

**Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link –
Northern Connection Sub-sea Tunnel
Section**

*Third Quarterly Environmental Monitoring &
Audit (EM&A) Report*

20 November 2014

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Contract No. HY/2012/08





Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

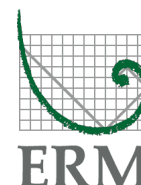
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Third Quarterly Environmental Monitoring & Audit (EM&A) Report

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Summary: This document presents the Third Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.		Date: 20 November 2014			
		Approved by: 			
		Mr Craig Reid Partner			
		Certified by: 			
		Mr Jovy Tam ET Leader			
	3 rd Quarterly EM&A Report	VAR	JT	CAR	20/11/14
Revision	Description	By	Checked	Approved	Date
<p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p>		<p>Distribution</p> <p><input type="checkbox"/> Internal</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p>			
		 			



Ref.: HYDHZMBEEM00_0_2470L.14

21 November 2014

AECOM
Supervising Officer Representative's Office
No. 8 Mong Fat Street, Tuen Mun,
New Territories, Hong Kong

By Fax (2450 3099) and By Post

Attention: Messrs. Edwin Ching / Andy Westmorelan

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/2012/08 TM-CLKL Northern Connection Sub-sea Tunnel Section
Third Quarterly Environmental Monitoring & Audit (EM&A) Report**

Reference is made to the Third Quarterly Environmental Monitoring & Audit (EM&A) Report certified by the ET Leader (ET's ref.: "0212330_3rd Quarterly EM&A_20141119.doc" dated 20 November 2014) provided to us via email on 20 November 2014.

We are pleased to inform you that we have no adverse comments on the captioned Report.

Thank you for your kind attention. Please do not hesitate to contact the undersigned or the ENPO Leader Mr. Y. H. Hui should you have any queries.

Yours sincerely,



F. C. Tsang
Independent Environmental Checker
Tuen Mun – Chek Lap Kok Link

c.c. HyD – Mr. Stephen Chan (By Fax: 3188 6614)
HyD – Mr. Matthew Fung (By Fax: 3188 6614)
AECOM – Mr. Conrad Ng (By Fax: 3922 9797)
ERM – Mr. Jovy Tam (By Fax: 2723 5660)
Dragages – Bouygues JV – Mr. C. F. Kwong (By Fax: 2293 7499)

Internal: DY, YH, CL, ENPO Site

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EXECUTIVE SUMMARY

Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project) while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with *Environmental Permit No. EP-354/2009/A*. ENVIRON Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO). Another application for variation of environmental permit (VEP) (*EP-354/2009/B*) was granted on 28 January 2014.

The construction phase of the Project commenced on 1 November 2013 and will tentatively be completed by the end of 2018. The impact monitoring of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.

This is the Third Quarterly EM&A report presenting the EM&A works carried out during the period from 1 June 2014 to 31 August 2014 for the *Contract No. HY/2012/08 Northern Connection Sub-sea Tunnel Section* (the “Project”) in accordance with the Updated EM&A Manual of the TM-CLK Link Project. As informed by the Contractor, the major activities in the reporting quarter included:

Marine-based Works

- Dredging at Portion N-C
- Reclamation Filling at Portions N-A and N-B
- Construction of Vertical Seawall and Sloping Seawall at Portions N-B and N-C
- Marine Sheet Piling for Box Culvert extension at Portion N-A

Land-based Works

Portion N6

- CLP Substation structure works
- CLP Substation E&M works
- Bored Piling
- Pile Cap Construction

Reclamation Works Area – Portion N-A

- Construction of temporary access
- Diaphragm Wall Construction
- Vibro-Compaction

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

24-hour TSP Monitoring	16 sessions
1-hour TSP Monitoring	16 sessions
Impact Water Quality Monitoring	38 sessions
Impact Dolphin Monitoring	6 sessions
Joint Environmental Site Inspection	13 sessions
Post Translocation Coral Monitoring	1 session

Implementation of Marine Mammal Exclusion Zone

Daily marine mammal exclusion zone was in effect during the period of marine works under this Contract. Passive Acoustic Monitoring (PAM) was also implemented for the detection of marine mammal when marine works are carried out outside the daylight hours under this Contract. No sighting of the Indo-Pacific humpback dolphin *Sousa chinensis* (i.e. Chinese White Dolphin) was recorded during the reporting period from June to August 2014 during both day-time marine mammal exclusion zone and passive acoustic monitoring.

Summary of Breaches of Action/Limit Levels

Breaches of Action and Limit Levels for Air Quality

No exceedances were recorded from the air quality monitoring in this reporting period.

Breaches of Action and Limit Levels for Water Quality

No exceedances were recorded from the water quality monitoring in this reporting period.

Dolphin Monitoring

Whilst two Action Level exceedances were observed for the quarterly dolphin monitoring data between June 2014 and August 2014, no unacceptable impact from the construction activities of the TM-CLKL Northern Connection Sub-sea Tunnel Section on Chinese White Dolphins was noticeable from general observations during the dolphin monitoring in this reporting quarter. The exceedances are considered to be the natural variation of Chinese White Dolphin ranging pattern.

Post Translocation Coral Monitoring

The Third quarterly Coral Post-Translocation Monitoring was conducted on 24 July 2014 and the results were provided in the Third Quarterly Post-Translocation Coral Monitoring Report. No exceedances were recorded from the third quarterly coral post-translocation monitoring in this reporting period.

Environmental Complaints, Non-compliance & Summons

No non-compliance with EIA recommendations, EP conditions and other requirements associated with the construction of this Contract was recorded in this reporting period.

No complaint/ enquiry case was record during the reporting period.

No environmental summons was received in this reporting period.

Reporting Change

There was no reporting change required in the reporting period.

Upcoming Works for the Next Reporting Period

Works to be undertaken in the coming quarterly period include the following:

Marine-based works

- Reclamation Filling
- Vertical seawall construction
- Sloping seawall construction
- Marine sheet piling for box culvert extension
- Predrilling for box culvert foundation

Land-based works

Portion N6

- CLP substation utilities works; and
- Pile Cap Construction

Reclamation Works Area – Portion N-A

- Diaphragm Wall Construction
- Construction of temporary access; and,
- Vibro-Compaction

Future Key Issues

Potential environmental impacts arising from the above upcoming construction activities in the coming quarterly period are expected to be mainly associated with dust, marine water quality, marine ecology and waste management.

1.1

BACKGROUND

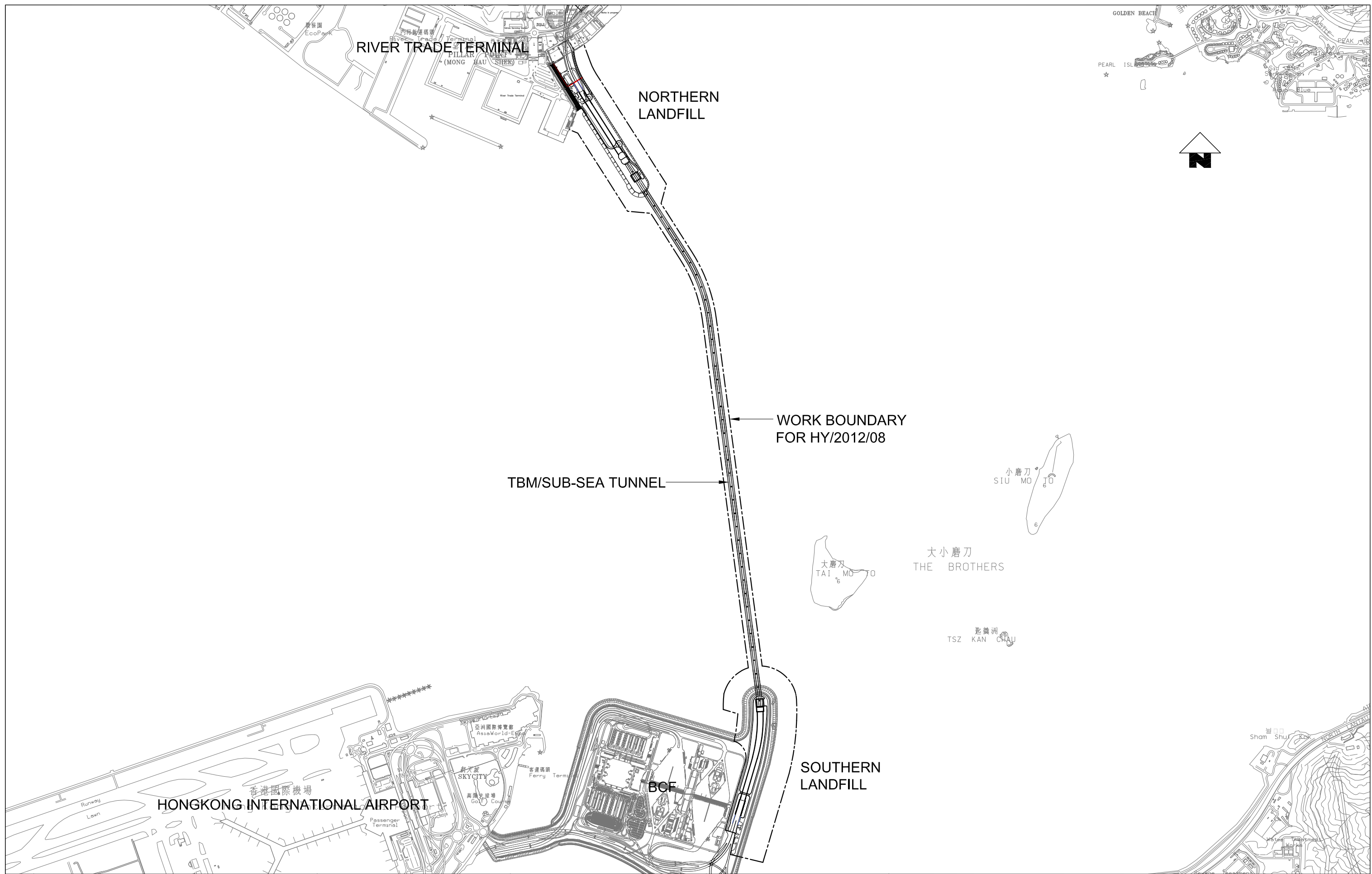
According to the findings of the Northwest New Territories (NWNT) Traffic and Infrastructure Review conducted by the Transport Department, Tuen Mun Road, Ting Kau Bridge, Lantau Link and North Lantau Highway would be operating beyond capacity after 2016. This forecast has been based on the estimated increase in cross boundary traffic, developments in the Northwest New Territories (NWNT), and possible developments in North Lantau, including the Airport developments, the Lantau Logistics Park (LLP) and the Hong Kong – Zhuhai – Macao Bridge (HZMB). In order to cope with the anticipated traffic demand, two new road sections between NWNT and North Lantau – Tuen Mun – Chek Lap Kok Link (TM-CLKL) and Tuen Mun Western Bypass (TMWB) are proposed.

