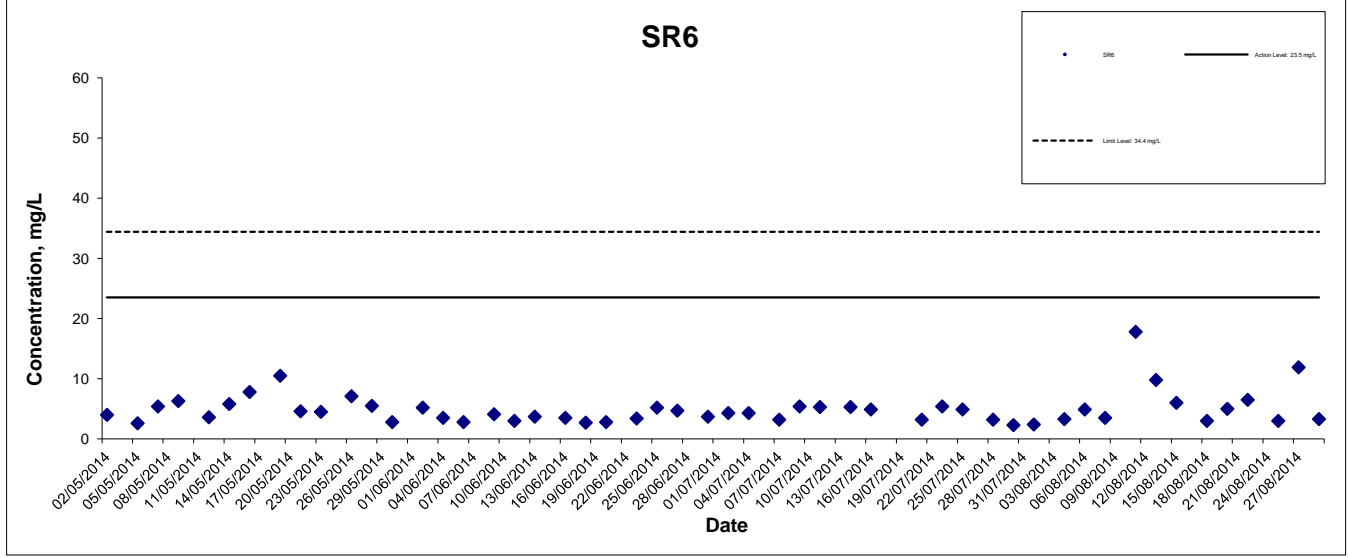
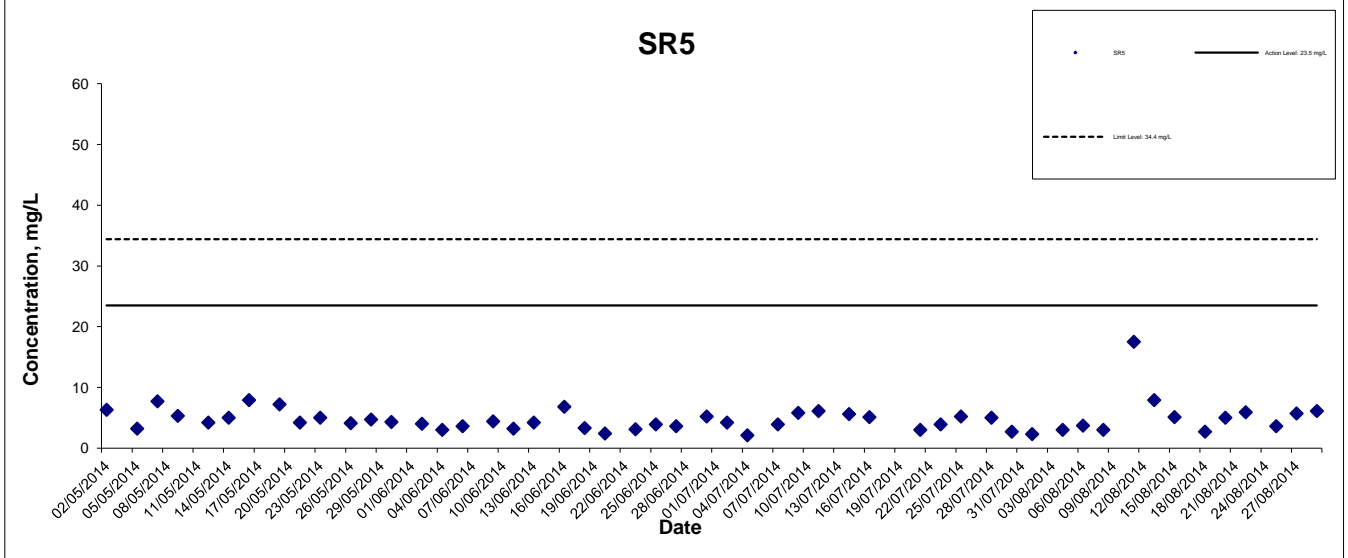
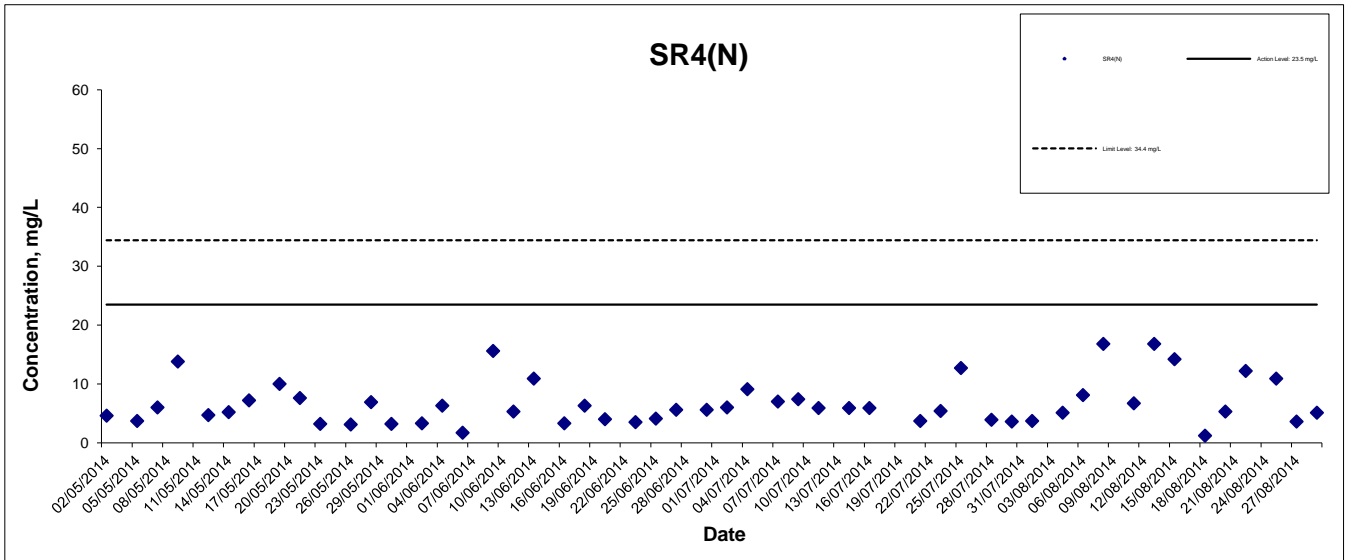
HONG KONG - ZHUHAI - MACAO BRIDGE  
 HONG KONG BOUNDARY CROSSING FACILITIES  
 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality  
 Monitoring Results



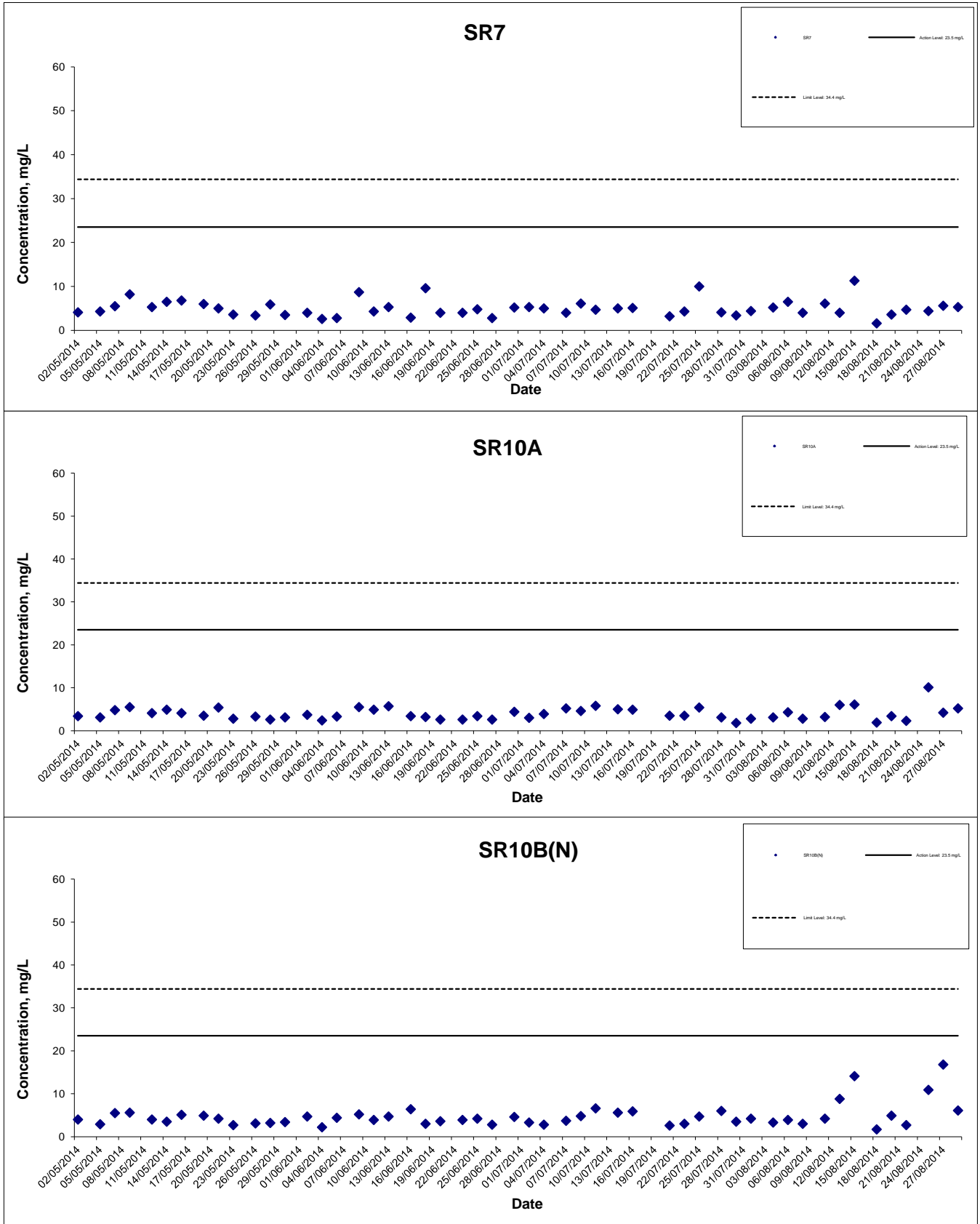


## Suspended Solids at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

## Suspended Solids at Mid-Flood Tide



This Drawing has been prepared for the use of AECOM's client. It Dec not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent.

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

Graphical Presentation of Impact Water Quality  
 Monitoring Results



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



Surface Active Juvenile and Adult,  
Tai O, Hong Kong SAR - July 2014

June - August 2014  
Quarterly Report

**Dolphin Impact Monitoring**

## TABLE OF CONTENTS

<b>1. Introduction</b>	<b>1</b>
<b>2. Objectives and Methodology</b>	<b>2</b>
2.1. <i>Objectives of the Present Study</i>	2
2.2. <i>Line-transect Vessel Surveys</i>	2
2.2.1 Baseline Survey Data and Data from Impact Monitoring	3
2.3. <i>Photo-Identification</i>	6
2.4. <i>Data Analyses</i>	6
2.4.1. Distribution pattern analysis	6
2.4.2. Encounter rate analysis	6
2.4.3. Quantitative grid analysis on habitat use	6
2.4.4. Behavioural analysis	6
2.4.5. Ranging pattern analysis	7
<b>3. Results and Discussions</b>	<b>7</b>
3.1. <i>Summary of survey effort and dolphin sightings</i>	7
3.2. <i>Distribution</i>	8
3.3. <i>Encounter rate</i>	9
3.4. <i>Group size</i>	10
3.5. <i>Habitat use</i>	10
3.6. <i>Mother-calf pairs</i>	10
3.7. <i>Activities and associations with fishing boats</i>	10
3.8. <i>Photo-identification work and individual range use</i>	11
<b>4. Conclusions</b>	<b>11</b>
<b>5. References</b>	<b>12</b>

### Tables

Table 1	The Dolphin Monitoring Transect Co-Ordinates for HKBCF Monthly Monitoring	4
Table 2	A Comparison of Total Sightings Recorded in NEL and NWL Areas During Sep – Nov 2011, June – August 2011; 2012; 2013 and 2014	8
Table 3	A Comparison of “On Effort” Sightings Recorded in NEL and NWL Combined During Sep – Nov 2011 and June – August 2011; 2012; 2013 and 2014	8
Table 4	A Comparison of “On Effort” Sightings Recorded in NEL and NWL During Sep – Nov 2011, and June – August 2011; 2012; 2013 and 2014	9
Table 5	A Comparison of Encounter Rates* in NEL and NWL Areas for Baseline Period (Sept – Nov 2011), June – August 2011; 2012; 2013 and 2014	9
Table 6	A Comparison of Sightings Group Size Averages Recorded in NEL and NWL Areas During Sep – Nov 2011, June – August 2011; 2012; 2013 and 2014	10

## **Figures**

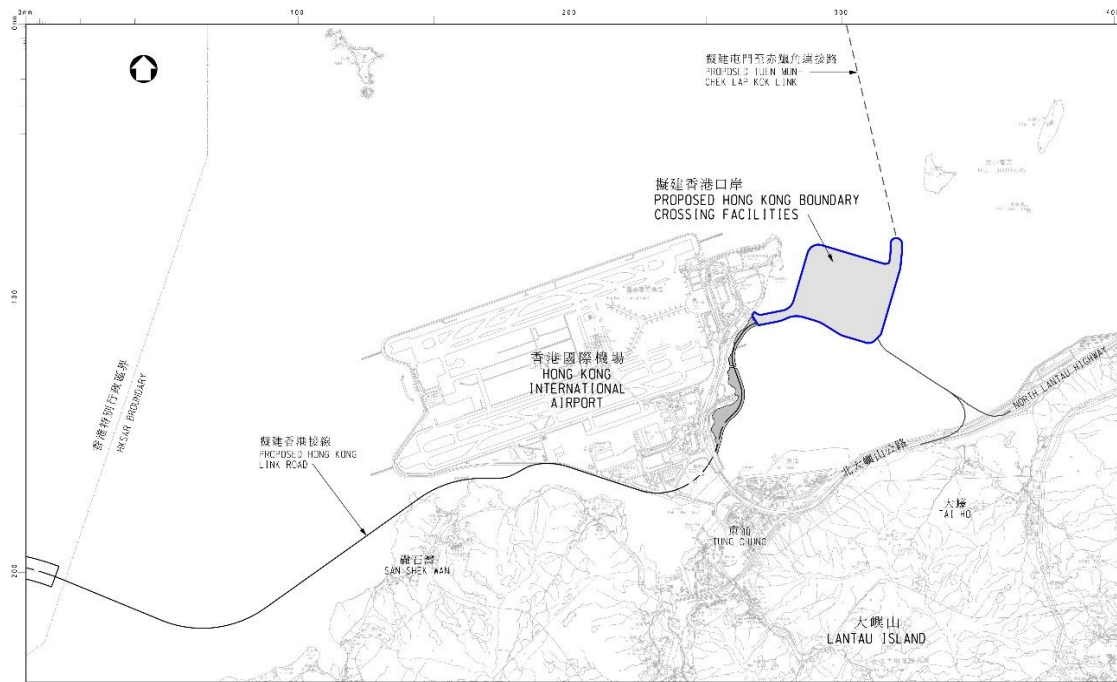
Figure 1.	The Hong Kong Boundary Crossing (HKBCF) Reclamation Sites, North Lantau, Hong Kong	1
Figure 2	Location of the Transect Lines for Baseline and Impact Monitoring during HKBCF (modified to accommodate HKBCF)	5
Figure 3	Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (June 2014)	13
Figure 4	Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (July 2014)	14
Figure 5	Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (August 2014)	15
Figure 6	Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (June - August 2014)	16
Figure 7.	The Location of Dolphin Groups Numbering 5 and Above Individuals (June - August 2014)	17
Figure 8	Sighting density SPSE (number of on-effort sightings per 100 units of survey effort) for June - August 2014	18
Figure 9	Dolphin density DPSE (number of dolphins per 100 units of survey effort) for June - August 2014	19
Figure 10.	Location of groups containing mother and calf pairs during June - August 2014	20
Figure 11.	Activity Budget for Dolphin Behaviour June - August 2014	21
Figure 12.	The Location of Different Behavioural Activities June - August 2014	22

## **ANNEXES**

Annex I	Impact Monitoring Survey Schedule and Details (June - August 2014)
Annex II	Impact Monitoring Survey Effort Summary (June - August 2014)
Annex III	Impact Monitoring Sighting Database (June - August 2014)
Annex IV	Photo ID Images (June - August 2014)

## 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](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 tenth quarterly (June-August 2014) summary of data associated with the impact monitoring conducted for contract HY/2010/02, HKBCF-Reclamation Works. The format of this report follows as closely as possible the outline provided for the Baseline Monitoring Report. The baseline monitoring was conducted during a different period from this quarter September to November (in 2011) and is thus not directly comparable as there is a documented seasonal variation of habitat use and behaviour within the Hong Kong habitat. 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<sup>1</sup>

<sup>1</sup>[http://www.afcd.gov.hk/english/conservation/con\\_mar/con\\_mar\\_chi/con\\_mar\\_chi\\_chi/con\\_mar\\_chi\\_chi.html](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. As HZMB construction works has progressed, some transect lines have been temporarily blocked either by the working vessels or the bridge structure itself. These are detailed in monthly submissions to ENPO, however, other than the truncation of line 10, no permanent changes have been made to the original transect layout provided at project onset. Line transect surveys should be conducted systematically and 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<sup>2</sup> and is not part of the observer team. This is not standard line transect survey

---

<sup>2</sup> 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).

procedure, however, the baseline study was conducted this way thus it has been requested that only two observers be used for impact surveys.

When the boat is travelling along the transect line (“on effort”), observers search the area in front of the boat between 90° and 270° abeam (bow being 0°). When a 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<sup>3</sup>. This is an “on effort” sighting. These input parameters are linked to the time-GPS-ships data which are automatically stored in Logger throughout the survey period. In this manner, information on heading, position, speed, weather, effort and sightings are stored in an interlinked database which can be subsequently used in a variety of analytical software packages.

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

### *2.2.1 Baseline Survey Data and Data from Impact Monitoring*

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

---

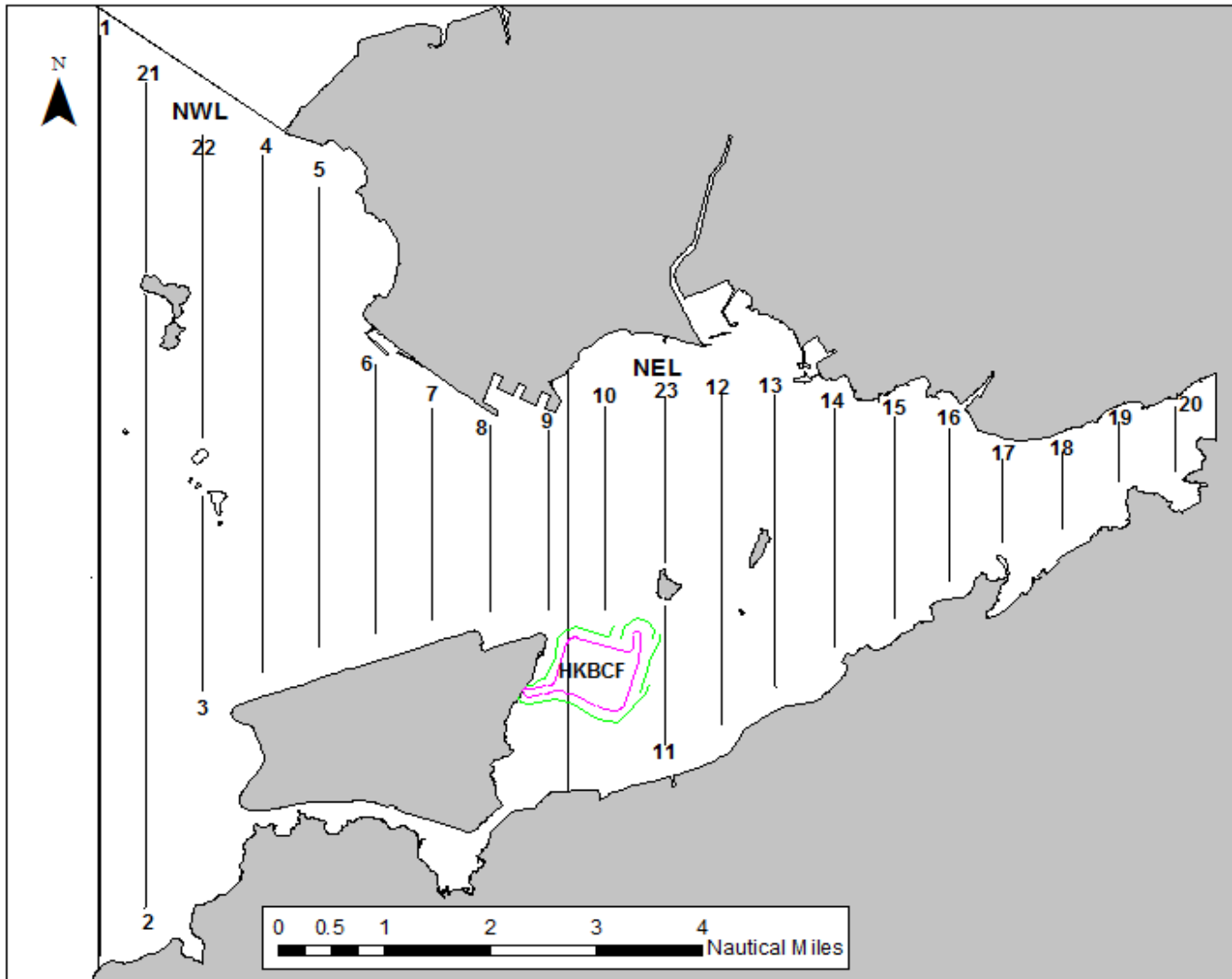
<sup>3</sup> Group size is defined as an aggregation of dolphins within 100m of each other involved in similar behaviour (Connor *et al* 1998).



**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. Digital SLR cameras (Nikon D90) using long lenses (Nikor 20-400mm and fixed length 300mm) are used to obtain high resolution images. Effort is made to ensure consistency of image quality, e.g., no shadow and at an angle perpendicular to the dorsal fin. Polarising filters are used to minimise glare. In this manner, the best image clarity is achieved and image sorting and matching is more consistent. Images are sorted according to clarity and presence/absence of identifying features (nicks/cuts/deformities/injury/pigmentation). Only images deemed to be of suitable quality and as containing sufficient markings for unambiguous identification are included in the photo-identification catalogue. A recent review of photo identification techniques was referred to ensure that current protocols for this monitoring conform to internationally recognised best practises. Recommendations from this review will be considered for future analyses (Urian *et al* 2014).

### 2.4. Data Analyses

#### 2.4.1. Distribution pattern analysis

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

#### 2.4.2. Encounter rate analysis

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

#### 2.4.3. Quantitative grid analysis of habitat use

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

SPSE and DPSE:

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

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

Where;

S= total number “on effort” sightings

D = total number dolphins from “on effort” sightings

E = total number units survey effort

SA% = percentage of sea area

#### 2.4.4. Behavioural analysis

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

#### 2.4.5. Ranging pattern analysis

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 impact monitoring period (30 months) is twelve (HZMB 002:WL111)

### 3. RESULTS AND DISCUSSIONS

#### 3.1. Summary of survey effort and dolphin sightings

From June – August 2014, 12 vessel surveys were conducted in the NEL and NWL survey areas A total of 661.1 km of “on-effort” transect lines were conducted, all of which under favourable conditions (Annex I; Annex II). Only those periods of “on-effort” survey conducted under favourable conditions were included in quantitative analyses. During June – August 2014, 27 groups of dolphins, numbering 87 (min 86; max 96<sup>4</sup>) individuals, were sighted from the vessel surveys. Of these, 17 groups were “on-effort” and the remaining 10 “opportunistic” (Annex I).

Of the 27 sightings, 26 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 June – August 2012, a total of 62 groups were sighted, 42 of which were located in NWL and 20 in NEL, and for the period June – August 2011, a total of 37 groups were sighted, 25 of which were located in NWL and 12 in NEL. There are differences between the number of sightings made during baseline compared to the summer periods of 2011, 2012 and 2013, however, there is known to be seasonal variation of dolphin occurrence in north Lantau, indeed within Hong Kong (AFCD 2012). When a comparison is made between June – August 2011; 2012; 2013 and the same period in 2014, the numbers of dolphin groups seen in NWL in 2012 and 2013 (both years when HKBCF was a working site) are similar and more than that recorded in 2011 (the year before work was initiated at HKBCF). A decline is noted in the total number of NWL sightings is observed in the same period of 2014. In NEL, when a comparison is made between June – August 2011; 2012; 2013 and the same period in 2014, there is a marked difference between 2013 and 2012 and between 2014 and 2012 (all years when construction activity at HKBCF occurred), 20, 7 and 1 sightings were recorded in 2012, 2013 and 2014, respectively, however, only 12 groups were seen in the same period, 2011, the year prior to HKBCF commencement (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.

---

<sup>4</sup> 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, June – August 2011; 2012; 2013 and 2014**

Monitoring Period	Total Dolphin Sighting in NWL	Total Dolphin Sighting in NEL
	Number of Groups	Number of Groups
Jun – Aug 2011* (Advanced Monitoring)	25	12
Sep – Nov 2011** (Baseline Monitoring)	34	10
Jun – Aug 2012** (Impact Monitoring)	42	20
Jun – Aug 2013** (Impact Monitoring)	38	7
Jun – Aug 2014** (Impact Monitoring)	26	1

\* Surveys conducted once per month

\*\* Surveys conducted twice per month (and three times in June and July 2012 only as compensatory surveys)

Compared to baseline monitoring, there is a similar number of total sightings for NEL and NWL combined in the first year of construction for the period June – August 2012. For the same period between 2012; 2013 and 2014, however, there is a decrease in “on effort” sightings recorded (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 and June – August 2011; 2012; 2013 and 2014.**

Monitoring Period	Groups of Dolphin sighted in NEL and NWL
June – August 2011 (Advanced Monitoring)	30
Sep - Nov 2011 (Baseline Monitoring)	44
June – August 2012 (Impact Monitoring)	47
June – August 2013 (Impact Monitoring)	29
June – August 2014 (Impact Monitoring)	17

### 3.2. Distribution

During the baseline survey, ~77% of all “on effort” sightings were made in NWL. During the June – August periods 2011, 2012, 2013 and 2014, 63%, 64%, 86% and 94% of all sightings were made in NWL, respectively. There is a notable trend of increased use of NWL habitat when comparing the period June to August. Further, this increase in NWL habitat use has been noted for the period December – February and March – May particularly from 2013. Again, there is no correction for effort for these group sightings (Table 4). The sightings in NWL occurred throughout the western portion with a concentration of sightings at Tai O, on the southern most part of NWL. The single sighting in NEL was at the Brothers Islands (Fig 6). This is a marked increase in use of southern part of NWL compared to the previous two quarters of impact monitoring.