An Environmental Impact Assessment (EIA) of TM-CLKL (the Project) was prepared in accordance with the EIA Study Brief (No. ESB-175/2007) and the *Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM)*. The EIA Report was submitted under the Environmental Impact Assessment Ordinance (EIAO) in August 2009. Subsequent to the approval of the EIA Report (EIAO Register Number AEIAR-146/2009), an Environmental Permit (EP-354/2009) for TM-CLKL was granted by the Director of Environmental Protection (DEP) on 4 November 2009, and EP variation (VEP) (EP-354/2009A) was issued on 8 December 2010. Another application for VEP (EP-354/2009/B) was granted on 28 January 2014.





Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of TM-CLKL while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with Environmental Permit No. EP-354/2009/A. ENVIRON Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO).

Layout of the Contract components is presented in *Figure 1.1*.

The construction phase of the Contract commenced on 1 November 2013 and will tentatively be completed by 2018. The impact monitoring phase of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.



Designed By	PKV
Drawn By	DAI
Approved By	SPo
Date	11SEP2013
Rev.	Description
A	FIRST ISSUE
	11SEP13
	PKV
	Checked

Main Contractor	 
Client	
Contractor's Designer	




 A member of the Bouygues Construction group
Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營



HIGHWAYS DEPARTMENT


 Ove Arup & Partners
 Hong Kong Limited

Project Contract No. HY/2012/08
 Tuen Mun - Chek Lap Kok Link -
 Northern Connection Sub-Sea Tunnel Section
 Drawing Title **Figure 1.1**

Drawing no.	TMCLKL8-DBJ-GEN-DWG-00174
Scale	1:25000 @ A3
CADD Ref.	TMCLKL8-DBJ-GEN-DWG-00174-DFT-A
Issue Status	DFT (DRAFT)
Revision	A

1.2 SCOPE OF REPORT

This is the Third Quarterly EM&A Report under the *Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section*. This report presents a summary of the environmental monitoring and audit works from 1 June 2014 to 31 August 2014.

1.3 ORGANIZATION STRUCTURE

The organization structure of the Contract is shown in *Appendix A*. The key personnel contact names and contact details are summarized in *Table 1.1* below.

Table 1.1 *Contact Information of Key Personnel*

Party	Position	Name	Telephone	Fax
Highways Department	Engr 16/HZMB	Kenneth Lee	2762 4996	3188 6614
SOR (AECOM Asia Company Limited)	Chief Resident Engineer	Edwin Ching	2450 3111	2450 3099
		Andrew Westmoreland	2450 3511	2450 3099
ENPO / IEC (ENVIRON Hong Kong Ltd.)	ENPO Leader	Y.H. Hui	3465 2888	3465 2899
	IEC	F. C. Tsang	3465 2828	3465 2899
Contractor (Dragages – Bouygues Joint Venture)	Environmental Manager	C.F. Kwong	2293 7322	2670 2798
	Environmental Officer	Bryan Lee	2293 7323	2670 2798
	24-hour complaint hotline	Rachel Lam	2293 7342	
ET (ERM-HK)	ET Leader	Jovy Tam	2271 3113	2723 5660

1.4 SUMMARY OF CONSTRUCTION WORKS

The construction phase of this Contract was commenced on 1 November 2013. The three-month rolling construction programme is shown in *Appendix B*.

With reference to DBJV's information, details of major construction works carried out in this reporting period are summarized in *Table 1.2*.

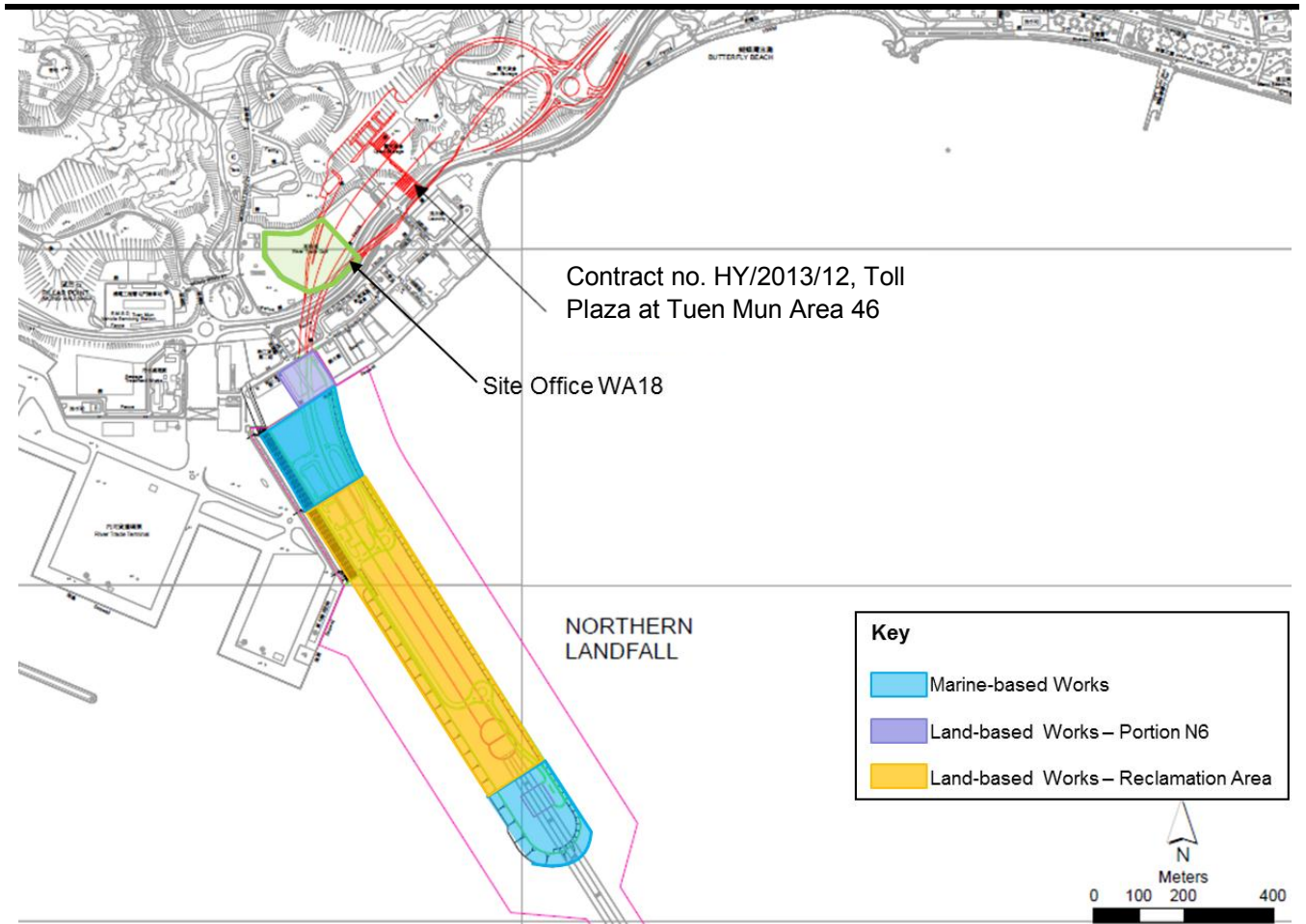
The general layout plan of the site showing the detailed works areas is shown in *Figure 1.2*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.3*.

The implementation schedule of environmental mitigation measures is presented in *Appendix C*.

Table 1.2 **Summary of Construction Activities Undertaken during the Reporting Period**

Construction Activities Undertaken
<i>Marine-based Works</i>
<ul style="list-style-type: none">• Dredging at Portion N-C• Reclamation Filling at Portions N-A and N-B• Construction of Vertical Seawall and Sloping Seawall at Portions N-B and N-C• Marine Sheet Piling for Box Culvert extension at Portion N-A
<i>Land-based Works</i>
Portion N6
<ul style="list-style-type: none">• CLP Substation structure works• CLP Substation E&M works• Bored Piling• Pile Cap Construction
Reclamation Area - Portion N-A
<ul style="list-style-type: none">• Construction of temporary access• Diaphragm Wall Construction• Vibro-Compaction

Figure 1.2 Locations of Construction Activities – June 2014 to August 2014



a. Tuen Mun – Land-based and Marine-based Works Area

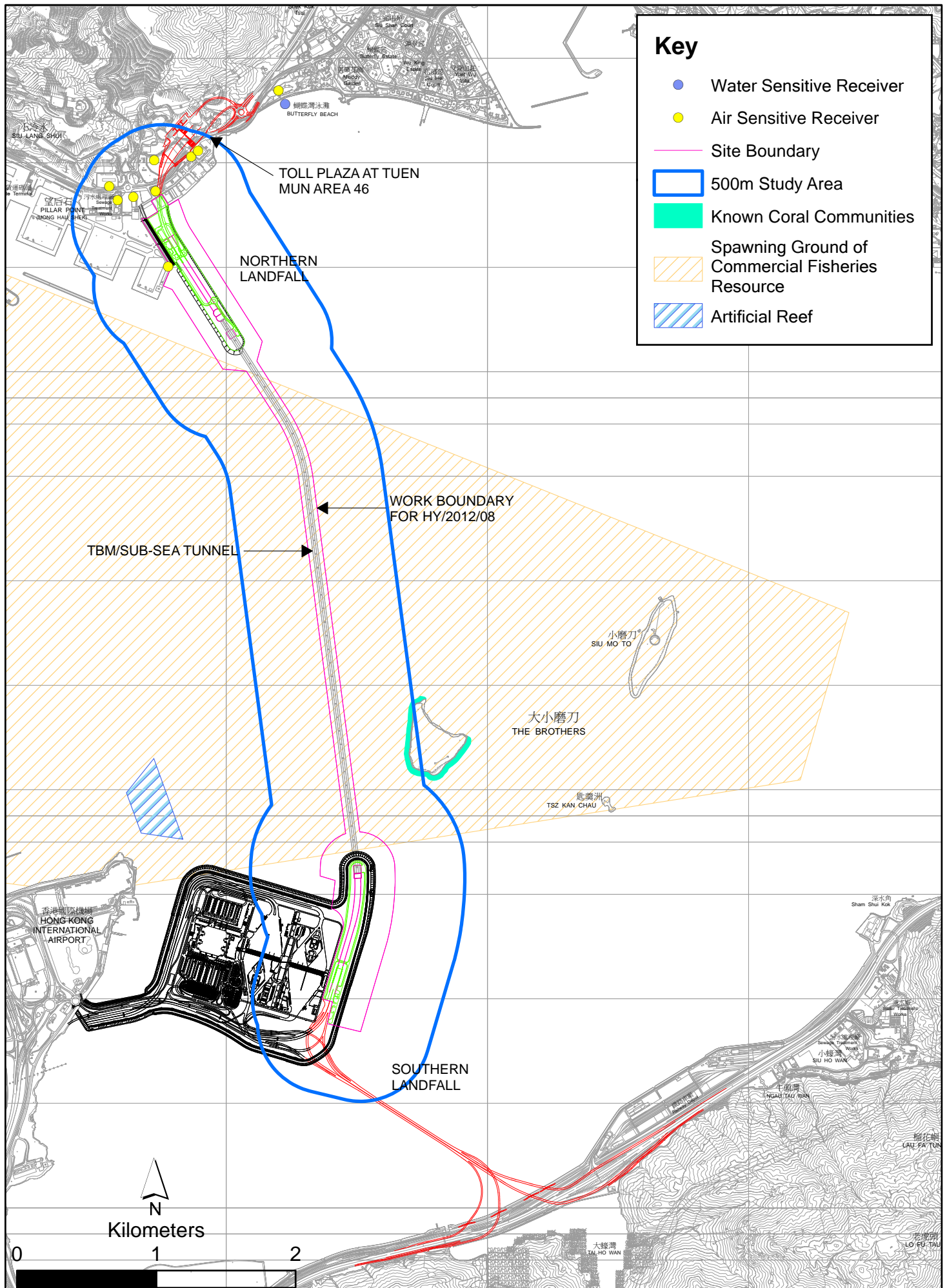


Figure 1.3 Environmental Sensitive Receivers in the vicinity of Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-Sea Tunnel Section

The EM&A programme required environmental monitoring for air quality, water quality and marine ecology as well as environmental site inspections for air quality, noise, water quality, waste management, marine ecology and landscape and visual impacts. The EM&A requirements and related findings for each component are summarized in the following sections

2.1 AIR QUALITY

As per the requirements under *Condition 2.4* of EP-354/2009/A and EP-354/2009/B, the Enhanced TSP Monitoring Plan has been prepared under *Contract No. HY/2012/08*. Details of the monitoring plan are presented in the *Enhanced TSP Monitoring Plan* ⁽¹⁾.