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

Monitoring Period	No. of Dolphin Groups sighted in NWL	No. of Dolphin Groups sighted in NEL
June – August 2011 (Advanced Monitoring)	19	11
Sep - Nov 2011 (Baseline Monitoring)	34	10
June – August 2012 (Impact Monitoring)	30	17
June – August 2013 (Impact Monitoring)	25	4
June – August 2014 (Impact Monitoring)	16	1

### 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<sup>5</sup> of survey effort was conducted under favourable conditions in the NEL and NWL survey areas. In NEL and NWL combined, 331.0km, 916.2km, 663.8km and 661.1km of track-line were conducted under favourable conditions during the periods June – August 2011; 2012; 2013 and 2014, respectively. In NEL, there is a decline in encounter rate within the pre construction period (June – November 2011), i.e., 7 to 5.4. There is a continued decline during impact monitoring periods June – August 2012; 2013 and 2014, i.e., 5.2; 1.8 and 0.5. In NWL, there is also a decline in encounter rate within the pre construction period (June – November 2011), i.e., 11 to 9.5, however, the trend does not continue as the encounter rate for June – August 2013 is higher than both 2012 and 2014 (Table 5).

**Table 5. A Comparison of Encounter Rates\* in NEL and NWL Areas for Baseline Period (Sept – Nov 2011), June – August 2011; 2012; 2013 and 2014.**

Monitoring Period	Encounter Rate NEL	Encounter Rate NWL (*)
June – August 2011 (Advanced Monitoring)	7.0	11
Sept-Nov 2011 (Baseline Monitoring)	5.4	9.5
June – August 2012 (Impact Monitoring)	5.2	5.1
June – August 2013 (Impact Monitoring)	1.8	5.7
June – August 2014 (Impact Monitoring)	0.5	3.6

<sup>5</sup> Updated data set provided April 2013

The AFCD Annual Reports describe variation in spatial distribution between areas and between seasons in NEL and NWL. For the last sixteen years (to 2013), it is reported that overall **annual encounter rate** for NEL varies between 1.6 and 6.2 and the **annual encounter rate** for NWL varies between 5.8 and 17.0. Both encounter rates recorded for NEL and NWL are below the “annual” normal rates. 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; 2014). The known decline in the population, on top of the highly variable encounter rate noted historically, makes it problematic to discern any additional influence HKBCF and other projects may have on the dolphin population encounter rate. It is noted, however, that since the initiation of impact monitoring, the number of sightings recorded in 2014 has been less than that recorded in previous years of both impact and baseline monitoring.

### 3.4. Group size

During impact monitoring, group size of all sightings varied from 1 to 15 individuals with an overall average of 3.2. For baseline monitoring, the NWL average group size was 4.5 and in June – August 2011; 2012; 2013 and 2014 it was 4.3, 2.8, 2.9 and 3.2, respectively. For baseline monitoring, the NEL average group size was 3.5 and in June – August 2011; 2012; 2013 and 2014 it was 2.8, 3.8, 2.3 and 1.0, respectively (Table 6). There is a smaller group size noted during impact monitoring in NWL. There is no apparent trend in NEL, until 2014 when group size is derived from a single sighting. A map depicting group size distribution shows that larger groups occur at SCLKCMP and Tai O and four of the five groups containing calves were in these larger groups (Fig. 7;10).

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

Monitoring Period	Average Group Size (NWL)	Average Group Size (NEL)
June – August 2011 (Advanced Monitoring)	4.3	2.8
Sep - Nov 2011 (Baseline Monitoring)	4.5	3.5
June – to August 2012 (Impact Monitoring)	2.8	3.8
June – August 2013 (Impact Monitoring)	2.9	2.3
June – August 2014 (Impact Monitoring)	3.3	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). A multi-variate analyses proposal has been submitted and analyses developed as and when data has been made available. The last quarterly report (March 2014 to May 2014 Quarterly EM&A) updated analyses progress; the environmental data for 2013 was released by EPD in July 2014 and was being reformatted, edited and filtered to fit the analyses. It was hoped that this would be completed by August 2014, however, this took longer than anticipated. Extensive habitat models have already been tested using all available data as per the proposal to AFCD and EPD. The draft final report is under review and will be presented separately to the Quarterly EM&A Report. It is expected that all reviews will be completed by February 2015, however, this is dependent on comments from all. Therefore, tentatively, the reviewed modelling report should be available within January 2015 and it results additionally interpreted in the Quarterly EM&A report December 2014 to February 2015.

### 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 the Tai O area. In NEL, areas to the east of the Brothers Islands contained a solitary sighting. Density in NEL has increased since the last quarter, although minimally, as seems typical of the summer season in NEL (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.

### 3.6. *Mother-calf pairs*

Five of the groups sighted contained mother and calf pairs. All groups were sighted in NWL (Fig. 10). Calves comprised 5.7% of all dolphins sighted, higher than that reported in the last quarterly report but lower than the two quarters previously (10.3%, 6.7% and 4.3%). Calf mortality has been reported in 2014, however, no formal figures are as yet available.

### 3.7. *Activities*

Of the 27 groups sighted (using all sightings), nine (33%) were engaged in feeding activities; eight (30%) were travelling; six (22%) were feeding/travelling/socialising; three (11%) were surface active and one was resting (4%). Feeding was the predominant activity during daylight hours in June to August with surface active/multiple behaviours (which includes surface active) decreasing towards the end of the quarter (Fig. 11). In NWL, feeding occurred most often at the north of SCLKCMP and Tai O whereas, the majority of surface active behavior occurred at the Tai O area. The single sighting made in NEL was feeding (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 IV. There are now a total of 112 individually identified dolphins in the stand alone catalogue prepared for HKBCF. Not all dolphins sighted have sufficient scarring, injury or pigmentation uniqueness to be unambiguously identified; to date an estimated 61% of the dolphins sighted have clear and identifying characteristics. 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. To date, 17 individuals seen during baseline in NEL and NWL have been re-sighted (one of which is now deceased). There are 12 dolphins which have been sighted six or more times, eight of which are known from the AFCD catalogue (HZMB 001 [WL46]; HZMB 002 [WL111]; HZMB 005; HZMB 011 [EL01]; HZMB 022; HZMB 023; HZMB 040; HZMB 041 [NL24]; HZMB 044 [NL98]; HZMB 051 [NL213]; HZMB 054 [CH34]; HZMB 098 [NL104]). Three of these well known individuals were not seen during the baseline study (HZMB 002, HZMB 044 and HZMB 098). When both baseline and impact monitoring data is pulled, HZMB 54 has been seen the most on 15 different days. HZMB 002 has been sighted 12 times; HZMB 041 has been sighted ten times; HZMB 044 has been seen nine times and HZMB 011 has been sighted eight times. Three new individuals were added to the catalogue (HZMB 121; HZMB 122 and HZMB 123) during June – August 2014 (Annex IV).



#### 4. CONCLUSION

The data from June – August 2014 shows some consistencies with the results reported in the same period 2011; 2012 and 2013 and the baseline (conducted during a different season). There is a noted decrease in encounter rate in NEL in 2014 and group size is smaller. NWL has a decreased encounter rate, however, the overall trend is not as marked as NEL. Habitat use and behavioural trends remain consistent, that is, areas such as SCLKCMP and Tai O remain the most used although sightings in NWL are now further south than previously recorded and on the boundary of the NWL habitat. Behavioural patterns are broadly similar, with a decrease in socialising behavior in August. Feeding is still the predominant activity. The existing long term data set does show an inherent variation in all patterns and rates as well as a significant decrease in abundance estimates observed across the areas NEL and NWL over the decade prior to HZMB construction (AFCD 2012; 2013). This is supported by an independent study of existing data with a predicted and accelerated decline if the factors which currently negatively impact the population are not reduced (Huang *et al* 2014). It is also noted that preparation works for other projects have been ongoing throughout the HKBCF Project works and at least one new project started in March 2014. As such, there is increased boat traffic and underwater works in the southern sector of NWL and the northern sector of NEL and NWL.

The decreases in encounter rates in both NEL and NWL are noted. HKBCF monthly reporting notes that the conditions of EM&A Manuel have been consistently upheld and that all measures stipulated to minimise disturbance to dolphins remain in place. Although it is likely that the increase in HKBCF activities is having an effect on dolphin encounter rates in NEL, it is also noted that other HZMB projects have increased activities over the last quarter throughout NEL and NWL. In addition, extensive marine works which are not part of HKBCF have been ongoing in NEL and also in parts of NWL throughout this current quarter period. Further, new projects have been initiated along the airport platform area. As there has been shifts in the habitat use, but no reported increase in dolphin mortality, the possibility that dolphins have shifted to other parts of Hong Kong and adjacent waters should be explored. To better understand how habitat use is changing, extending the survey area to other parts of Hong Kong that dolphins are known to occur in may be useful to fully understand habitat shifts in all local waters. Further, previously identified individuals have been displaced from NEL and NWL and it is currently not known where these individuals now occur. By extending the range of the impact surveying, or pooling existing impact monitoring from other HZMB projects, an assessment can be made of individual displacement and, if the dolphins are occurring elsewhere, if they are behaving in a manner which has previously been recorded as “typical” for that individual. In addition, collaboration with cross border authorities involved in the HZMB Project, in particular with regards to sharing photo ID catalogues, may provide additional information on habitat use outside Hong Kong, including monitoring of identified individuals.

In conclusion, there is an ongoing and increasing number of activities occurring in the dolphins habitat, however, the strict mitigation initiatives at HKBCF aim to minimize the localised impact of HKBCF construction itself. This alone is not sufficient to ameliorate the myriad of other impacts throughout the dolphins habitat, though, some of which appear to have been occurring in the long term.

## References

Agriculture, Fisheries and Conservation Department (AFCD) 2012;2013. *Annual Marine Mammal Monitoring Programme April 2011-March 2012.* ) The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

Buckland, S., Burnham, K., Laake, J., Borchers, D. and Thomas, L. 2001. Introduction to Distance Sampling. Oxford University Press.

Connor, R. Mann, J., Tyack, P. and Whitehead, H. 1998. Social Evolution in Toothed Whales. *Trends in Ecology and Evolution* 13, 228-232

Gillespie, D., Leaper, R., Gordon, J. and Macleod, K. 2010. An integrated data collection system for line transect surveys. *J. Cetacean Res. Manage.* 11(3): 217–227.

Huang, S., Karczarski, Chen, J, Zhou, R, Lin, W., Zhang, H., Li., H. and Wu, Y. 2012 Demography and Population Trends of the Largest Population of Indo-Pacific Humpback Dolphins. *Biological Conservation* 147: 234-242

Kauhala, K. & Auttila, M. 2010: Estimating habitat selection of badgers - a test between different methods. - *Folia Zoologica* 59: 16-25.

Taylor, B., Martinez, M, Gerodette, T., Barlow, J and Hrovat, Y. 2007. Lessons from Monitoring Trends in Abundance of Marine Mammals. *Marine Mammal Science* 23(1):157-175.

Urian, K., Gorgone, A., Read, A., Balmer, B., Wells, R. S., Berggren, P., Durban, J., Eguchi, T., Rayment, W. and Hammond, P. S. (2014), Recommendations for photo-identification methods used in capture-recapture models with cetaceans. *Marine Mammal Science* 30(4): doi: 10.1111/mms.12141

Wauters, L., Preatoni, D., Molinari, A. and Tosi, G. 2007. Radio-tracking squirrels: Performance of home range density and linkage estimators with small range and sample size. *Ecological Modelling* 202(10):333-44

Worton, B. 1989. Kernel Methods for Estimating Utilization Distribution in Home Range Studies. *Ecology* 70(1):164-8

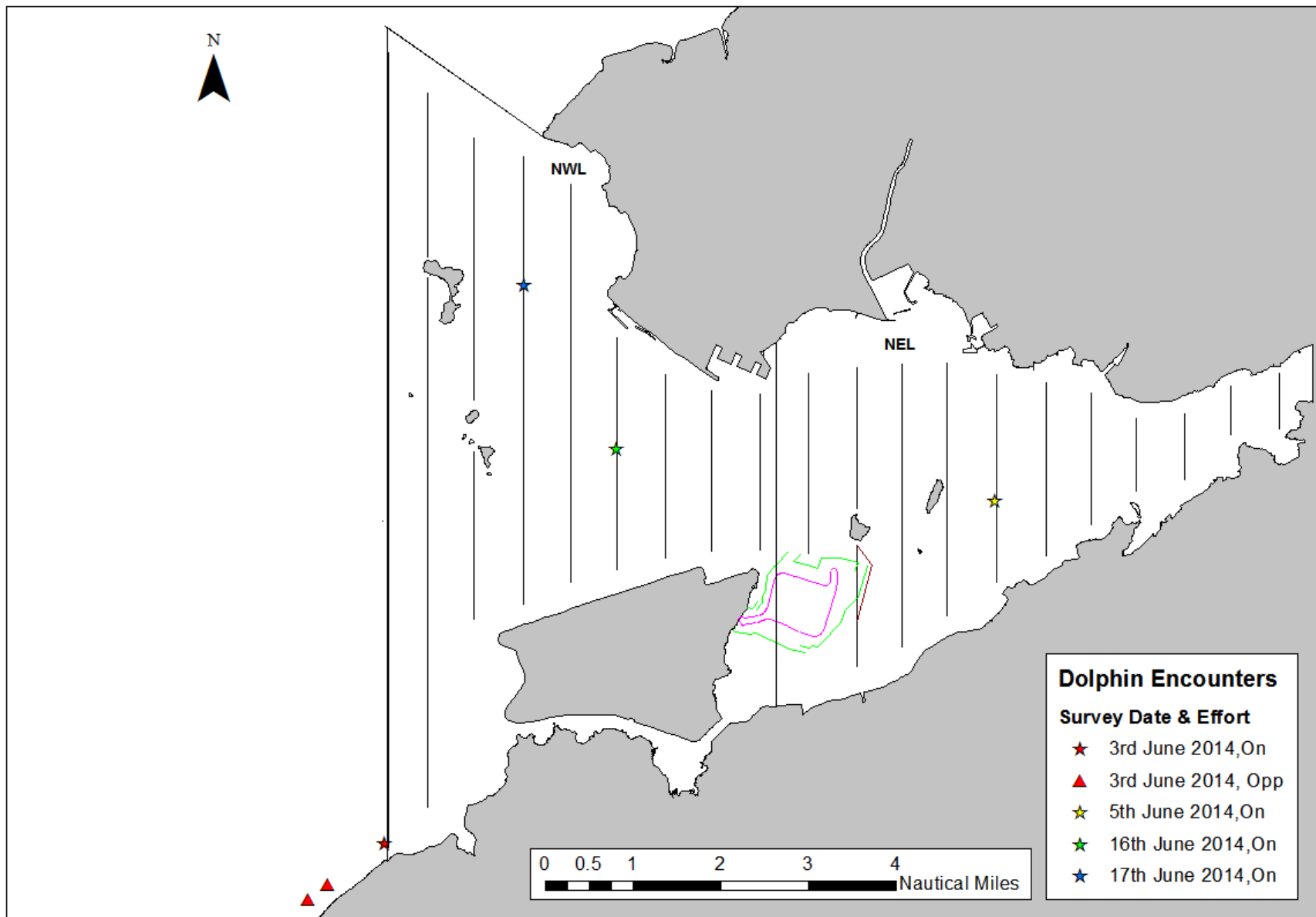


Figure 3 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (June 2014)

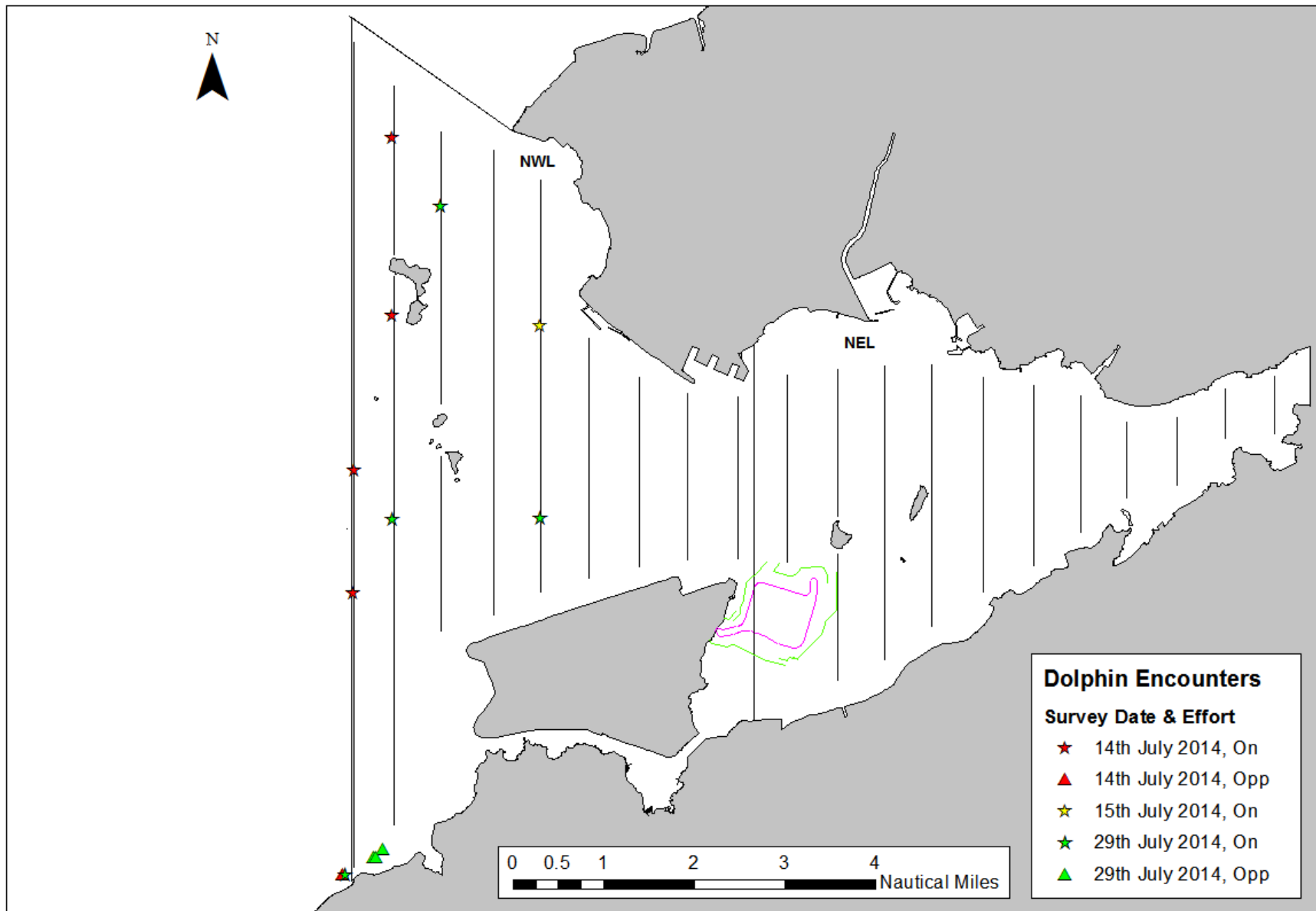


Figure 4 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (July 2014)

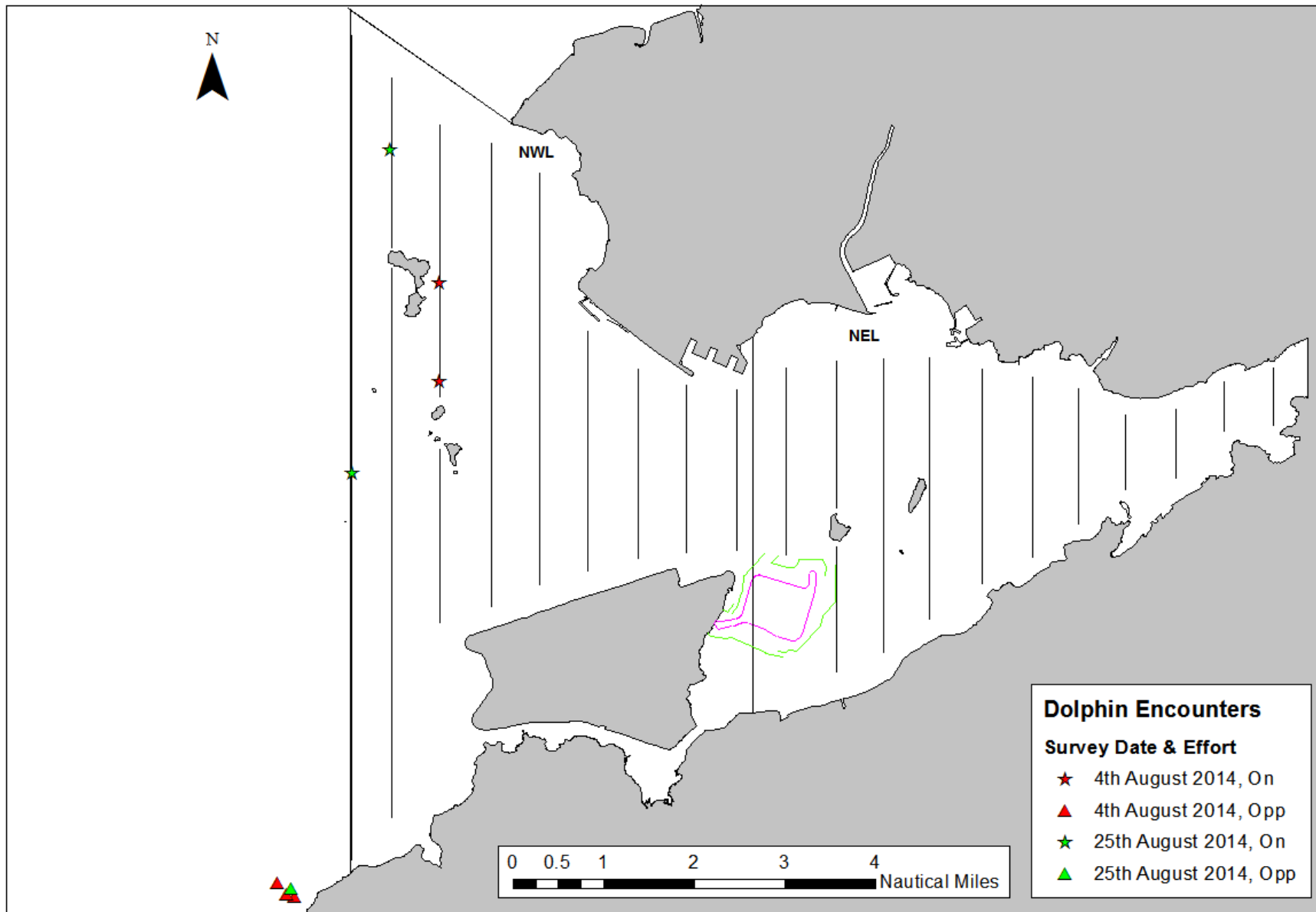


Figure 5 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (August 2014)

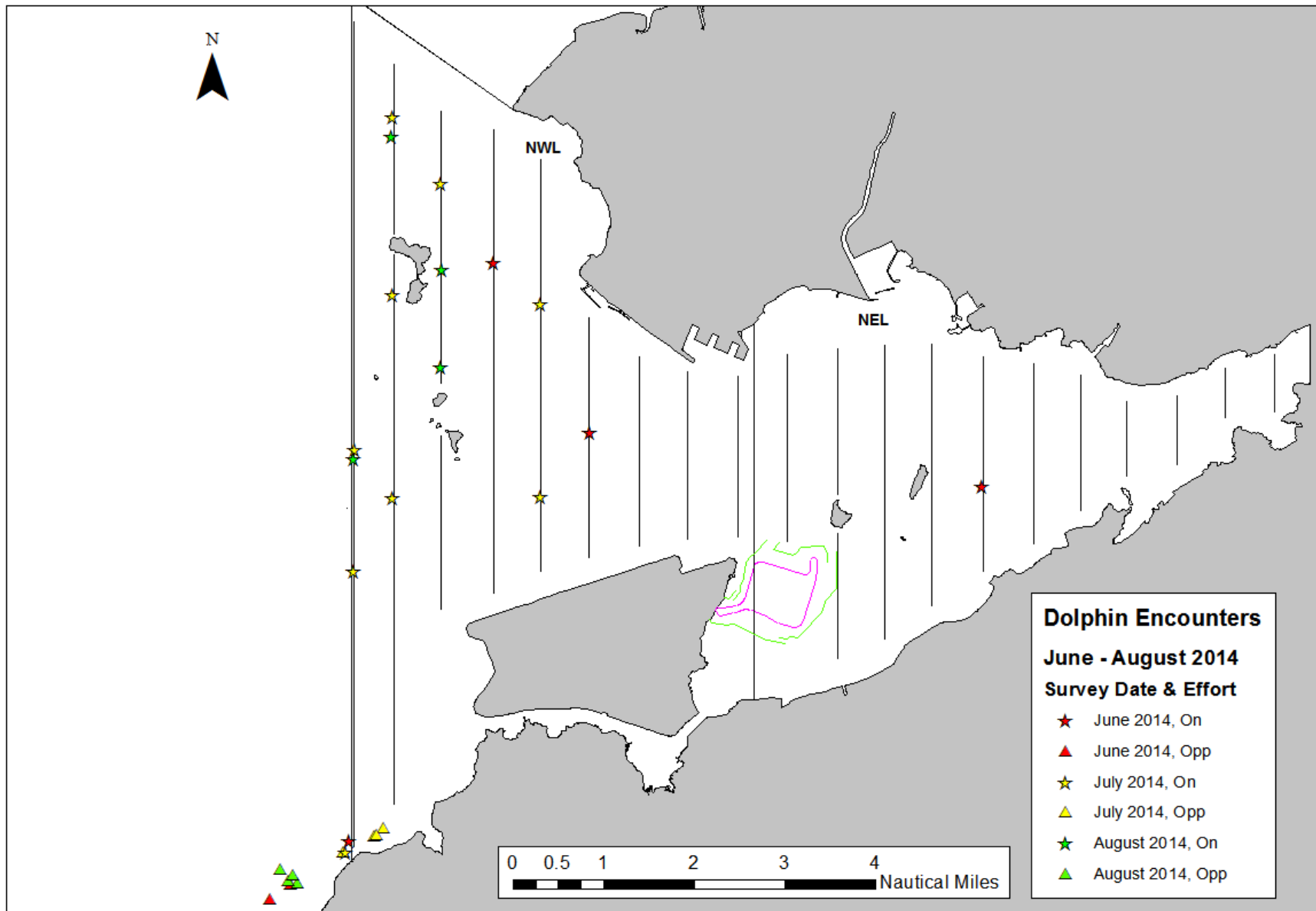


Figure 6. Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (June-August 2014)