2.1.1 Monitoring Requirements and Equipment

In accordance with the Updated EM&A Manual and the *Enhanced TSP Monitoring Plan*, impact 1-hour TSP monitoring was conducted three (3) times in every six (6) days and impact 24-hour TSP monitoring was carried out once in every six (6) days when the highest dust impact was expected.

High volume samplers (HVSs) were used to carry out the 1-hour and 24-hour TSP monitoring in the reporting quarter at the five (5) air quality monitoring stations in accordance with the requirements stipulated in the Updated EM&A Manual (*Figure 2.1; Table 2.1*). Wind anemometer was installed at the rooftop of ASR5 for logging wind speed and wind direction. Details of the equipment deployed are provided in *Table 2.2*.

⁽¹⁾ ERM (2013) Enhanced TSP Monitoring Plan. Submitted on 28 October 2013 and subsequently approved by EPD on 1 November 2013.

Table 2.1 *Locations of Impact Air Quality Monitoring Stations and Monitoring Dates in this Reporting Period*

Monitoring Station	Location	Description	Parameters & Frequency	Monitoring Dates
ASR1	Tuen Mun Fireboat Station	Office	• 1-hour Total Suspended Particulates	3, 9, 13, 19, 25 and 30 June 2014;
ASR5	Pillar Point Fire Station	Office	(1-hour TSP, $\mu\text{g}/\text{m}^3$), 3 times per day	5, 11, 19, 23 and 29 July 2014;
AQMS1	Previous River Trade Golf	Bare ground		4, 8, 14, 20 and 26 August 2014
ASR6	Butterfly Beach Laundry	Office		
ASR10	Butterfly Beach Park	Recreational uses	• 24-hour Total Suspended Particulates (24-hour TSP, $\mu\text{g}/\text{m}^3$), daily for 24-hour in every 6 days	

Table 2.2 *Air Quality Monitoring Equipment*

Equipment	Brand and Model
High Volume Sampler (1-hour TSP and 24-hour TSP)	Tisch Environmental Mass Flow Controlled Total Suspended Particulate (TSP) High Volume Sampler (Model No. TE-5170)
Wind Meter	MetPak (Model: MetPak II (S/N: 13130002)
Wind Anemometer for calibration	Lutron (Model No. AM-4201)

2.1.2 *Action & Limit Levels*

The Action and Limit Levels of the air quality monitoring is provided in *Appendix D*. The Event and Action plan is presented in *Appendix I*.

2.1.3 *Monitoring Schedule for the Reporting Quarter*

The schedules for air quality monitoring in the reporting quarter are provided in *Appendix E*.

2.1.4 *Results and Observations*

Impact air quality monitoring was conducted at all designated monitoring stations in the reporting period under favourable weather conditions. The major dust sources in the reporting period include construction activities under the Contract as well as nearby traffic emissions.

The monitoring results for 1-hour TSP and 24-hour TSP are summarized in *Tables 2.3* and *2.4*, respectively. Monitoring results are presented graphically in *Appendix F* and detailed impact air quality monitoring data were reported in the *Eighth to Tenth Monthly EM&A Report*.

Table 2.3 Summary of 1-hour TSP Monitoring Results in this Reporting Period

Month/Year	Station	Average ($\mu\text{g}/\text{m}^3$)	Range ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
June 2014 to	ASR 1	158	83 - 321	331	500
August 2014	ASR 5	150	65 - 287	340	500
	AQMS1	88	48 - 148	335	500
	ASR6	120	60 - 224	338	500
	ASR10	86	43 - 183	337	500

Table 2.4 Summary of 24-hour TSP Monitoring Results in this Reporting Period

Month/Year	Station	Average ($\mu\text{g}/\text{m}^3$)	Range ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
June 2014 to	ASR 1	87	49 - 152	213	260
August 2014	ASR 5	80	56 - 120	238	260
	AQMS1	52	38 - 85	213	260
	ASR6	66	43 - 135	238	260
	ASR10	51	40 - 68	214	260

In this reporting period, a total of sixteen monitoring events were undertaken in which no Action Level exceedances or Limit Level exceedances for 1-hr TSP; no Action Level exceedances or Limit Level exceedances for 24-hr TSP were recorded. Summary of Exceedances for Air Quality Impact Monitoring in this Reporting Quarter is detailed in *Table 2.15*.

2.2

WATER QUALITY MONITORING

The baseline water quality monitoring undertaken by the Hong Kong - Zhuhai - Macao Bridge Hong Kong Projects (HKZMB) between 6 and 31 October 2011 has included all monitoring stations for the Project. Thus, the baseline monitoring results and Action/Limit Levels presented in HKZMB Baseline Monitoring Report ⁽¹⁾ are adopted for this Project.

2.2.1

Monitoring Requirements & Equipment

In accordance with the Updated EM&A Manual, impact water quality monitoring was carried out three days per week during the construction period at nine (9) water quality monitoring stations (*Figure 2.2; Table 2.5*).

Table 2.5 *Locations of Water Quality Monitoring Stations and the Corresponding Monitoring Requirements*

Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
		Easting	Northing			
IS12	Impact Station	813218	823681	<ul style="list-style-type: none"> • Temperature(°C) • pH(pH unit) • Turbidity (NTU) • Water depth (m) • Salinity (ppt) • DO (mg/L and % of saturation) • SS (mg/L) 	3 water depths: 1m	Impact monitoring: 3 days per week, at mid-flood and mid-ebb tides during the construction period of the Contract.
IS13	Impact Station	813667	824325		below sea surface,	
IS14	Impact Station	812592	824172		mid-depth and 1m	
IS15	Impact Station	813356	825008		above sea bed. If	
CS4	Control / Far Field Station	810025	824004		the water depth is	
CS6	Control / Far Field Station	817028	823992		less than 3m, mid-depth sampling	
SR8	Sensitive receiver (Gazettal beaches in Tuen Mun)	816306	825715		only. If water	
SR9	Sensitive receiver (Butterfly Beach)	813601	825858		depth less than 6m, mid-depth may be omitted.	
SR10A	Sensitive receiver (Ma Wan FCZ)	823741	823495			

*Notes:

In addition to the parameters presented monitoring location/position, time, water depth, sampling depth, tidal stages, weather conditions and any special phenomena or works underway nearby were also recorded.

Table 2.6 summarizes the equipment used in the impact water quality monitoring programme.

⁽¹⁾ Agreement No. CE 35/2011 (EP) Baseline Environmental Monitoring for Hong Kong - Zhuhai - Macao Bridge Hong Kong Projects - Investigation. Baseline Environmental Monitoring Report (Version C). Submitted on 8 March 2012 and subsequently approved by EPD.

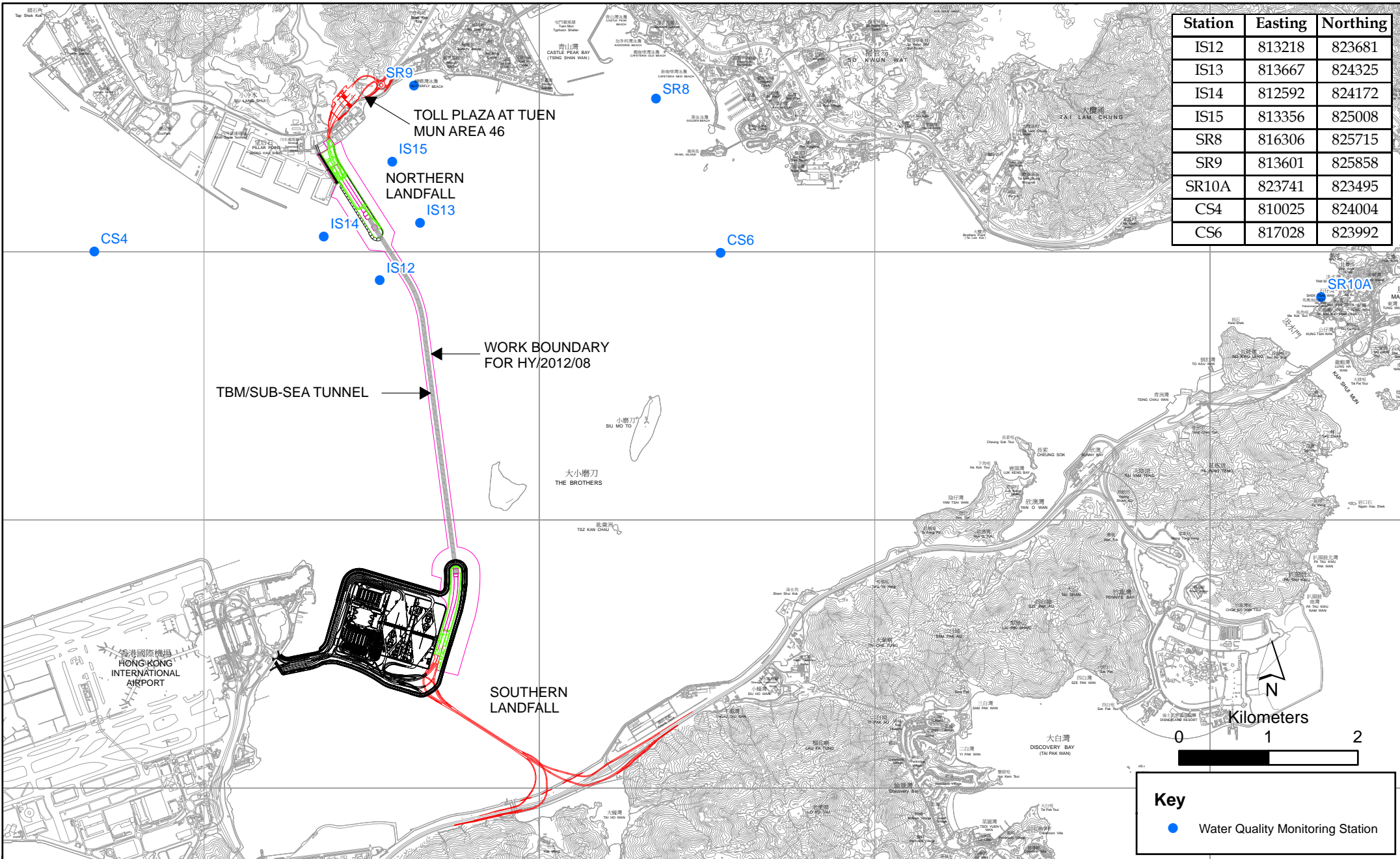


Figure 2.2

Water Quality Monitoring Station

Table 2.6 Water Quality Monitoring Equipment

Equipment	Model	Qty.
Water Sampler	Kahlsico Water-Bottle Model 135DW 150	1
Dissolved Oxygen Meter	YSI Pro 2030	1
pH Meter	HANNA HI 8314	1
Turbidity Meter	HACH 2100Q	1
Monitoring Position Equipment	“Magellan” Handheld GPS Model eXplorist GC DGPS Kodon KGP913MK2 ⁽¹⁾	4 1