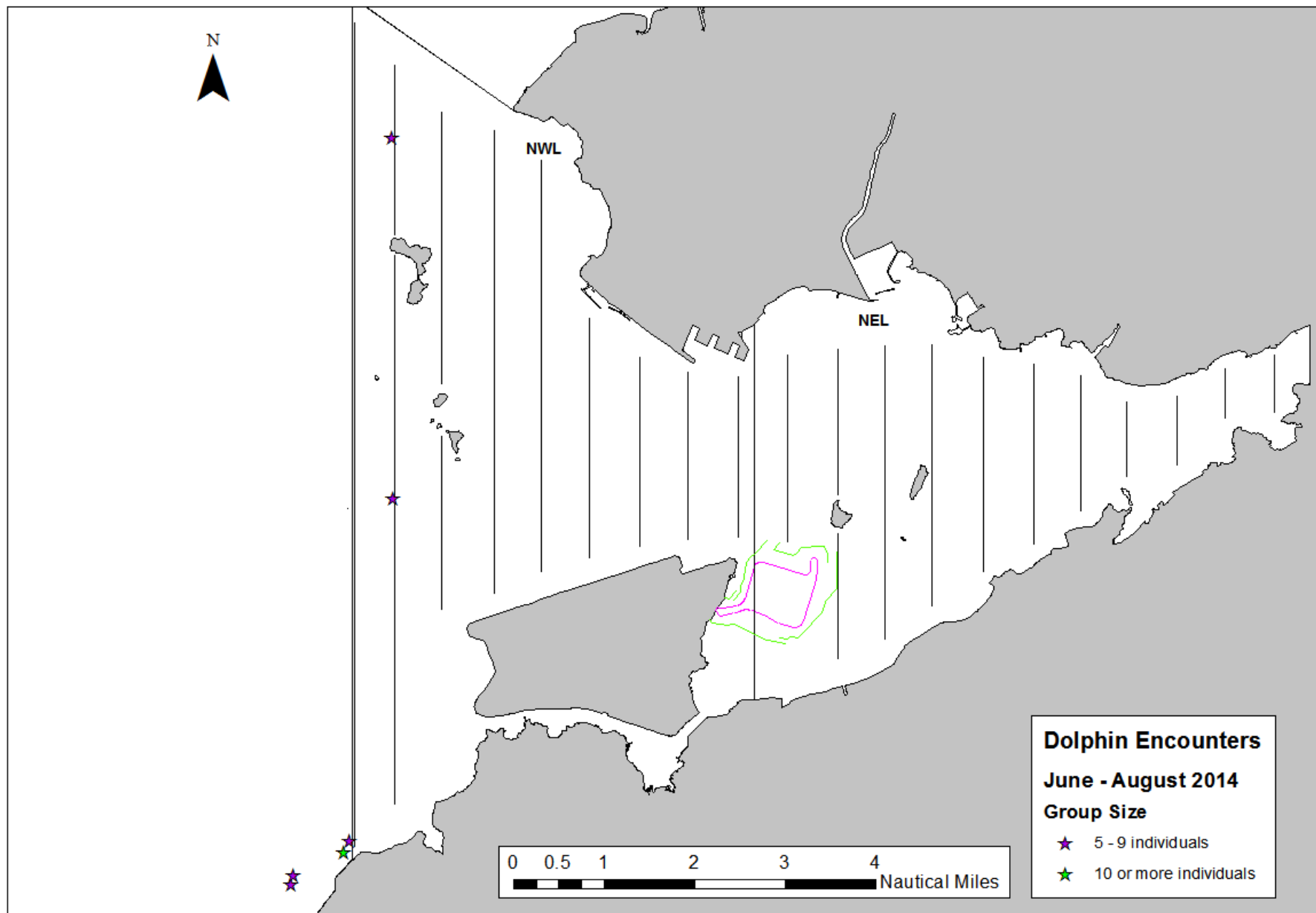


Figure 7. The Location of Dolphin Groups Numbering 5 and Above Individuals (June-August 2014)

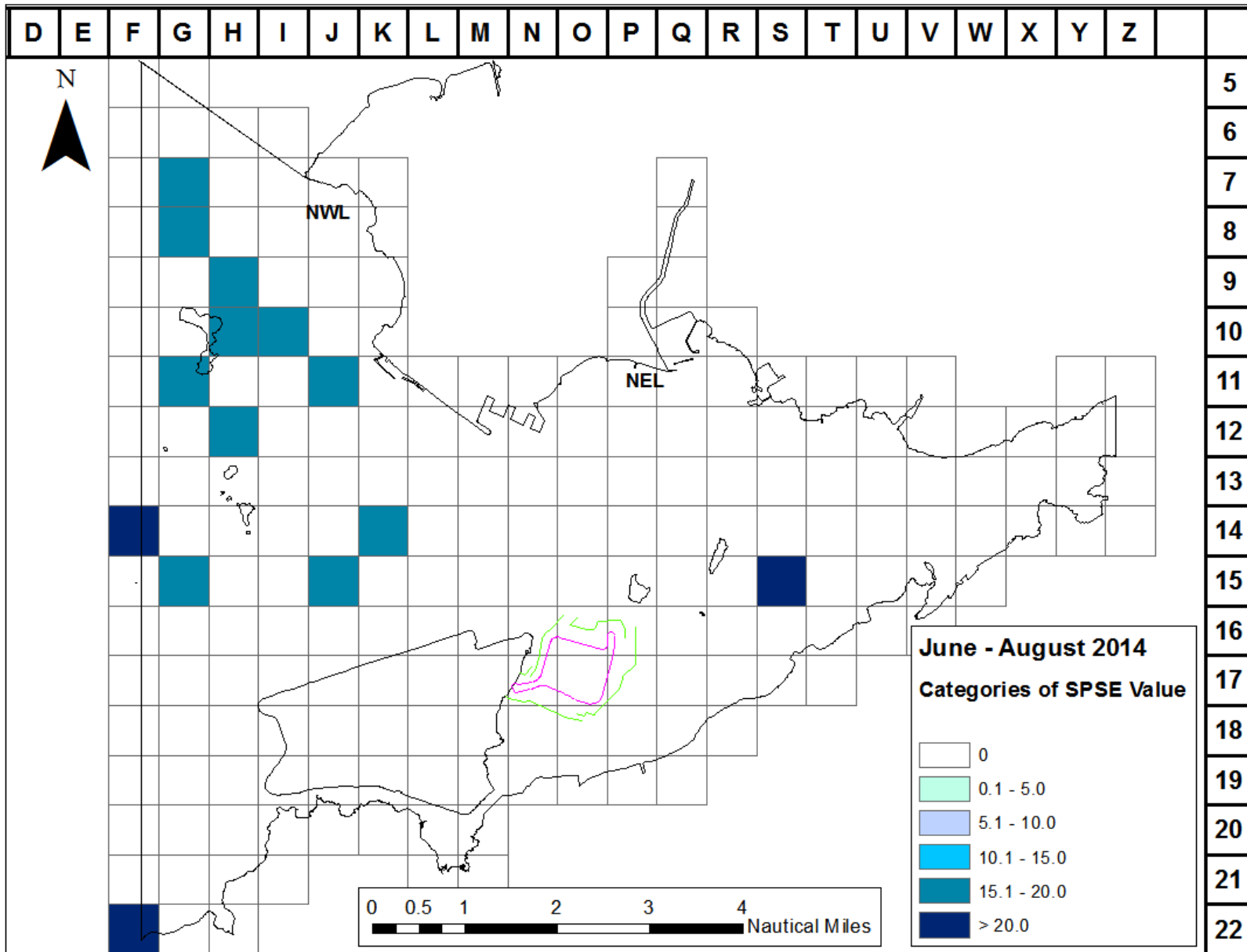


Figure 8. Sighting density SPSE (number of on-effort sightings per 100 units of survey effort) for June - August 2014.



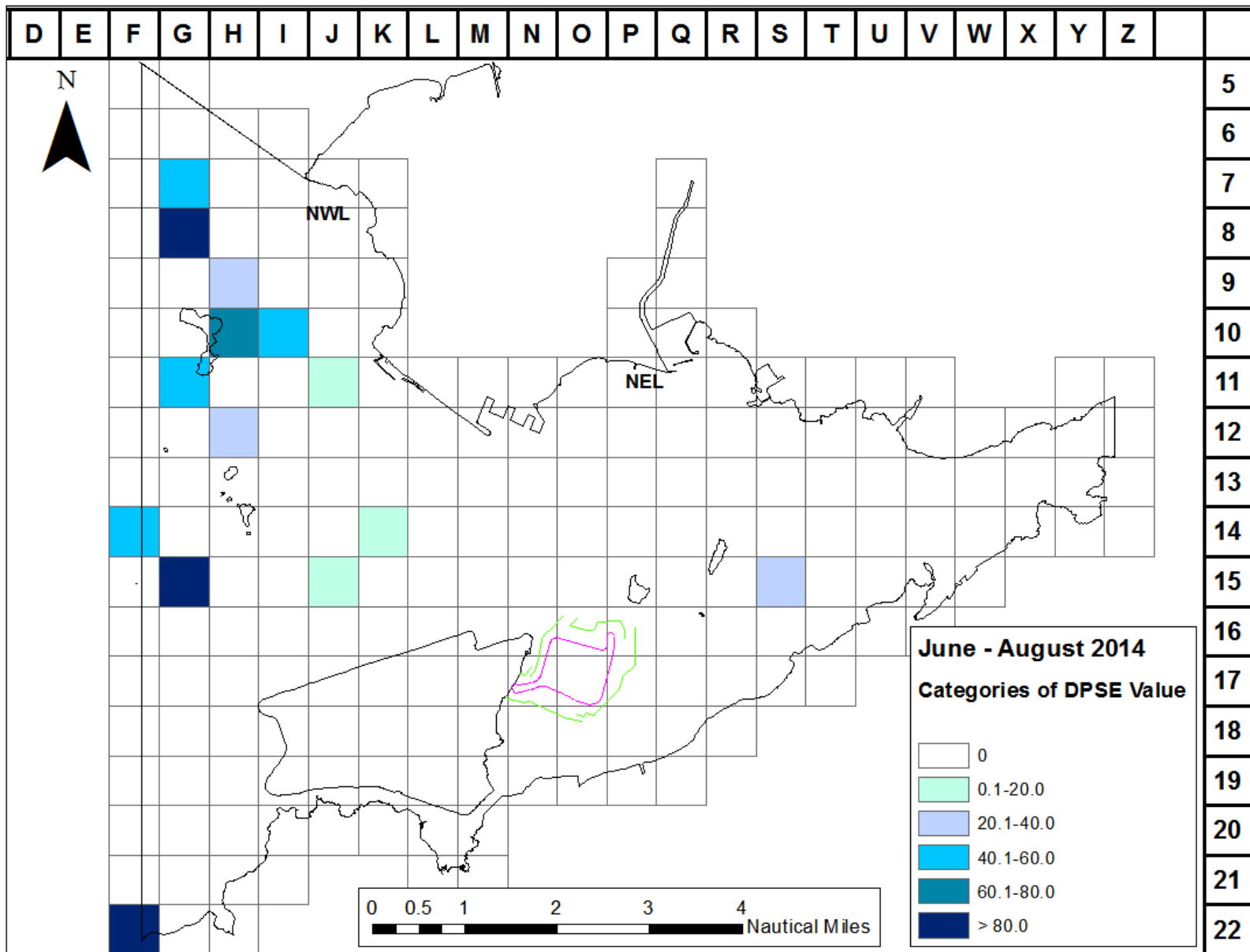


Figure 9. Dolphin density DPSE (number of dolphins per 100 units of survey effort) for June to August 2014.

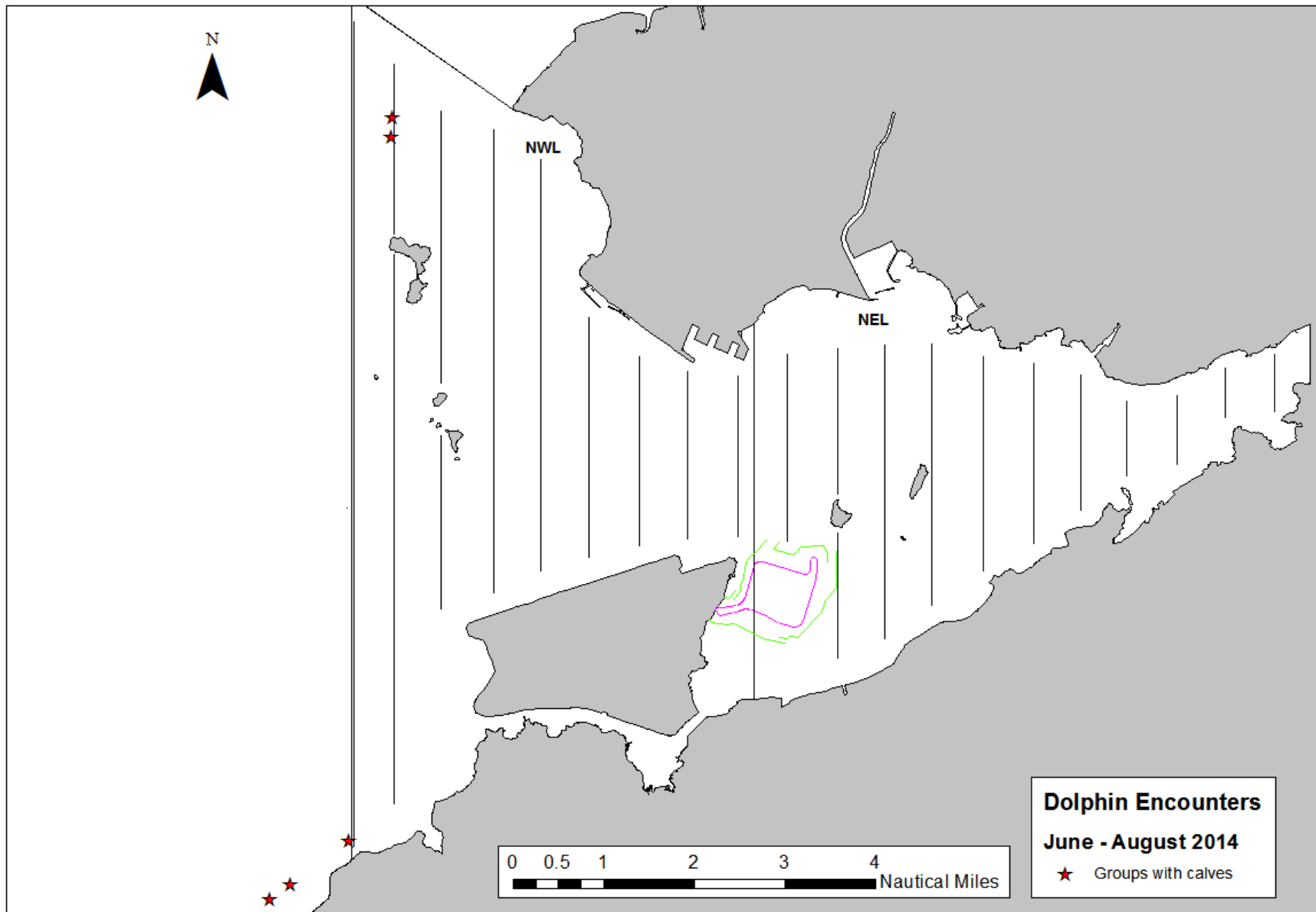


Figure 10. Location of groups containing mother and calf pairs during June to August 2014.