2.2.2 Action & Limit Levels

The Action and Limit Levels of the water quality monitoring is provided in *Appendix D*. The Event and Action plan is presented in *Appendix I*.

2.2.3 Monitoring Schedule for the Reporting Period

The schedules for water quality monitoring in the reporting period are provided in *Appendix E*.

2.2.4 Results and Observations

During this reporting period, major marine dredging activities included dredging at Portions N-C, seawall construction at Portions N-B and N-C, and reclamation filling at Portions N-A and N-B. A closed grab dredger was used and silt curtains (cage-type and single floating type) were deployed during dredging works in accordance with the EP. The level of dredging activities was within the working rate described in the EP and the approved EIA Report. In addition, reclamation filling was undertaken between the 200 m of leading seawalls using filling materials specified in the EP and the approved EIA Report with a single layer silt curtain being deployed as a precautionary measure to reduce dispersion of suspended solids. It is useful to note that heavy marine traffic (not associated with the Project) was commonly observed nearby the Project site and its vicinity.

Impact water quality monitoring was conducted at all designated monitoring stations in the reporting period under favourable weather conditions. Monitoring results are presented graphically in *Appendix G* and detailed impact water quality monitoring data were reported in the *Eighth to Tenth Monthly EM&A Report*.

In this reporting period, a total of thirty-eight monitoring events were undertaken in which no exceedances were recorded. Summary of Exceedances for Water Quality Impact Monitoring in this Reporting Quarter is detailed in *Table 2.17*.

2.3 DOLPHIN MONITORING

2.3.1 Monitoring Requirements

Impact dolphin monitoring is required to be conducted by a qualified dolphin specialist team to evaluate whether there have been any effects on the dolphins. In order to fulfil the EM&A requirements and make good use of available resources, the on-going impact line transect dolphin monitoring data collected by HyD's *Contract No. HY/2011/03 Hong Kong-Zhuhai-Macao Bridge. Hong Kong Link Road - Section between Scenic Hill and Hong Kong Boundary Crossing Facilities* on the monthly basis is adopted to avoid duplicates of survey effort.

2.3.2 Monitoring Equipment

Table 2.7 summarises the equipment used for the impact dolphin monitoring.

Table 2.7 Dolphin Monitoring Equipment

Equipment	Model
Global Positioning System (GPS)	Garmin 18X-PC
Camera	Geo One Phottix
Laser Binoculars	Nikon D90 300m 2.8D fixed focus
Marine Binocular	Nikon D90 20-300m zoom lens
Vessel for Monitoring	Infinitor LRF 1000
	Bushell 7 x 50 marine binocular with compass and reticules
	65 foot single engine motor vessel with viewing platform 4.5m above water level

2.3.3 Monitoring Parameter, Frequencies & Duration

Dolphin monitoring should cover all transect lines in Northeast Lantau (NEL) and the Northwest Lantau (NWL) survey areas twice per month throughout the entire construction period. The monitoring data should be compatible with, and should be made available for, long-term studies of small cetacean ecology in Hong Kong. In order to provide a suitable long-term dataset for comparison, identical methodology and line transects employed in baseline dolphin monitoring was followed in the impact dolphin monitoring.

2.3.4 Monitoring Location

The impact dolphin monitoring was carried out in the NEL and NWL along the line transect as depicted in *Figure 2.3*. The co-ordinates of all transect lines are shown in *Table 2.8* below.

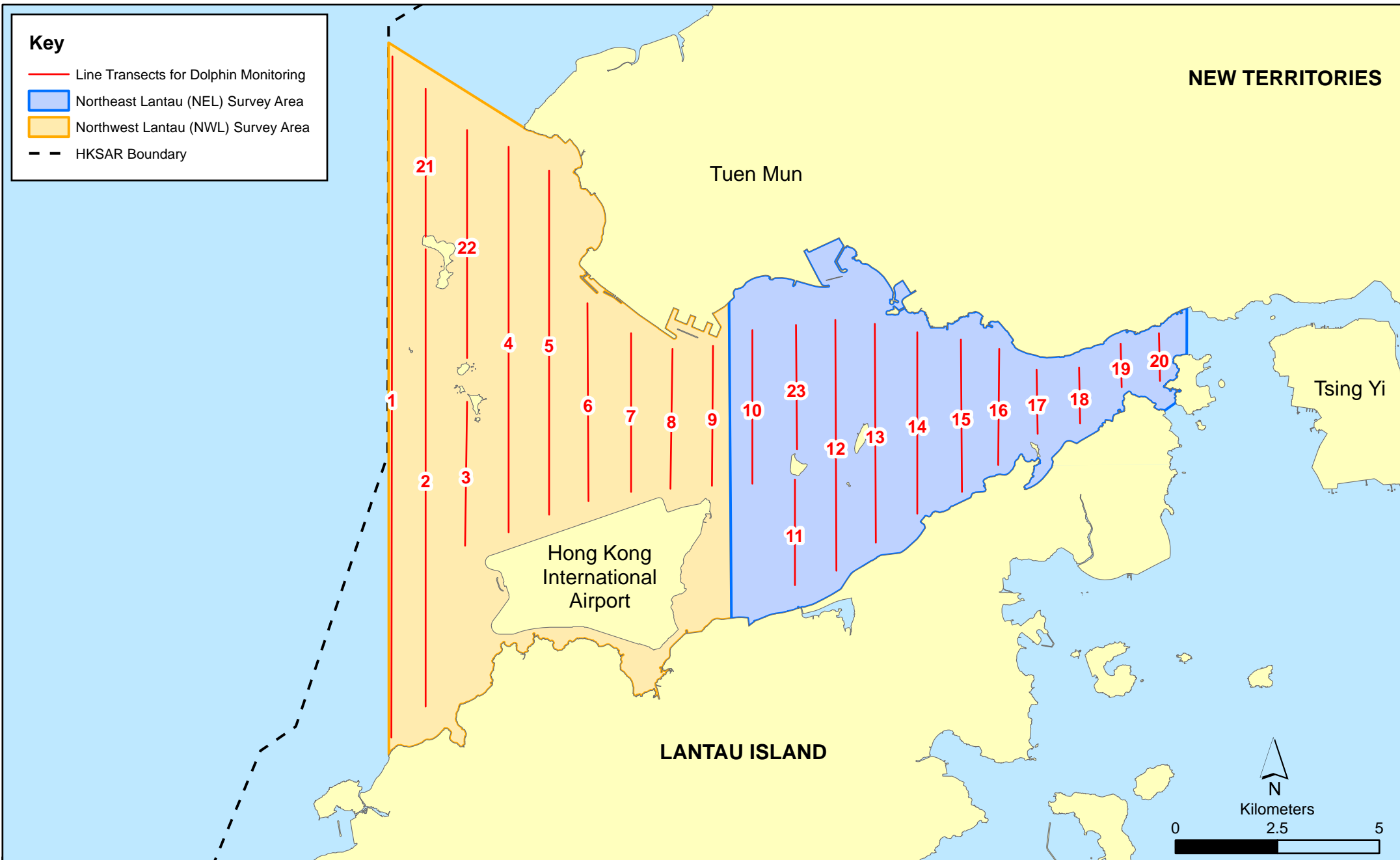


Figure 2.3

Layout of Transect Lines of Dolphin Monitoring in Northwest and Northeast Lantau Areas

Table 2.8 Impact Dolphin Monitoring Line Transect Co-ordinates

Line No.		Easting	Northing	Line No.		Easting	Northing
1	Start Point	804671	814577	13	Start Point	816506	819480
1	End Point	804671	831404	13	End Point	816506	824859
2	Start Point	805475	815457	14	Start Point	817537	820220
2	End Point	805477	826654	14	End Point	817537	824613
3	Start Point	806464	819435	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	819771	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	820220	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	820466	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761
7	Start Point	810499	820690	19	Start Point	822513	823268
7	End Point	810499	824613	19	End Point	822513	824321
8	Start Point	811508	820847	20	Start Point	823477	823402
8	End Point	811508	824254	20	End Point	823477	824613
9	Start Point	812516	820892	21	Start Point	805476	827081
9	End Point	812516	824254	21	End Point	805476	830562
10	Start Point	813525	820872	22	Start Point	806464	824033
10	End Point	813525	824657	22	End Point	806464	829598
11	Start Point	814556	818449	23	Start Point	814559	821739
11	End Point	814556	820992	23	End Point	814559	824768
12	Start Point	815542	818807				
12	End Point	815542	824882				

2.3.5 Action & Limit Levels

The Action and Limit levels of dolphin impact monitoring are shown in *Appendix D*. The Event and Action plan is presented in *Appendix I*.

2.3.6 *Monitoring Schedule for the Reporting Period*

The dolphin monitoring schedules for the reporting period are shown in *Appendix E*.

2.3.7 *Results & Observations*

A total of 894.40 km of survey effort was collected, with 93.6% of the total survey effort being conducted under favourable weather conditions (ie Beaufort Sea State 3 or below with good visibility) in this reporting quarter. Amongst the two areas, 343.21 km and 551.19 km of survey effort were collected from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 647.96 km and 246.44 km, respectively. The survey efforts are summarized in *Appendix H*.

A total of 28 groups of 96 Chinese White Dolphin sightings were recorded during the six sets of surveys in this reporting quarter. All except two sighting were made during on-effort search. Twenty on-effort sightings were made on primary lines, while six other on-effort sightings were made on secondary lines. During this reporting quarter, almost all dolphin groups were sighted in NWL, with the exception of one group of four dolphins being sighted in NEL.

For the detailed comparison of dolphin occurrence and usage of NEL and NWL survey area between the impact phase and baseline phase monitoring, only the quarterly data of June 2014 to August 2014 from the impact phase monitoring was used in the present report to tally with the three-month period of baseline monitoring (September 2011 to November 2011).

As the baseline monitoring period was in the autumn season (September 2011 to November 2011) while the present monitoring period was in the summer season (June 2014 to August 2014), a direct comparison in dolphin distribution between the two quarterly periods of summer months in 2013 and 2014 was also made to avoid the potential bias in seasonal variation.

Between the two summer periods, none of the dolphin sightings was made in NEL in summer 2014, while there were five sightings made in summer 2013. Moreover, more dolphin sightings were made in the middle and western portions of North Lantau waters and to the north of the airport platform in summer 2013 than in summer 2014.

Encounter rates of Chinese White Dolphins are deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below with good visibility) in the reporting quarter with the results and comparison with baseline results present in *Tables 2.9* and *2.10*.

Table 2.9 Individual Survey Event Encounter Rates

		Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)
		Primary Lines Only	Primary Lines Only
NEL	Set 1: Jun 3 rd /5 th	0.0	0.0
	Set 2: Jun 10 th /16 th	0.0	0.0
	Set 3: Jul 3 rd /9 th /10 th	2.54	10.16
	Set 4: Jul 14 th /21 st	0.0	0.0
	Set 5: Aug 5 nd /6 th	0.0	0.0
	Set 6: Aug 15 th /19 th	0.0	0.0
NWL	Set 1: Jun 3 rd /5 th	1.67	5.00
	Set 2: Jun 10 th /16 th	0.0	0.00
	Set 3: Jul 3 rd /9 th /10 th	3.03	10.61
	Set 4: Jul 14 th /21 st	8.40	26.60
	Set 5: Aug 5 nd /6 th	5.63	22.52
	Set 6: Aug 15 th /19 th	9.70	40.40

Note: Dolphin Encounter Rates are deduced from the Two Sets of Surveys (Two Surveys in Each Set) in the reporting quarter in Northeast (NEL) and Northwest Lantau (NWL)

Table 2.10 Monthly Average Encounter Rates

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	June 2014 - August 2014	September 2011 - November 2011	June 2014 - August 2014	September 2011 - November 2011
Northeast Lantau	0.42 ± 1.04	6.00 ± 5.05	1.69 ± 4.15	22.19 ± 26.81
Northwest Lantau	4.74 ± 3.84	9.85 ± 5.85	17.52 ± 15.12	44.66 ± 29.85

Note: Encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions.

Group size of Chinese White Dolphins ranged from 1 - 8 individuals per group in North Lantau region during June 2014 to August 2014. The average dolphin group sizes from these three months were compared with the ones deduced from the baseline period in September to November 2011, as shown in Table 2.11.

Table 2.11 *Average Dolphin Group Size*

	Average Dolphin Group Size	
	June 2014 - August 2014	September 2011 - November 2011
Overall	3.43 ± 1.95	3.72 ± 3.13
Northeast Lantau	4.00 ± 0.00	3.18 ± 2.16
Northwest Lantau	3.41 ± 1.99	3.92 ± 3.40

Whilst two Action Level exceedances were observed for the quarterly dolphin monitoring data between June 2014 and August 2014, no unacceptable impact from the construction activities of this Contract was recorded from the general observations.

Although the dolphins infrequently occurred along the alignment of TM-CLKL Northern Connection Sub-Sea Tunnel Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL.

It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters to determine whether the dolphins are continuously affected by the various construction activities in relation to the HZMB-related works, and whether suitable mitigation measure can be applied to revert the situation.

2.3.8 *Implementation of Marine Mammal Exclusion Zone*

Daily 250 m marine mammal exclusion zone monitoring was undertaken during the period of dredging activities under this Contract. Passive Acoustic Monitoring (PAM) was also implemented for the detection of marine mammal when marine works are carried out outside the daylight hours during the reporting period. No sighting of the Indo-Pacific humpback dolphin *Sousa chinensis* (i.e. Chinese White Dolphin) was recorded during the reporting period during both day-time marine mammal exclusion zone and passive acoustic monitoring.

2.4 *POST TRANSLOCATION CORAL MONITORING*

The Third quarterly Coral Post-Translocation Monitoring was conducted on 24 July 2014 and the results were provided in the *Third Quarterly Post-Translocation Coral Monitoring Report* under a separate cover. The findings indicated that the Action or Limit Levels for coral monitoring were not exceeded as increase in percentage of partial mortality was not detected for both the tagged translocated and natural coral colonies when comparing to the pre-translocation dataset.

Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. Thirteen (13) site inspections were carried out in the reporting quarter on 3, 10, 18 and 25 June; 2, 9, 16, 23 and 30 July; 6, 13, 20 and 27 August 2014.

Key observations during the site inspections in this reporting period are summarized in *Table 2.12*.

Table 2.12 *Specific Observations and Recommendations during the Weekly Site Inspection in this Reporting Period*

Inspection Date	Environmental Observations	Recommendations/ Remarks
3 June 2014	Reclamation Area - Portion N-A <ul style="list-style-type: none"> Oil was observed in the water adjacent to the works site. Water spraying should be applied to the dust generating area more frequently. 	Reclamation Area - Portion N-A <ul style="list-style-type: none"> The Contractor was reminded to clean up the oil spill in the water as chemical waste. The Contractor was reminded to provide adequate water spraying to prevent dust generation.
10 June 2014	Works Area - Portion N6 <ul style="list-style-type: none"> Adequate water spraying should be applied. Oil-stained soil should be cleaned up as chemical waste. Stockpile should be covered. 	Works Area - Portion N6 <ul style="list-style-type: none"> The Contractor was reminded to ensure adequate water spraying on dust generating area. The Contractor was reminded to clean up oil-stained soil as chemical waste. The Contractor was reminded to either apply water spraying or cover the stockpile in dry or windy condition.
18 June 2014	Barge - GBFC <ul style="list-style-type: none"> Drip tray should be provided to the chemical container. Reclamation Area - Portion N-A <ul style="list-style-type: none"> Excess sandy materials should be cleared regularly to avoid runoff. Silt curtain should be properly maintained. 	Barge - GBFC <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray to the chemical container. Reclamation Area - Portion N-A <ul style="list-style-type: none"> The Contractor was reminded to clear the excess sandy materials regularly. The Contractor was reminded to properly maintain the silt curtain.
25 June 2014	Reclamation Area - Portion N-A <ul style="list-style-type: none"> General refuse should be placed in proper waste container. Drip tray should be maintained in good conditions. 	Reclamation Area - Portion N-A <ul style="list-style-type: none"> The Contractor was reminded to provide waste container for general refuse. The Contractor was reminded to regular check for the capacity of drip trays.
2 July 2014	Marine Works Area - Portion N-C <ul style="list-style-type: none"> The remaining seawall block should be installed. Reclamation Area - Portion N-A <ul style="list-style-type: none"> Drip tray should be maintained in good conditions. 	Marine Works Area - Portion N-C <ul style="list-style-type: none"> The Contractor was reminded to install the remaining seawall block. Reclamation Area - Portion N-A <ul style="list-style-type: none"> The Contractor was reminded to conduct regular check for the capacity of drip tray.

Inspection Date	Environmental Observations	Recommendations/ Remarks
9 July 2014	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> Accumulated general refuse was observed. Litter was presented in the water adjacent to the works site. Drip tray should be provided to the chemical containers. <p>Works Area - Portion N6</p> <ul style="list-style-type: none"> Sedimentation tank should be maintained regularly. 	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to regularly clear the general refuse. The Contractor was reminded to clean up litter more often. The Contractor was reminded to provide drip tray to the chemical containers. <p>Works Area - Portion N6</p> <ul style="list-style-type: none"> The Contractor was reminded to clear the slurry in the sedimentation tank.
16 July 2014	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> Wheel washing facilities should be maintained properly. Excess muddy water was observed in the mud pit. 	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to clear the muddy water at the site entrance. The Contractor was reminded to remove excess muddy water in the mud pit.
23 July 2014	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> Accumulated muddy water was observed near the drainage. <p>Marine Works Area - Portion N-A</p> <ul style="list-style-type: none"> Silt curtain should be maintained properly. <p>Barge - GBFC</p> <ul style="list-style-type: none"> Excess water was observed in the drip tray. 	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to clear the muddy water near the drainage. <p>Marine Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to regularly maintain the silt curtain. <p>Barge - GBFC</p> <ul style="list-style-type: none"> The Contractor was reminded to clear the excess water in the drip tray.
30 July 2014	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> Accumulated litter was observed on water near the marine works area. <p>Reclamation Works Area - Portion N-B</p> <ul style="list-style-type: none"> Silt curtain should be maintained properly. <p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> Excess muddy water was observed near the site entrance. 	<p>Reclamation Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to clear the accumulated litter. <p>Reclamation Works Area - Portion N-B</p> <ul style="list-style-type: none"> The Contractor was reminded to regularly check and maintain the silt curtain. <p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to remove excess muddy water near the site entrance.
6 August 2014	<p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> Excess muddy water should be cleared in the wheel washing area. Accumulated general refuse should be cleared regularly. 	<p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to clear the excess muddy water on a regular basis. The Contractor was reminded to clear the general refuse regularly.
13 August 2014	<p>Marine Works Area - Portion N-A</p> <ul style="list-style-type: none"> Accumulated general refuse near the marine works area should be cleared. <p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> General site maintenance should be kept more regularly. 	<p>Marine Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to clear the accumulated general refuse. <p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to maintain site tidiness more regularly.
20 August 2014	<p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> Sedimentation tank should be in place to treat the excess muddy water. 	<p>Reclamation Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to provide sedimentation tank with sufficient capacity.

Inspection Date	Environmental Observations	Recommendations/ Remarks
27 August 2014	Reclamation Works Area - Portion N-A <ul style="list-style-type: none"> Sandy materials near the seawall should be cleared. Reclamation Works Area - Portion N-B <ul style="list-style-type: none"> The Contractor was reminded to clear the excess muddy water after heavy rainstorm. 	Reclamation Works Area - Portion N-A <ul style="list-style-type: none"> The Contractor was reminded to clear the sandy materials near the seawall. Reclamation Works Area - Portion N-B <ul style="list-style-type: none"> The Contractor was reminded to clear the excess muddy water after heavy rainstorm.

The Contractor has rectified all of the observations as identified during environmental site inspections in the reporting quarter.

2.6 WASTE MANAGEMENT STATUS

The Contractor had submitted application form for registration as chemical waste producer under the Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting.

Wastes generated during this reporting period include mainly construction wastes (inert and non-inert), imported fill, recyclable materials, and marine sediments. Reference has been made to the waste flow table prepared by the Contractor (*Appendix K*). The quantities of different types of wastes are summarized in *Table 2.13*.