## June - August 2014 Dolphin Behavior

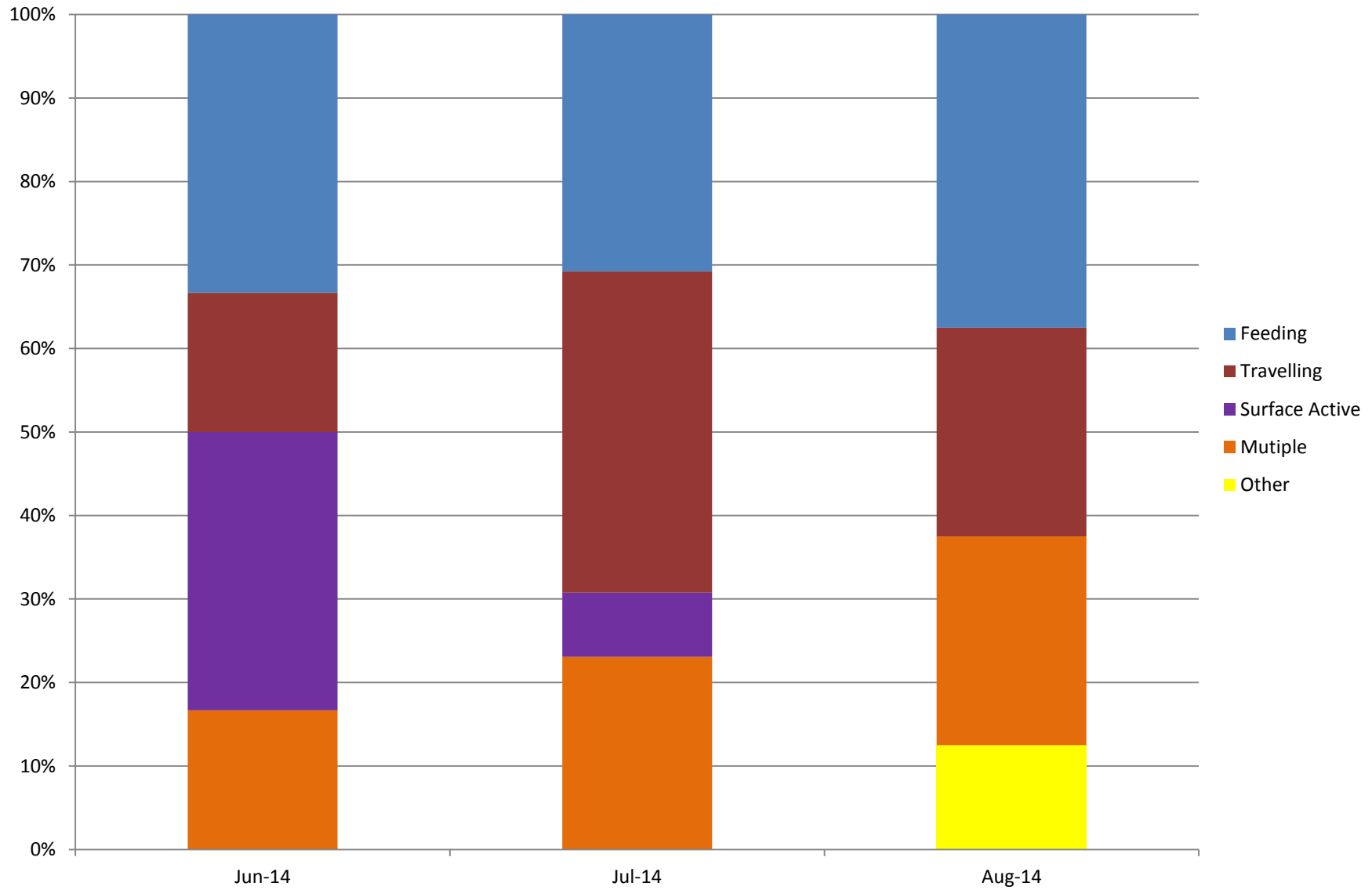


Figure 11. Activity Budget for Dolphin Behaviour June to August 2014.

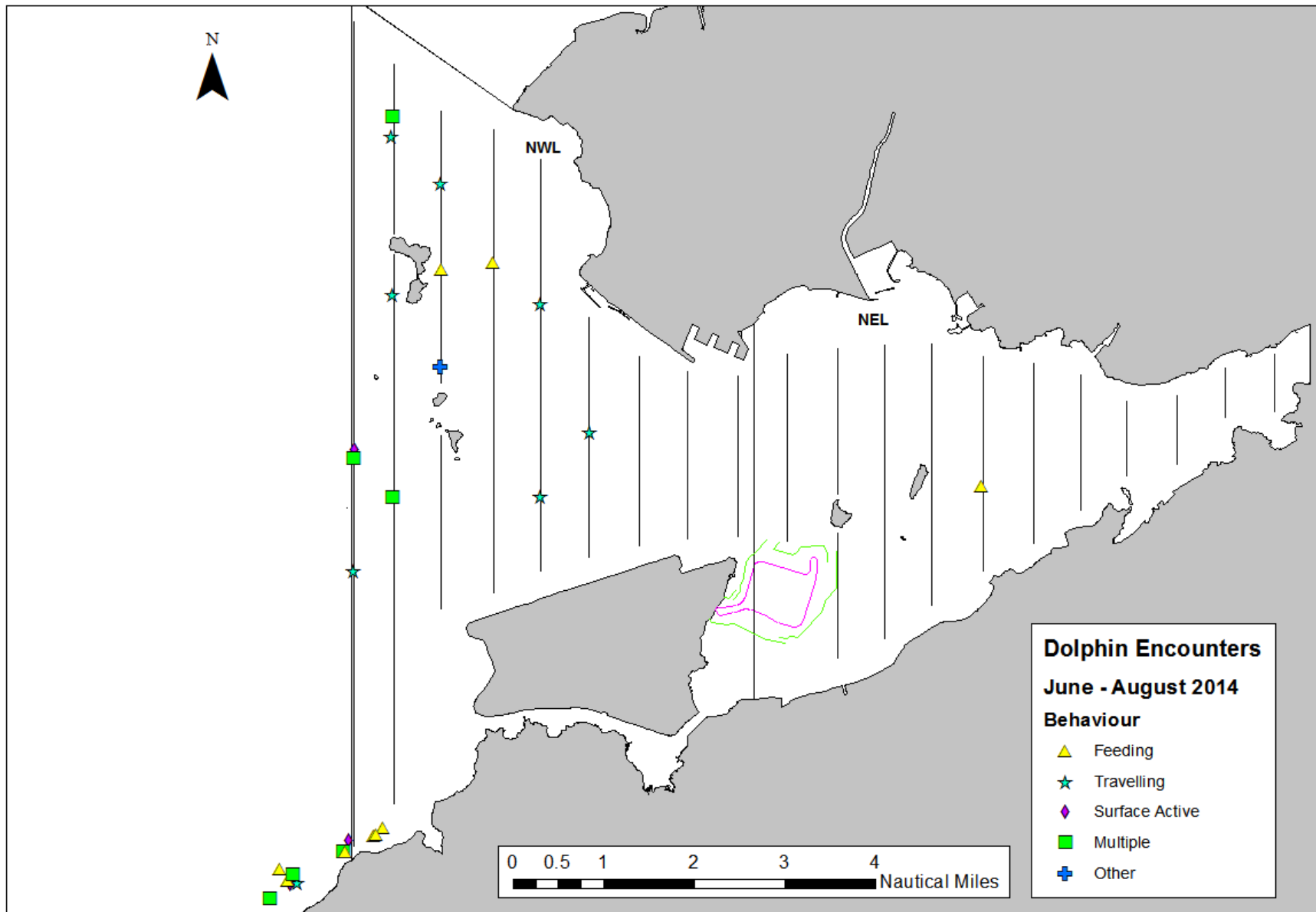


Figure 12. The Location of Different Behavioural Activities June to August 2014

## Annex I. Impact Monitoring Survey Schedule and Details (June – August 2014)

Date	Location of Survey	No. Sightings ON EFFORT	No. Sightings Opportunistic	Total km ON EFFORT (favourable conditions)
06/03/2014	NWL (1-5, 21, 22)	1	2	58.6
06/05/2014	NE and NW Lantau (6-20,23)	1	0	51.8
06/16/2014	NE and NW Lantau (5-20,23)	1	0	60.5
06/17/2014	NWL (1-4, 21, 22)	1	0	49.2
07/14/2014	NWL (1-4, 21, 22)	4	1	49.4
07/15/2014	NE and NW Lantau (5-20,23)	1	0	61.1
07/29/2014	NE and NW Lantau (1-6)	4	3	63.0
07/31/2014	NWL (7-20,23)	0	0	47.7
08/04/2014	NWL (1-4, 21, 22)	2	3	49.7
08/07/2014	NE and NW Lantau (5-20,23)	0	0	60.0
08/25/2014	NE and NW Lantau (1-5, 21, 22)	2	1	58.1
08/26/2014	NWL (6-20,23)	0	0	52.0
<b>Total</b>				<b>661.1</b>

All effort in all sea states is listed

## Annex II. Impact Monitoring Survey Effort Summary (June – August 2014)

Date	Area	Sea State (on effort)	Effort (km)	Season	Vessel	Type
06/03/2014	NWL	1	17.3	SUMMER	HKDW	IMPACT
06/03/2014	NWL	2	30.5	SUMMER	HKDW	IMPACT
06/03/2014	NWL	3	10.8	SUMMER	HKDW	IMPACT
06/05/2014	NWL	2	15	SUMMER	HKDW	IMPACT
06/05/2014	NEL	1	22.5	SUMMER	HKDW	IMPACT
06/05/2014	NEL	2	14.3	SUMMER	HKDW	IMPACT
06/16/2014	NWL	1	5.3	SUMMER	HKDW	IMPACT
06/16/2014	NWL	2	16.3	SUMMER	HKDW	IMPACT
06/16/2014	NWL	3	2	SUMMER	HKDW	IMPACT
06/16/2014	NEL	1	35.8	SUMMER	HKDW	IMPACT
06/16/2014	NEL	2	1.1	SUMMER	HKDW	IMPACT
06/17/2014	NWL	0	0.1	SUMMER	HKDW	IMPACT
06/17/2014	NWL	2	19.2	SUMMER	HKDW	IMPACT
06/17/2014	NWL	3	29.9	SUMMER	HKDW	IMPACT
07/14/2014	NWL	1	6.2	SUMMER	HKDW	IMPACT
07/14/2014	NWL	2	31.9	SUMMER	HKDW	IMPACT
07/14/2014	NWL	3	11.3	SUMMER	HKDW	IMPACT
07/15/2014	NWL	0	0.1	SUMMER	HKDW	IMPACT
07/15/2014	NWL	1	5.8	SUMMER	HKDW	IMPACT
07/15/2014	NWL	2	18.1	SUMMER	HKDW	IMPACT
07/15/2014	NEL	1	8.4	SUMMER	HKDW	IMPACT
07/15/2014	NEL	2	21.3	SUMMER	HKDW	IMPACT
07/15/2014	NEL	3	7.4	SUMMER	HKDW	IMPACT
07/29/2014	NWL	1	21.1	SUMMER	HKDW	IMPACT
07/29/2014	NWL	2	41.9	SUMMER	HKDW	IMPACT
07/31/2014	NWL	1	9	SUMMER	HKDW	IMPACT
07/31/2014	NWL	2	1.2	SUMMER	HKDW	IMPACT
07/31/2014	NEL	1	14.9	SUMMER	HKDW	IMPACT
07/31/2014	NEL	2	22.6	SUMMER	HKDW	IMPACT

## Annex II. Impact Monitoring Survey Effort Summary (June – August 2014) (con)

Date	Area	Sea State (on effort)	Effort (km)	Season	Vessel	Type
08/04/2014	NWL	0	0.8	SUMMER	HKDW	IMPACT
08/04/2014	NWL	1	40.1	SUMMER	HKDW	IMPACT
08/04/2014	NWL	2	8.8	SUMMER	HKDW	IMPACT
08/07/2014	NWL	1	1.2	SUMMER	HKDW	IMPACT
08/07/2014	NWL	2	22.2	SUMMER	HKDW	IMPACT
08/07/2014	NEL	0	0.3	SUMMER	HKDW	IMPACT
08/07/2014	NEL	1	23	SUMMER	HKDW	IMPACT
08/07/2014	NEL	2	13.3	SUMMER	HKDW	IMPACT
08/25/2014	NWL	1	38.3	SUMMER	HKDW	IMPACT
08/25/2014	NWL	2	19.8	SUMMER	HKDW	IMPACT
08/26/2014	NWL	1	10.1	SUMMER	HKDW	IMPACT
08/26/2014	NWL	2	4.8	SUMMER	HKDW	IMPACT
08/26/2014	NEL	1	13.8	SUMMER	HKDW	IMPACT
08/26/2014	NEL	2	19.4	SUMMER	HKDW	IMPACT
08/26/2014	NEL	3	3.9	SUMMER	HKDW	IMPACT

### Annex III. Impact Monitoring Sighting Database (June – August 2014)

Project	Contract	Date	Sighting No.	Time	Group Size	Area	Beaufort	PSD	Effort	Type	Latitude	Longitude	Season	Boat Assoc.
HKBCF	HY/2010/02	3-Jun-14	956	9:20	3	NWL	2	N/A	Opp	Impact	22.26008	113.8537	Summer	No
HKBCF	HY/2010/02	3-Jun-14	957	9:39	5	NWL	2	N/A	Opp	Impact	22.26285	113.8578	Summer	No
HKBCF	HY/2010/02	3-Jun-14	958	10:13	6	NWL	1	200	On	Impact	22.27093	113.8695	Summer	No
HKBCF	HY/2010/02	5-Jun-14	960	13:48	1	NEL	2	150	On	Impact	22.33637	113.9947	Summer	No
HKBCF	HY/2010/02	16-Jun-14	962	14:01	1	NWL	2	225	On	Impact	22.34635	113.9169	Summer	No
HKBCF	HY/2010/02	17-Jun-14	964	11:11	3	NWL	2	834	On	Impact	22.37756	113.8978	Summer	No
HKBCF	HY/2010/02	14-Jul-14	967	9:27	15	NWL	1	N/A	Opp	Impact	22.26872	113.8682	Summer	No
HKBCF	HY/2010/02	14-Jul-14	968	10:56	1	NWL	1	1000	On	Impact	22.32058	113.8702	Summer	No
HKBCF	HY/2010/02	14-Jul-14	970	11:24	1	NWL	1	80	On	Impact	22.34309	113.8703	Summer	No
HKBCF	HY/2010/02	14-Jul-14	971	12:25	3	NWL	2	104	On	Impact	22.40441	113.8777	Summer	No
HKBCF	HY/2010/02	14-Jul-14	972	13:01	3	NWL	2	58	On	Impact	22.37162	113.8778	Summer	No
HKBCF	HY/2010/02	15-Jul-14	975	10:34	1	NWL	2	355	On	Impact	22.36987	113.9071	Summer	No
HKBCF	HY/2010/02	29-Jul-14	979	9:51	1	NWL	1	N/A	Opp	Impact	22.27175	113.8743	Summer	No
HKBCF	HY/2010/02	29-Jul-14	980	10:04	2	NWL	1	N/A	Opp	Impact	22.27322	113.8762	Summer	No
HKBCF	HY/2010/02	29-Jul-14	981	2:14	2	NWL	1	N/A	Opp	Impact	22.27189	113.8749	Summer	No
HKBCF	HY/2010/02	29-Jul-14	982	10:27	2	NWL	1	143	On	Impact	22.26870	113.8687	Summer	No
HKBCF	HY/2010/02	29-Jul-14	983	12:18	9	NWL	2	686	On	Impact	22.33420	113.878	Summer	No
HKBCF	HY/2010/02	29-Jul-14	984	14:12	2	NWL	1	95	On	Impact	22.39204	113.8874	Summer	No
HKBCF	HY/2010/02	29-Jul-14	985	15:20	1	NWL	2	6	On	Impact	22.33440	113.9072	Summer	No
HKBCF	HY/2010/02	4-Aug-14	988	9:19	1	NWL	2	N/A	Opp	Impact	22.26310	113.8591	Summer	No
HKBCF	HY/2010/02	4-Aug-14	989	9:30	2	NWL	2	N/A	Opp	Impact	22.26351	113.8574	Summer	No
HKBCF	HY/2010/02	4-Aug-14	990	9:43	1	NWL	2	N/A	Opp	Impact	22.26562	113.8557	Summer	No
HKBCF	HY/2010/02	4-Aug-14	991	13:09	2	NWL	1	455	On	Impact	22.35825	113.8874	Summer	No
HKBCF	HY/2010/02	4-Aug-14	992	13:36	4	NWL	1	46	On	Impact	22.37636	113.8875	Summer	No
HKBCF	HY/2010/02	25-Aug-14	997	9:20	6	NWL	1	N/A	Opp	Impact	22.26450	113.8583	Summer	No
HKBCF	HY/2010/02	25-Aug-14	998	10:46	2	NWL	1	350	On	Impact	22.34126	113.8702	Summer	No
HKBCF	HY/2010/02	25-Aug-14	999	12:09	7	NWL	1	710	On	Impact	22.40086	113.8776	Summer	No



**Annex IV**  
**March 2012– August 2014**  
**(and Baseline September – November 2011)**  
**Photo Identification Information**

Identification Number	Baseline Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 123		2014/08/25	998	NWL
HZMB 122		2014/08/04	989	NWL
HZMB 121		2014/07/14	968	NWL
HZMB 120		2014/05/31	951	NWL
HZMB 119		2014/04/19	940	NWL
HZMB 118		2014/01/06	890	NWL
HZMB 117		2014/06/17	964	NWL
		2014/01/06	888	NWL
HZMB 116		2014/08/25	999	NWL
		2014/07/14	972	NWL
		2014/07/14	971	NWL
		2013/12/26	879	NWL
HZMB 115		2013/12/26	879	NWL
HZMB 114		2013/10/24	827	NWL
HZMB 113		2013/10/24	827	NWL
HZMB 112		2013/10/15	815	NWL
HZMB111		2013/10/15	815	NWL
HZMB 110		2013/10/15	812	NWL
HZMB 108		2013/08/30	780	NEL
HZMB 107		2013/08/21	770	NWL
HZMB 106		2013/08/21	769	NWL
HZMB 105		2014/05/31	951	NWL
		2013/07/08	711	NWL
HZMB 104		2013/07/08	711	NWL
HZMB 103		2013/07/08	711	NWL
HZMB 102		2013/07/08	706	NWL
HZMB 101		2013/07/08	706	NWL
HZMB 100		2013/07/08	706	NWL
HZMB 099		2013/06/13	681	NWL
		2013/06/13	680	NWL
HZMB 098	NL104	2014/08/04	992	NWL
		2014/01/06	888	NWL
		2013/11/02	849	NWL
		2013/11/02	845	NWL
		2013/10/24	831	NWL
		2013/07/08	711	NWL
		2013/05/24	659	NWL
HZMB 097		2013/05/09	647	NWL
HZMB 096		2013/04/01	621	NWL
HZMB 095		2013/08/30	780	NEL
		2013/06/25	697	NWL
		2013/06/13	682	NWL
		2013/04/01	621	NWL

HZMB 094		2014/05/31	954	NWL
		2014/02/17	910	NWL
		2013/06/26	703	NWL
		2013/06/25	698	NWL
		2013/03/18	601	NWL
HZMB 093		2013/05/24	657	NWL
		2013/02/21	587	NWL
HZMB 092		2013/02/21	589	NWL
		2013/02/15	581	NWL
HZMB 091		2013/02/15	579	NWL
HZMB 090		2013/06/25	697	NWL
		2013/06/13	682	NWL
		2013/02/15	579	NWL
HZMB 089		2013/02/15	579	NWL
HZMB 088		2013/02/15	579	NWL
HZMB 087		2013/02/15	579	NWL
HZMB 086	NL242	2013/05/09	642	NWL
		2013/02/15	579	NWL
		2011/10/10	Baseline	NWL
HZMB 085		2014/05/31	954	NWL
		2013/06/26	703	NWL
		2013/02/15	579	NWL
HZMB 084		2013/02/14	575	NWL
HZMB 083	NL136	2013/12/19	863	NWL
		2013/03/28	607	NWL
		2013/02/15	579	NWL
		2013/01/28	568	NWL
		2012/01/28	564	NWL
HZMB 082		2013/02/21	587	NWL
		2013/02/15	579	NWL
		2013/01/28	563	NWL
HZMB 081		2013/01/28	559	NWL
		2013/01/28	557	NWL
HZMB 080		2013/01/28	556	NWL
HZMB 079		2013/01/28	556	NWL
HZMB 078		2013/02/15	579	NWL
		2013/01/08	552	NWL
HZMB 077		2013/12/26	878	NWL
		2013/07/08	706	NWL
		2012/12/11	541	NWL
HZMB 076		2013/07/08	706	NWL
		2012/12/11	541	NWL
HZMB 075		2012/12/06	525	NEL

HZMB 074		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/21	594	NEL
		2012/12/10	529	NEL
		2012/12/06	525	NEL
HZMB 073		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/21	594	NEL
		2012/12/10	529	NEL
		2012/12/06	525	NEL
HZMB 072		2012/10/24	476	NWL
HZMB 071		2012/10/24	475	NWL
		2012/10/12	466	NWL
HZMB 070		2012/10/24	476	NWL
HZMB 069		2013/08/21	774	NWL
		2013/07/08	711	NWL
		2012/10/24	476	NWL
HZMB 068		2013/11/01	839	NWL
		2012/10/24	476	NWL
HZMB 067		2012/10/24	475	NWL
HZMB 066	NL93	2013/01/28	559	NWL
		2012/12/11	537	NWL
		2012/10/24	475	NWL
		2012/10/12	466	NWL
HZMB 064		2014/06/17	964	NWL
		2013/05/09	647	NWL
		2013/01/28	561	NWL
		2012/10/24	475	NWL
		2012/10/12	466	NWL
HZMB 063		2013/05/09	647	NWL
		2012/10/12	466	NWL
HZMB 062		2012/12/06	525	NEL
		2012/10/11	457	NWL
HZMB 060		2012/09/18	447	NWL
HZMB 059		2013/02/21	591	NWL
		2012/09/18	445	NWL
HZMB 057		2012/09/18	440	NWL
HZMB 056		2012/09/18	442	NWL
		2012/09/05	433	NEL
HZMB 055		2012/09/04	425	NWL

HZMB 054	CH34	2014/05/31	953	NWL
		2014/01/06	888	NWL
		2013/11/07	854	NWL
		2013/11/02	845	NWL
		2013/10/24	831	NWL
		2013/08/30	780	NEL
		2013/07/08	711	NWL
		2013/09/18	448	NWL
		2012/09/05	432	NEL
		2011/11/07	Baseline	NWL
		2011/11/05	Baseline	NWL
		2011/11/02	Baseline	NWL
		2011/11/01	Baseline	NEL
		2011/11/01	Baseline	NEL
2011/10/28	Baseline	NWL		
2011/10/06	Baseline	NWL		
HZMB 053		2012/09/04	425	NWL
HZMB 052		2012/09/04	423	NWL
HZMB 051	NL213	2014/08/04	989	NWL
		2013/05/09	644	NWL
		2013/04/01	622	NWL
		2013/02/15	582	NWL
		2013/02/15	581	NWL
		2013/01/28	559	NWL
		2013/01/28	556	NWL
		2012/09/04	422	NWL
HZMB 050		2014/07/14	971	NWL
		2014/01/10	900	NWL
		2014/01/06	888	NWL
		2013/02/15	579	NWL
		2012/09/04	421	NWL
HZMB 049		2014/07/29	982	NWL
		2012/09/03	419	NWL
HZMB 048		2012/09/03	419	NWL
HZMB 047		2012/09/03	412	NWL
HZMB 046		2012/09/03	412	NWL
HZMB 045		2014/02/17	910	NWL
		2013/06/13	682	NWL
		2013/02/15	579	NWL
		2012/11/01	495	NWL

HZMB 044	NL98	2014/02/17	910	NWL
		2013/12/19	864	NWL
		2013/11/02	845	NWL
		2013/11/01	842	NWL
		2013/10/15	819	NWL
		2013/05/09	648	NWL
		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/15	579	NWL
		2012/11/01	495	NWL
HZMB 043		2012/09/03	407	NWL
HZMB 042	NL260	2013/12/19	863	NWL
		2012/11/01	495	NWL
		2011/11/07	Baseline	NWL
HZMB 041	NL24	2014/06/05	960	NEL
		2014/02/17	910	NWL
		2013/11/02	845	NWL
		2013/05/09	648	NWL
		2013/05/09	647	NWL
		2013/04/01	623	NWL
		2013/04/01	621	NWL
		2013/02/15	579	NWL
		2012/11/01	495	NWL
		2011/11/06	Baseline	NEL
		2011/11/05	Baseline	NWL
2011/11/05	Baseline	NWL		
2011/10/10	Baseline	NWL		
HZMB 040		2014/02/17	910	NWL
		2014/01/06	893	NWL
		2013/10/15	821	NWL
		2013/07/08	714	NWL
		2013/07/08	711	NWL
		2013/02/21	589	NWL
		2012/11/01	493	NWL
HZMB 038		2012/11/01	490	NWL
HZMB 037		2012/11/01	490	NWL
HZMB 036		2012/09/03	407	NWL
		2012/11/01	490	NWL
HZMB 035		2013/02/15	579	NWL
		2012/11/01	490	NWL
HZMB 034		2012/11/01	493	NWL
HZMB 028		2013/04/01	625	NWL
		2012/08/06	373	NWL

HZMB 027		2013/12/19	863	NWL
		2013/02/15	579	NWL
		2013/01/28	568	NWL
		2013/01/28	564	NWL
		2012/06/14	299	NWL
HZMB 026		2013/06/25	697	NWL
		2013/05/09	642	NWL
		2013/01/28	561	NWL
		2012/06/13	295	NEL
HZMB 025		2013/02/22	596	NEL
		2013/02/21	591	NWL
		2012/12/06	525	NEL
		2012/10/11	457	NWL
		2012/06/13	295	NEL
HZMB 024		2013/03/18	601	NWL
		2012/06/13	295	NEL
HZMB 023		2014/01/06	888	NWL
		2013/07/08	715	NWL
		2013/07/08	711	NWL
		2013/04/01	619	NWL
		2013/02/21	589	NWL
		2013/02/15	579	NWL
		2012/07/10	330	NWL
HZMB 022		2014/08/04	991	NWL
		2014/01/06	888	NWL
		2013/10/24	827	NWL
		2013/07/08	715	NWL
		2013/07/08	711	NWL
		2013/04/01	619	NWL
		2013/02/21	589	NWL
		2013/02/15	579	NWL
	2012/07/10	330	NWL	
HZMB 021	NL37	2012/07/10	330	NWL
		2011/09/16	Baseline	NWL
HZMB 020		2012/07/10	330	NWL
HZMB 019		2012/07/10	330	NWL
HZMB 018		2014/02/17	910	NWL
		2013/05/09	647	NWL
		2013/02/21	594	NEL
		2012/12/10	529	NEL
		2012/07/10	330	NWL
HZMB 017		2012/07/10	330	NWL