Table 2.13 Quantities of Different Waste Generated in the Reporting Period

Month/Year	Inert Construction Waste (a) (tonnes)	Imported Fill (tonnes)	Inert Construction Waste Re-used (tonnes)	Non-inert Construction Waste (b) (tonnes)	Recyclable Materials (c) (kg)	Chemical Wastes (kg)	Marine Sediment (m ³)	
							Category L	Category M
June 2014	4,393	407,489	0	30	0	30	40,700	7,700
July 2014	14,405	428,392	0	33	300	0	37,950	7,150
August 2014	12,728	623,029	0	22	0	0	12,100	0
Total	31,526	1,458,910	0	85	300	30	90,750	14,850

Notes:

- (a) Inert construction wastes include hard rock and large broken concrete, and materials disposed as public fill.
- (b) Non-inert construction wastes include general refuse disposed at landfill.
- (c) Recyclable materials include metals, paper, cardboard, plastics, timber and others.

The Contractor was advised to properly maintain on site C&D materials and waste 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 was also reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly.

For chemical waste containers, the Contractor was reminded to treat properly and store 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.

2.7 ENVIRONMENTAL LICENSES AND PERMITS

The status of environmental licensing and permit is summarized in *Table 2.14* below.

Table 2.14 Summary of Environmental Licensing and Permit Status

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
Environmental Permit	EP-354/2009/B	28 January 2014	Throughout the Contract	HyD	Application for VEP on 20 January 2014 to replace EP-354/2009/A
Construction Dust Notification	363510	19 August 2013	Throughout the Contract	DBJV	-
Chemical Waste Registration	5213-422-D2516-01	10 September 2013	Throughout the Contract	DBJV	-
Construction Waste Disposal Account	7018108	19 August 2013	Throughout the Contract	DBJV	Waste disposal in Contract HY/2012/08
Waste Water Discharge License	WT00017707-2013	18 November 2013	30 November 2018	DBJV	For works in site WA18
Waste Water Discharge License	WT00018433-2014	6 March 2014	31 March 2019	DBJV	For works in site Portion N6
Construction Noise Permit	GW-RW0223-14	29 March 2014	28 September 2014	DBJV	For works in site Portion N6
Construction Noise Permit	GW-RW0234-14	29 March 2014	28 September 2014	DBJV	For Dredging and Reclamation Works
Construction Noise Permit	GW-RW0550-14	25 July 2014	24 January 2015	DBJV	For Dredging and Reclamation Works
Construction Noise Permit	GW-RS0362-14	11 May 2014	10 November 2014	DBJV	For works in site WA23
Marine Dumping Permit	EP/MD/15-006	1 May 2014	31 October 2014	DBJV	For Type 1
Marine Dumping Permit	EP/MD/15-007	31 May 2014	29 June 2014	DBJV	For Type 1 (dedicated site) and Type 2
Marine Dumping Permit	EP/MD/15-045	30 June 2014	29 July 2014	DBJV	For Type 1 (dedicated site) and Type 2
Marine Dumping Permit	EP/MD/15-061	1 August 2014	31 August 2014	DBJV	For Type 1 (dedicated site) and Type 2

Notes:

HyD = Highways Department

DBJV = Dragages – Bouygues Joint Venture

VEP = Variation of Environmental Permit

2.8 **IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES**

In response to the site audit findings, the Contractors carried out all corrective actions.

A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in *Appendix C*. The necessary mitigation measures relevant to this Contract were implemented properly.

2.9 **SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT**

For air quality impact monitoring, a total of sixteen monitoring events were undertaken in which no exceedances were recorded. (*Table 2.15*).

Table 2.15 *Summary of Exceedances for Air Quality Impact Monitoring in this Reporting Quarter*

Station	Exceedance Level	1-hr TSP	24-hr TSP	Number of Exceedances	
				1-hr TSP	24-hr TSP
AQMS1	Action Level	-	-	0	0
	Limit Level	-	-	0	0
ASR1	Action Level	-	-	0	0
	Limit Level	-	-	0	0
ASR5	Action Level	-	-	0	0
	Limit Level	-	-	0	0
ASR6	Action Level	-	-	0	0
	Limit Level	-	-	0	0
ASR10	Action Level	-	-	0	0
	Limit Level	-	-	0	0
Total number of Action level Exceedances:				0	0
Total number of Limit level Exceedances:				0	0

For marine water quality impact monitoring, a total of thirty-eight monitoring events were undertaken in which no exceedances were recorded (*Table 2.17*).

In addition, the construction impact on depth-averaged SS was assessed to compare the quarterly mean values of depth-averaged SS with the relevant ambient mean values. Results showed that the quarterly mean values of depth-averaged SS at all monitoring stations are well below the ambient mean values (*Table 2.16*), thus no further action is required in accordance with the Updated EM&A Manual.

Table 2.16 *Comparison between Quarterly Mean and Ambient Mean Values of Depth-averaged Suspended Solids (mg/L)*

Station	Baseline Mean		Ambient Mean ^(a)		Quarterly Mean (June 2014 to August 2014)	
	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
CS4	10.2	9.0	13.3	11.7	4.2	4.3
CS6	10.9	11.7	14.1	15.2	4.3	4.5
IS12	9.2	9.5	12.0	12.3	4.2	3.9
IS13	10.0	10.5	13.0	13.7	4.1	3.9
IS14	10.4	9.7	13.5	12.6	4.3	4.0
IS15	9.6	11.0	12.5	14.2	4.2	4.0
SR10A	10.3	10.2	13.3	13.3	4.4	3.9
SR8	10.1	11.3	13.1	14.7	4.1	4.3
SR9	8.8	9.9	11.4	12.8	4.2	4.3
Grand Total	10.0	10.3	13.0	13.4	4.2	4.1

Notes:

(a) Ambient mean value is defined as a 30% increase of the baseline mean value

Table 2.17 Summary of Exceedances for Marine Water Quality Impact Monitoring in this Reporting Quarter

Station	Exceedance Level ^(a)	DO (Surface and Middle)		DO (Bottom)		Turbidity (depth-averaged)		SS (depth-averaged)	
		Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
CS4	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
CS6	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
IS12	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
IS13	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
IS14	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
IS15	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
SR8	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
SR9	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
SR10	AL	-	-	-	-	-	-	-	-
	LL	-	-	-	-	-	-	-	-
Total AL Exceedances:		0	0	0	0	0	0	0	0
Total LL Exceedances:		0	0	0	0	0	0	0	0

Notes:

(a) AL = Action Level; LL = Limit Level

Two Action Level exceedances of impact dolphin monitoring were recorded in this reporting quarter. Following the review of monitoring data and marine works details in accordance with the procedures stipulated in the Event and Action Plan of the Updated EM&A Manual, the recorded exceedances were considered to be due to natural variation of dolphin ranging pattern. Detailed investigation findings are presented in *Appendix J*.

Cumulative statistics are provided in *Appendix J*.

2.10 *SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS*

The Environmental Complaint Handling Procedure is provided in *Figure 2.4*.

No non-compliance event was recorded during the reporting period.

No complaint/ enquiry case was record during the reporting period.

No summons/ prosecution was received during the reporting period.

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

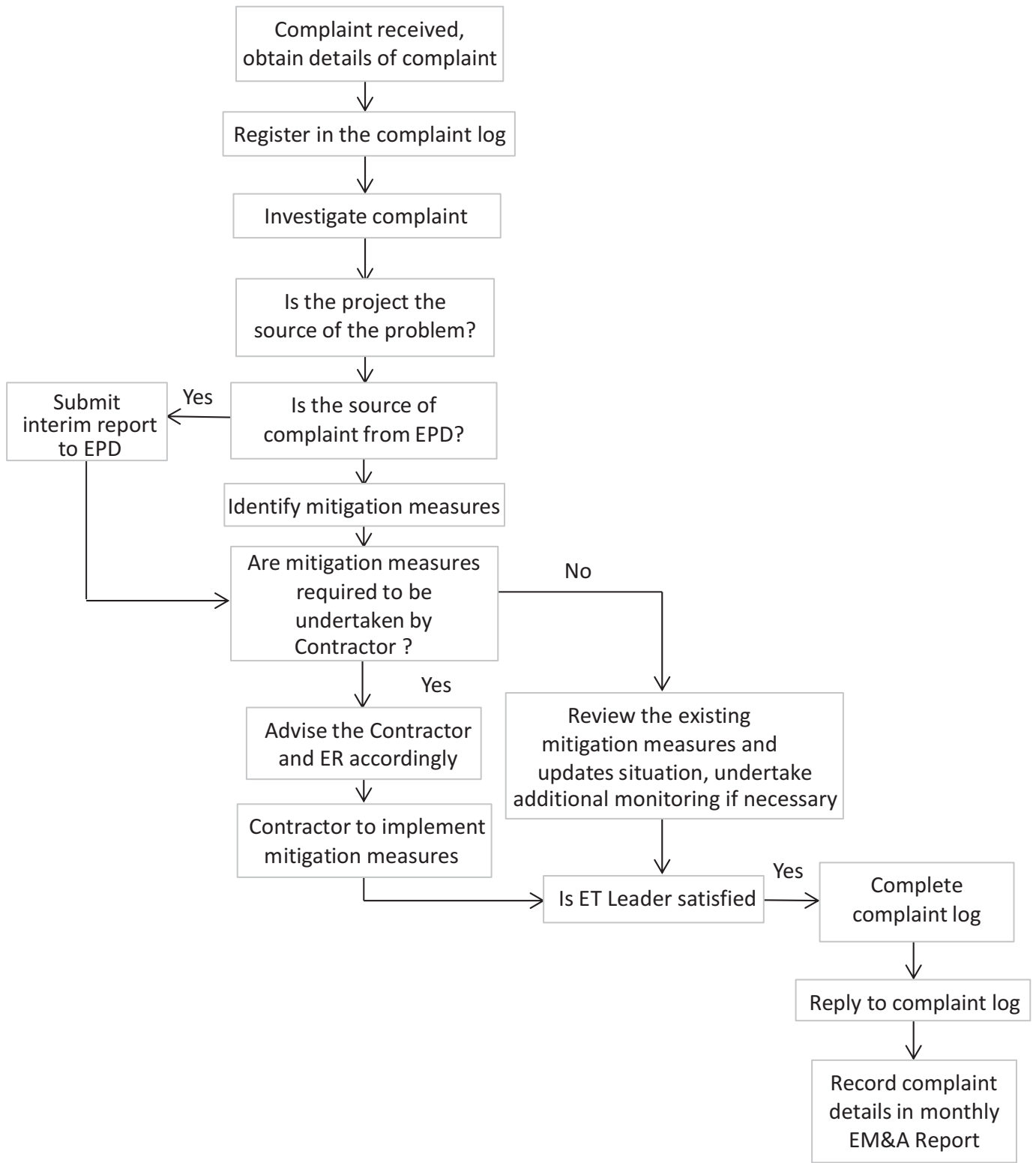


Figure 2.4

Environmental Complaint Handling Procedure

3 FUTURE KEY ISSUES

3.1 CONSTRUCTION ACTIVITIES FOR THE COMING QUARTER

As informed by the Contractor, the major works for the Project in the coming quarter are summarized in *Table 3.1*.