HZMB 016		2013/07/08	706	NWL
		2012/12/11	539	NWL
		2012/09/18	446	NWL
		2012/09/04	421	NWL
		2012/07/10	330	NWL
HZMB 015		2012/07/10	330	NEL
HZMB 014	NL176	2013/12/26	880	NWL
		2012/08/06	373	NWL
		2012/06/13	295	NEL
		2011/11/06	Baseline	NEL
		2011/11/01	Baseline	NEL
2011/11/01	Baseline	NEL		
HZMB 013		2012/05/28	281	NWL
HZMB 012		2012/05/28	281	NWL
HZMB 011	EL01	2013/02/22	597	NEL
		2013/02/21	592	NEL
		2013/02/14	572	NEL
		2012/11/06	517	NEL
		2012/09/19	452	NWL
		2012/03/31	261	NEL
		2011/11/02	Baseline	NWL
2011/11/01	Baseline	NEL		
HZMB 009		2012/05/28	281	NWL
HZMB 008		2012/05/28	281	NWL
HZMB 007	NL246	2012/12/10	529	NEL
HZMB 006		2013/02/21	594	NEL
		2012/12/11	539	NWL
		2012/11/01	495	NWL
		2012/03/29	250	NWL
HZMB 005		2013/11/09	860	NWL
		2013/11/07	858	NWL
		2013/10/15	813	NWL
		2012/12/10	532	NWL
		2012/08/06	374	NWL
		2012/05/28	287	NWL
HZMB 004		2012/09/04	421	NWL
		2012/03/31	262	NWL
HZMB 003	NL179	2013/10/15	812	NWL
		2013/06/25	697	NWL
		2012/12/10	529	NEL
		2012/03/31	261	NWL
		2011/11/06	Baseline	NEL
		2011/09/16	Baseline	NWL



HZMB 002	WL111	2014/05/31	951	NWL
		2013/12/26	878	NWL
		2013/12/19	863	NWL
		2013/11/01	839	NWL
		2013/10/15	819	NWL
		2013/09/24	798	NWL
		2013/02/14	573	NWL
		2012/12/11	536	NWL
		2012/12/11	535	NWL
		2012/10/12	466	NWL
		2012/10/24	475	NWL
		2012/05/28	281	NWL
		2012/03/29	250	NWL
HZMB 001	WL46	2014/08/25	997	NWL
		2013/08/21	771	NWL
		2013/06/13	681	NWL
		2013/04/01	617	NWL
		2013/02/14	573	NWL
		2012/03/29	250	NWL
	CH98	2011/11/02	Baseline	NWL
	NL11	2011/11/02	Baseline	NWL
		2011/11/07	Baseline	NWL
	NL12	2011/11/02	Baseline	NWL
	NL33	2011/09/23	Baseline	NWL
		2011/11/01	Baseline	NEL
		2011/11/05	Baseline	NWL
		2011/11/07	Baseline	NWL
	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 2012-03-18\_10-53-38



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



HZMB 028 2012-08-08\_13-53-56



HZMB 028 2012-08-08\_13-59-08\_05



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 032 2012-10-24\_13-58-34\_02



HZMB 032 2012-12-11\_11-37-06\_01



HZMB 033 2012-08-15\_11-08-02\_03



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



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



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



HZMB 036 2012-09-03\_08-53-14\_01



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 2012-11-01\_13-22-54\_03



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



HZMB 041 2013-02-15\_14-41-58\_01



HZMB 041 2013-02-15\_14-45-08\_02



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



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



HZMB 044 2013-02-15\_14-41-06\_01





HZMB 044 2013-02-15\_14-46-22



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



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



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



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



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



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



HZMB 050 2013-02-15\_15-00-34\_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 2012-09-05\_11-06-42\_04



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



HZMB 056 2012-09-18\_09-56-52



HZMB 056 2012-09-18\_10-01-04



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



HZMB 059 2013-02-21\_16-49-34\_02



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



HZMB 061 2012-09-18\_17-17-58\_01



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



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



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



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



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



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



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



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 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 077 2013-07-08\_09-45-55\_01



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 2013-01-28\_13-22-47



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 2013-02-15\_14-46-42\_01



HZMB 086 2013-02-15\_14-46-14\_02



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 2013-02-15\_15-41-04\_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 105WL 2013-07-08\_14-17-45



HZMB 106 WL\_2013-08-21\_09-37-43



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



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



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



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



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



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



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



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



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



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



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



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



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



HZMB 120 2014-05-31\_09-50-10\_02



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



HZMB 121 LL\_2014-07-14 11-08-30 (4)



HZMB 122 2014-08-04 09-33-48\_01



HZMB 122 2014-08-04 09-34-16\_01



HZMB 123 2014-08-25#2





# China Harbour Engineering Company Limited

## Monthly Summary Waste Flow Table for August / 2014 (year)

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

Contract No.: HY/2010/02

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete (see Note 1)	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (see Note 2)	Chemical Waste (see Note 4)	Others, e.g. general refuse (see Note 3)
	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000 kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000 m <sup>3</sup> )
Jan-14	0.0000	0.0000	0.0000	0.0000	0.0000	1158.9828	0.0000	0.1680	0.0000	2.0000	0.0325
Feb-14	0.0000	0.0000	0.0000	0.0000	0.0000	1064.5957	0.0000	0.2520	0.0000	0.0000	0.0520
Mar-14	0.0000	0.0000	0.0000	0.0000	0.0000	1111.9982	0.0000	0.0000	0.0000	1.4000	0.1690
Apr-14	0.0000	0.0000	0.0000	0.0000	0.0000	1294.8080	0.0000	0.0000	0.0000	0.0000	0.0845
May-14	0.0000	0.0000	0.0000	0.0000	0.0000	1181.4168	0.0400	0.0240	0.0000	1.0000	0.2250
Jun-14	0.0000	0.0000	0.0000	0.0000	0.0000	752.7711	0.0000	0.1400	0.0000	8.8000	0.1690
Sub-total	0.0000	0.0000	0.0000	0.0000	0.0000	6564.5726	0.0400	0.5840	0.0000	13.2000	0.7320
Jul-14	0.0000	0.0000	0.0000	0.0000	0.0000	1252.4373	0.0030	0.0340	0.0010	0.2000	0.2145
Aug-14	0.0000	0.0000	0.0000	0.0000	0.0000	1427.9730	0.0000	0.1960	0.0000	0.0000	0.0650
Sep-14											
Oct-14											
Nov-14											
Dec-14											
Total	0.0000	0.0000	0.0000	0.0000	0.0000	9244.9829	0.0430	0.8140	0.0010	13.4000	1.0115

- 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<sup>3</sup> by volume.
  - (4) Chemical waste refer to spent “battery” and “oil with water”.

## Appendix J

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

#### Cumulative statistics on Exceedances

		Total no. recorded in this reporting quarter	Total no. recorded since project commencement
<b>1-Hour TSP</b>	Action	-	-
	Limit	-	-
<b>24-Hour TSP</b>	Action	-	-
	Limit	-	-
<b>Noise</b>	Action	-	-
	Limit	-	-
<b>Water Quality</b>	Action	-	1
	Limit	-	1
<b>Dolphin Monitoring</b>	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
<b>Environmental complaints</b>	3 July 2014	As informed by the Contractor on 3 July 2014, there was an environmental complaint received on 13 June 14. The complainant who lived at Caribbean Coast complained that there were night time noise and visual impact (strong lighting) from the overnight construction works/plants of HKBCF Island.	Closed	1	21

		<p>After investigation, this visual impact complaint is likely to be related to the construction works of this contract.</p> <p>However, with referred to the available information, it is concluded that the night time noise complaint is unlikely to be related to this Contract.</p>			
	23 July 14	<p>As informed by the Contractor on 23 July 14, a complaint has been received from Oriental Daily Newspaper on 22 July 14. In the complaint, Oriental Daily Newspaper stated that Miss Cheung, who is a resident of Miami Beach Towers (Tuen Mun), pointed out that construction of the airport artificial island engineering works was being conducted at the sea area in front of the estate, a lot of sand delivery barges were moored at sea area between Castle Peak Beach (Tuen Mun Typhoon Shelter) and Tuen Mun Ferry Pier. She discovered on several occasions that there were leakage of soil from sand delivery barges causing discoloration of sea water and sometimes, leaking of sand from more than two sand delivery barges at a time was observed.</p> <p>After investigation, there is no</p>	Closed	2	22

## Appendix K – Event Action Plan

### Event / Action Plan for Air Quality

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

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



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

Event / Action Plan for Construction Noise

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

Event / Action Plan for Water Quality

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

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

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

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

Event / Action Plan for Dolphin Monitoring

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

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



		adequate information to conclude the observed impact is related to this Contract.			
	22 August 2014	<p>As informed by the Contractor on 22 Aug 2014, EPD referred a complainant to this Contract on 21 August 2014, the complainant raised concern about uncovered sand barges at the sea area outside Melody Garden, Tuen Mun, sand were brought to inside of houses by wind and also causing the vicinity to be covered with sand and dust.</p> <p>After investigation, there is no adequate information to conclude the observed impact is related to this Contract.</p>	Closed	3	23
<b>Notification of summons</b>	-	-	-	-	2
<b>Successful Prosecutions</b>	-	-	-	-	2

**Report No. D006**  
**Monitoring Period June 2014 - August 2014**

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

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

**Quarterly Encounter Rate**

	STG*	ANI**	Level Exceeded
<b>NEL</b>	0.5	0.5	Limit
<b>NWL</b>	3.6	10.9	

<sup>#</sup> Reference is made to the enhanced Event Action Plan for Chinese White Dolphin Monitoring accepted by EPD on 7 May 2013.

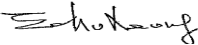
\*Quarterly Encounter Rate of Number of Dolphin Sightings (STG) presents averaged encounter rates of the three monitored months in terms of groups per 100km per survey event.

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

**Investigation Results:**

- a) Causes of exceedance
- After review of all available and relevant data, including the raw data and analyses of other parameters included in the EM&A, no significant variation is detected in key environmental parameters.
  - No direct relationship with Project construction activities can be found between either the increase or decrease of dolphin numbers in NEL.
  - It was observed that both NEL and NWL areas have been affected by construction and transport activities which are not related to this Contract. These activities may cause impact to marine mammals, usually manifested as a shift in distribution although we do not yet know the long term effect of these activities which are not part of this Contract.
  - Current mitigation measures are being upheld. Both day and night MMO and PAM systems have been fully implemented from the start of works of the Project.
  - There has been no failure or reduction of dolphin-specific mitigation measures.
- There is no evidence that exceedances are related to Project works.
- b) Action required under the action plan  
 Please refer to corresponding Event and Action Plan.
- c) Action taken under the action plan
1. Statistical data analysis has been repeated to confirm findings;
  2. All available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&A have been reviewed;
  3. Identification of source of impact was carried out;
  4. The IEC, ER and Contractor have been informed of findings;
  5. Monitoring data have been checked
  6. Repeated review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary;
  7. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related to Project works.
- d) ET's conclusions and recommendations for mitigation  
 Current mitigation measures for CWD are being implemented fully, and the Contractor has been reminded to consistently implement existing mitigation measures.
- e) Contractor's actions to implement the mitigation  
 N/A

Please refer to the attachment for the full investigation result.

ET Leader Signature & Date:  30-Oct-14

**Report No. D006**  
**Monitoring Period June - Aug 2014**

### ***Investigation Report Attachment***

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

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

- 2. Identify source(s) of impacts.***

There is a documented significant population decline of the Hong Kong dolphin and, as yet, no detailed assessment of causal factors is available. Recent population modelling studies do show a significant and, possibly, accelerating population decline since 2000 (see 1) and, prior to 2008, an expert panel concluded that the anthropogenic activities which occur in the Hong Kong and adjacent habitat which have considerable potential to affect the PRE dolphin population through pollution, infection, lowered prey availability, intense and low noise levels, collisions, behavioural changes, disturbance, entanglement in fishing gear and habitat modification are; construction, dredging, sewage disposal, industrial effluent discharge, shipping, reclamation, fishing. Since this review, pro-active management by AFCD has resulted in a reduction of the negative impacts caused by non-sustainable fishing (as the trawling ban progresses “lowered prey availability” should alter) and a general reduction in fishing activities will reduce the potential for entanglement in fishing gear. Other identified impacts, however, are ongoing and it is noted that construction activities and the high speed ferry traffic in NEL and NWL have both increased since 2008 (AFCD Annual Monitoring Reports 2009;2010;2011;2012;2013;2014). It is known from studies elsewhere that dredging and all piling activities cause significant disturbance to marine mammals (David 2006; Jefferson *et al.* 2009; Bailey *et al* 2010). These activities do not occur as part of this Project but may do elsewhere in the NEL and NWL areas as well as in Hong Kong and

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

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

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

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

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

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

No construction works associated with the Project can be found to coincide with the observed dolphin encounter rates.

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

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.

These factors were reported in D005 and, since that period, there has been no reduction in the overall and / or cumulative impacts listed. As no quantitative levels of impact were predicted in the impact

assessment, and given the interactive nature of the number and extent of impacts from both Project and non-Project related activities, the conclusions of D005 still ae valid; at this time, the long term impacts of construction and other activities not associated with this Project can neither be looked at in isolation nor conclusively assess long term or significant impact

#### References

AFCD Monitoring Report. From:

[http://www.afcd.gov.hk/english/conservation/con\\_mar/con\\_mar\\_chi/con\\_mar\\_chi\\_chi/con\\_mar\\_chi\\_chi.html](http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html)

Bailey, H., Senior, B., Simmons, D., Rusin, J., Picken, G., & Thompson, P. M. (2010). Assessing underwater noise levels during pile-driving at an offshore windfarm and its potential effects on marine mammals. *Marine Pollution Bulletin*, 60 (6), 888-897.

David, J.A. (2006). Likely sensitivity of bottlenose dolphins to pile-driving noise. *Water and Environment Journal* 20:48–54

Jefferson, T. A., Hung, S. K., & Würsig, B. (2009). Protecting small cetaceans from coastal development: Impact assessment and mitigation experience in Hong Kong. *Marine Policy*, 33(2), 305-311.

Huang , S.L., Karczmarski, L., Chen, J, Zhou, R., Lin, W., Zhang, H., Li, H. and Wu, Y.P. (2012). Demography and population trends of the largest population of Indo-Pacific humpback dolphins. *Conservation Biology* 147(1):234-42

Gui, D., Yu, R., He, X., Tu, Q., Chen, L., and Wu, Y. (2014) Bioaccumulation and biomagnification of persistent organic pollutants in Indo-Pacific humpback dolphins (*Sousa chinensis*) from the Pearl River Estuary, China. *Chemosphere Volume 114, November 2014*, Pages 106 – 113