Table 3.1 Construction Works to Be Undertaken in the Coming Quarter

Works to be undertaken
<i>Marine-based Works</i>
<ul style="list-style-type: none">• Reclamation Filling• Vertical Seawall construction• Sloping Seawall construction• Marine Sheet Piling for Box Culvert extension• Predrilling for Box culvert Foundation
<i>Land-based Works</i>
Works Area - Portion N6
<ul style="list-style-type: none">• CLP Substation utilities works• Pile Cap Construction
Reclamation Area - Portion N-A
<ul style="list-style-type: none">• Construction of temporary access• Diaphragm Wall Construction• Vibro-Compaction

3.2 KEY ISSUES FOR THE COMING QUARTER

Potential environmental impacts arising from the above upcoming construction activities are mainly associated with dust, marine water quality, marine ecology and waste management issues.

3.3 MONITORING SCHEDULE FOR THE COMING QUARTER

Impact monitoring for air quality, marine water quality and marine ecology (include dolphin monitoring and post-translocation coral monitoring) are scheduled to continue for the next reporting period.

The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the monitoring programme was thus not considered to be necessary at this stage. The monitoring programme will be evaluated as appropriate in the next reporting period.

CONCLUSIONS

This Third Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 June 2014 to 31 August 2014, in accordance with the Updated EM&A Manual and the requirements of *EP-354/2009/B*.

Air quality (including 1-hour TSP and 24-hour TSP), marine water quality, coral and dolphin monitoring were carried out in the reporting period. No Action Level or Limit Level exceedances for 1-hr TSP, and no Action Level or Limit Level exceedances for 24-hr TSP were recorded during the reporting period. No Action Level or Limit Level exceedances were recorded in marine water quality impact monitoring during the reporting period. No Action Level or Limit Level exceedances were recorded in the post-translocation coral monitoring in the reporting period. Nevertheless, the Contractor was reminded to ensure that all dust mitigation measures are provided at the construction sites and the proper deployment of cage-type silt curtains at the dredging site.

A total of 28 groups of 96 Chinese White Dolphin sightings were recorded during the six sets of surveys from June 2014 to August 2014. Whilst two Action Level exceedances were recorded for the quarterly dolphin monitoring data between June and August 2014, no unacceptable impact from the construction activities of the TM-CLKL Northern Connection Sub-sea Tunnel Section on Chinese White Dolphins was noticeable from general observations. Although the dolphins infrequently occurred along the alignment of TM-CLKL Northern Connection Sub-Sea Tunnel Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL. It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the construction works of the Contract, and whether suitable mitigation measure can be applied to improve the situation.

Thirteen weekly environmental site inspections were carried out in the reporting period. Recommendations on remedial actions provided for the deficiencies identified during the site audits were properly implemented by the Contractor. No non-compliance event was recorded during the reporting period.

No complaint/ enquiry was received during the reporting period.

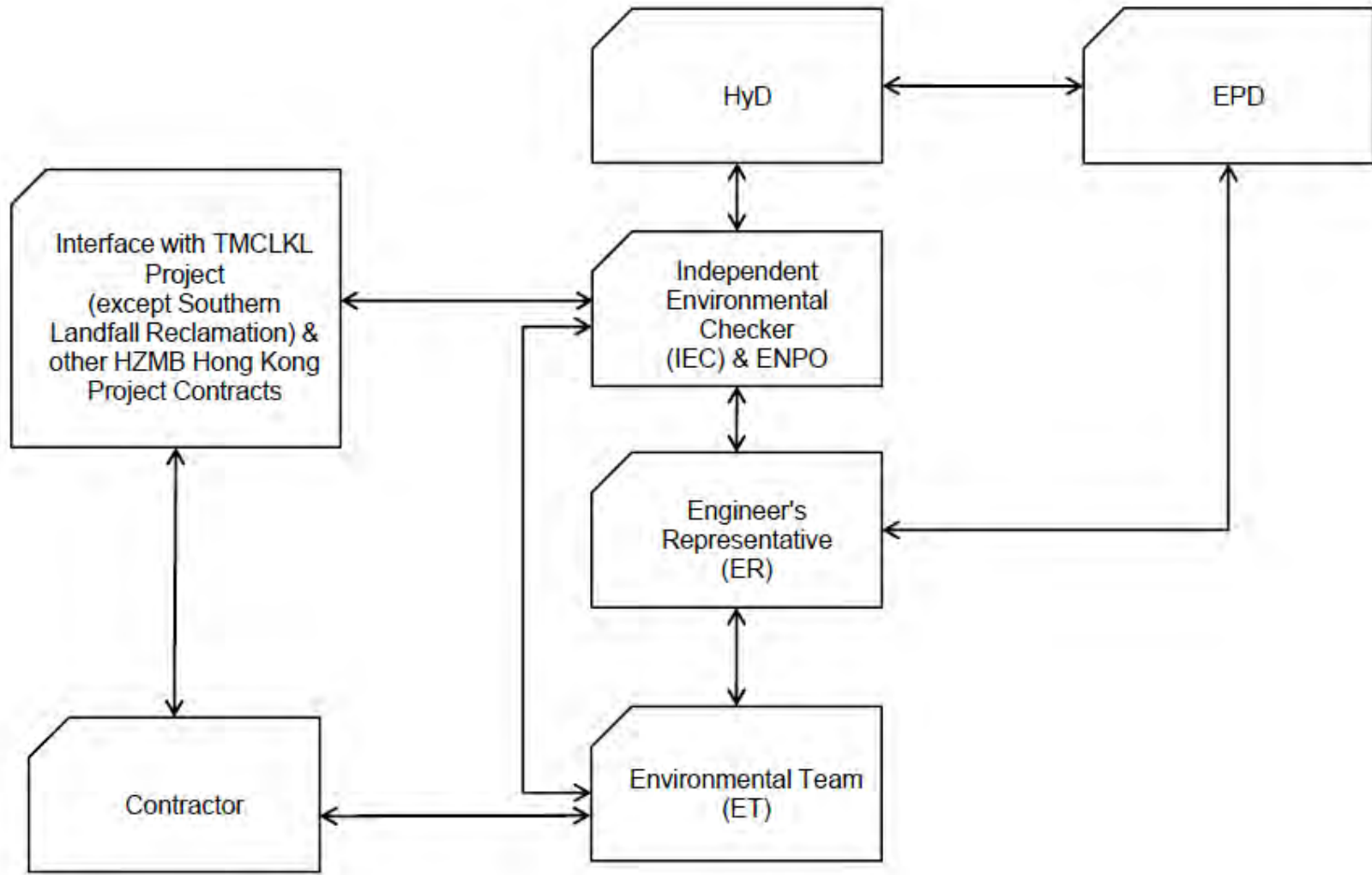
No summons/ prosecution was received during the reporting period.

The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the monitoring programme was thus not recommended at this stage. The monitoring programme will be evaluated as appropriate in the next reporting period. The ET will keep track on the construction works to confirm

compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Appendix A

Project Organization for Environmental Works



↔ Line of Communication

Appendix B

Three-Month Rolling Construction Programme

Activity ID	Activity Name	Orig Dur	Current Start	Current Finish	2014											
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
TMCLK - Northern Connection Sub-Sea Tunnel Section		393	02-Apr-14A	30-Jul-15												
Construction		393	02-Apr-14A	30-Jul-15												
Northern Landfall		393	02-Apr-14A	30-Jul-15												
North Reclamation (Phase 1)		393	02-Apr-14A	13-Jul-15												
Construction		393	02-Apr-14A	13-Jul-15												
Milestones		150	02-Jul-14A	14-Jan-15												
NRC10110	200m Leading Seawall for Reclamation: 550-600 (Zone C2)	0	02-Jul-14A		◆ 200m Leading Seawall for Reclamation: 550-600 (Zone C2), 200m Leading Seawall for Reclamation: 550-600 (Zone C2)											
NRC10120	200m Leading Seawall for Reclamation: 600-650 (Zone B)	0	16-Jul-14A		◆ 200m Leading Seawall for Reclamation: 600-650 (Zone B), 200m Leading Seawall for Reclamation: 600-650 (Zone B)											
NRC10130	200m Leading Seawall for Reclamation: 650-700 (Zone B)	0	13-Aug-14A		◆ 200m Leading Seawall for Reclamation: 650-700 (Zone B), 200m Leading Seawall for Reclamation: 650-700 (Zone B)											
NRC10140	200m Leading Seawall for Reclamation: 700-956 (Zone B, A1 & A2)	0	23-Aug-14A		◆ 200m Leading Seawall for Reclamation: 700-956 (Zone B, A1 & A2), 200m Leading Seawall for Reclamation: 700-956 (Zone B, A1 & A2)											
NRC13150	Completion of Zone D1 Reclamation up to +5.0mPD	0	11-Jul-14 A		◆ Completion of Zone D1 Reclamation up to +5.0mPD, Completion of Zone D1 Reclamation up to +5.0mPD											
NRC13160	Completion of Zone D1 Reclamation up to +14.5mPD	0	02-Dec-14		◆ Completion of Zone D1 Reclamation up to +14.5mPD, Completion of Zone D1 Reclamation up to +14.5mPD											
NRC13170	Completion of Zone D2 Reclamation up to +5.0mPD	0	06-Aug-14A		◆ Completion of Zone D2 Reclamation up to +5.0mPD, Completion of Zone D2 Reclamation up to +5.0mPD											
NRC13180	Completion of Zone D2 Reclamation up to +14.5mPD	0	27-Dec-14		◆ Completion of Zone D2 Reclamation up to +14.5mPD, Completion of Zone D2 Reclamation up to +14.5mPD											
NRC13190	Completion of Zone C1 Reclamation up to +5.0mPD	0	16-Aug-14A		◆ Completion of Zone C1 Reclamation up to +5.0mPD, Completion of Zone C1 Reclamation up to +5.0mPD											
NRC13200	Completion of Zone C1 Reclamation up to +10mPD	0	15-Dec-14		◆ Completion of Zone C1 Reclamation up to +10mPD, Completion of Zone C1 Reclamation up to +10mPD											
NRC13205	Completion Zone C2 Reclamation up to +6mPD	0	01-Sep-14		◆ Completion Zone C2 Reclamation up to +6mPD, Completion Zone C2 Reclamation up to +6mPD											
NRC13210	Completion of Zone C2 Reclamation up to +10mPD	0	19-Nov-14		◆ Completion of Zone C2 Reclamation up to +10mPD, Completion of Zone C2 Reclamation up to +10mPD											
NRC13230	Completion of Zone B Reclamation up to +6mPD	0	07-Oct-14		◆ Completion of Zone B Reclamation up to +6mPD, Completion of Zone B Reclamation up to +6mPD											
NRC13240	Completion of Zone A1 Reclamation up to +10mPD	0	31-Dec-14		◆ Completion of Zone A1 Reclamation up to +10mPD, Completion of Zone A1 Reclamation up to +10mPD											
NRC13250	Completion of Zone A2 Reclamation up to +10mPD (TBC)	0	14-Jan-15		◆ Completion of Zone A2 Reclamation up to +10mPD (TBC), Completion of Zone A2 Reclamation up to +10mPD (TBC)											
Zone E		253	30-Jun-14A	21-May-15												
Vertical Seawall		63	30-Jun-14A	19-Sep-14												
NRC10450	VS - Berm Stone - Zone E - (CH50 to 100)	2	30-Jun-14A	01-Jul-14A	■ VS - Berm Stone - Zone E - (CH50 to 100)											
NRC10460	VS - Berm Stone - Zone E - (CH100 to 150)	3	11-Jul-14 A	16-Jul-14A	■ VS - Berm Stone - Zone E - (CH100 to 150)											
NRC10470	VS - Berm Stone - Zone E - (CH150 to 205)	5	14-Jul-14A	01-Aug-14A	■ VS - Berm Stone - Zone E - (CH150 to 205)											
NRC10480	VS - Mass Concrete Coping - Zone E - (CH0 to 50)	8	21-Jul-14A	03-Sep-14	■ VS - Mass Concrete Coping - Zone E - (CH0 to 50)											
NRC10490	VS - Mass Concrete Coping - Zone E - (CH50 to 100)	8	23-Jul-14A	06-Sep-14	■ VS - Mass Concrete Coping - Zone E - (CH50 to 100)											
NRC10500	VS - Mass Concrete Coping - Zone E - (CH100 to 150)	8	09-Jul-14A	13-Sep-14	■ VS - Mass Concrete Coping - Zone E - (CH100 to 150)											
NRC10510	VS - Mass Concrete Coping - Zone E - (CH150 to 205)	11	16-Jul-14A	19-Sep-14	■ VS - Mass Concrete Coping - Zone E - (CH150 to 205)											
Reclamation		150	15-Nov-14	21-May-15												
NRC10755	Public Fill - Zone E - (CH150 to 205) to +14.0mPD	7	15-Nov-14	22-Nov-14	■ Public Fill - Zone E - (CH150 to 205) to +14.0mPD											
NRC10765	Public Fill - Zone E - (CH150 to 205) - Surcharge Period	180	23-Nov-14	21-May-15	■ Public Fill - Zone E - (CH150 to 205) - Surcharge Period											
Zone D1		355	24-Jun-14A	31-May-15												
Vertical Seawall		107	28-Jun-14A	09-Oct-14												
NRC11280	VS - Granular Filter - Zone D1 - (CH305 to 355)	4	28-Jun-14A	02-Jul-14A	■ VS - Granular Filter - Zone D1 - (CH305 to 355)											
NRC11430	VS - Berm Stone - Zone D1 - (CH205 to 255)	6	01-Aug-14A	06-Aug-14A	■ VS - Berm Stone - Zone D1 - (CH205 to 255)											
NRC11500	VS - Berm Stone - Zone D1 - (CH255 to 305)	3	06-Aug-14A	12-Aug-14A	■ VS - Berm Stone - Zone D1 - (CH255 to 305)											
NRC11570	VS - Berm Stone - Zone D1 - (CH305 to 355)	3	13-Aug-14A	16-Aug-14A	■ VS - Berm Stone - Zone D1 - (CH305 to 355)											
NRC11720	VS - Mass Concrete Coping - Zone D1 - (CH205 to 255)	15	01-Sep-14*	18-Sep-14	■ VS - Mass Concrete Coping - Zone D1 - (CH205 to 255)											
NRC11790	VS - Mass Concrete Coping - Zone D1 - (CH255 to 305)	8	19-Sep-14	27-Sep-14	■ VS - Mass Concrete Coping - Zone D1 - (CH255 to 305)											
NRC11860	VS - Mass Concrete Coping - Zone D1 - (CH305 to 355)	8	29-Sep-14	09-Oct-14	■ VS - Mass Concrete Coping - Zone D1 - (CH305 to 355)											
Sloping Seawall		139	01-Aug-14A	23-Sep-14												
NRC120200	VS - Berm Stone - Zone D1 - RTT	2	22-Sep-14	23-Sep-14	■ VS - Berm Stone - Zone D1 - RTT											
NRC120200	VS - Mass Concrete Coping - Zone D1 - RTT	4	12-Aug-14A	01-Sep-14	■ VS - Mass Concrete Coping - Zone D1 - RTT											
NRC13610	SS - Armour Rock Underlayer - Zone D1 - (CH255 to 305)	5	01-Aug-14A	10-Aug-14A	■ SS - Armour Rock Underlayer - Zone D1 - (CH255 to 305)											
NRC13690	SS - Armour Rock Underlayer - Zone D1 - (CH305 to 355)	5	11-Aug-14A	19-Aug-14A	■ SS - Armour Rock Underlayer - Zone D1 - (CH305 to 355)											
NRC14070	SS - Armour Rock - Zone D1 - (CH255 to 305)	4	01-Sep-14	04-Sep-14	■ SS - Armour Rock - Zone D1 - (CH255 to 305)											
NRC14080	SS - Armour Rock - Zone D1 - (CH305 to 355)	4	05-Sep-14	10-Sep-14	■ SS - Armour Rock - Zone D1 - (CH305 to 355)											
NRC14120	SS - Mass Concrete Coping - Zone D1 - (CH255 to 305)	7	05-Sep-14	13-Sep-14	■ SS - Mass Concrete Coping - Zone D1 - (CH255 to 305)											
NRC14130	SS - Mass Concrete Coping - Zone D1 - (CH305 to 355)	7	15-Sep-14	22-Sep-14	■ SS - Mass Concrete Coping - Zone D1 - (CH305 to 355)											
Reclamation		267	24-Jun-14A	31-May-15												
NRC13380	Public Fill - Zone D1 - (CH305 to 355) to +2.5mPD	4	24-Jun-14A	03-Jul-14A	■ Public Fill - Zone D1 - (CH305 to 355) to +2.5mPD											
NRC13430	Public Fill - Zone D1 - (CH255 to 305) to +5.0mPD	4	25-Jun-14A	08-Jul-14A	■ Public Fill - Zone D1 - (CH255 to 305) to +5.0mPD											
NRC13450	Public Fill - Zone D1 - (CH305 to 355) to +5.0mPD	4	01-Jul-14A	11-Jul-14A	■ Public Fill - Zone D1 - (CH305 to 355) to +5.0mPD											
NRC13460	Public Fill - Zone D1 - (CH205 to 255) to +14.5mPD	10	27-Oct-14	06-Nov-14	■ Public Fill - Zone D1 - (CH205 to 255) to +14.5mPD											
NRC13470	Public Fill - Zone D1 - (CH255 to 305) to +14.5mPD	11	07-Nov-14	19-Nov-14	■ Public Fill - Zone D1 - (CH255 to 305) to +14.5mPD											
NRC13480	Public Fill - Zone D1 - (CH305 to 355) to +14.5mPD	11	20-Nov-14	02-Dec-14	■ Public Fill - Zone D1 - (CH305 to 355) to +14.5mPD											
NRC15150	Surcharge Period - Zone D1 - (CH205 to 255)	180	07-Nov-14	05-May-15	■ Surcharge Period - Zone D1 - (CH205 to 255)											
NRC15170	Surcharge Period - Zone D1 - (CH255 to 305)	180	20-Nov-14	18-May-15	■ Surcharge Period - Zone D1 - (CH255 to 305)											
NRC15190	Surcharge Period - Zone D1 - (CH305 to 355)	180	03-Dec-14	31-May-15	■ Surcharge Period - Zone D1 - (CH305 to 355)											
Zone D2		361	17-Jun-14A	25-Jun-15												
Vertical Seawall		109	02-Jul-14A	19-Sep-14												
NRC11350	VS - Granular Filter - Zone D2 - (CH355 to 405)	4	02-Jul-14A	07-Jul-14A	■ VS - Granular Filter - Zone D2 - (CH355 to 405)											
NRC11390	VS - Granular Filter - Zone D2 - (CH405 to 443)	4	08-Jul-14A	11-Jul-14A	■ VS - Granular Filter - Zone D2 - (CH405 to 443)											
NRC11640	VS - Berm Stone - Zone D2 - (CH355 to 405)	3	23-Aug-14A	23-Aug-14A	■ VS - Berm Stone - Zone D2 - (CH355 to 405)											
NRC11680	VS - Berm Stone - Zone D2 - (CH405 to 443)	3	28-Aug-14A	28-Aug-14A	■ VS - Berm Stone - Zone D2 - (CH405 to 443)											
NRC11930	VS - Mass Concrete Coping - Zone D2 - (CH355 to 405)	8	01-Sep-14	10-Sep-14	■ VS - Mass Concrete Coping - Zone D2 - (CH355 to 405)											
NRC11980	VS - Mass Concrete Coping - Zone D2 - (CH405 to 443)	8	11-Sep-14	19-Sep-14	■ VS - Mass Concrete Coping - Zone D2 - (CH405 to 443)											
Sloping Seawall		95	12-Aug-14A	10-Oct-14												
NRC13770	SS - Armour Rock Underlayer - Zone D2 - (CH355 to 405)	5	12-Aug-14A	28-Aug-14A	■ SS - Armour Rock Underlayer - Zone D2 - (CH355 to 405)											
NRC13880	SS - Armour Rock Underlayer - Zone D2 - (CH405 to 443)	5	01-Sep-14	05-Sep-14	■ SS - Armour Rock Underlayer - Zone D2 - (CH405 to 443)											
NRC14090	SS - Armour Rock - Zone D2 - (CH355 to 405)	4	11-Sep-14	15-Sep-14	■ SS - Armour Rock - Zone D2 - (CH355 to 405)											
NRC14100	SS - Armour Rock - Zone D2 - (CH405 to 443)	4	16-Sep-14	19-Sep-14	■ SS - Armour Rock - Zone D2 - (CH405 to 443)											
NRC14140	SS - Mass Concrete Coping - Zone D2 - (CH355 to 405)	7	23-Sep-14	30-Sep-14	■ SS - Mass Concrete Coping - Zone D2 - (CH355 to 405)											
NRC14150	SS - Mass Concrete Coping - Zone D2 - (CH405 to 443)	7	03-Oct-14	10-Oct-14	■ SS - Mass Concrete Coping - Zone D2 - (CH405 to 443)											
Reclamation		307	17-Jun-14A	25-Jun-15												
NRC13500	Compacted Sandfill - Zone D2 - (CH405 to 443) to -2.5mPD	2	17-Jun-14A	02-Jul-14A	■ Compacted Sandfill - Zone D2 - (CH405 to 443) to -2.5mPD											
NRC13510	Public Fill - Zone D2 - (CH355 to 405) to -2.5mPD	4	17-Jun-14A	05-Jul-14A	■ Public Fill - Zone D2 - (CH355 to 405) to -2.5mPD											
NRC13520	Public Fill - Zone D2 - (CH405 to 443) to -2.5mPD	4	08-Jul-14A	16-Jul-14A	■ Public Fill - Zone D2 - (CH405 to 443) to -2.5mPD											
NRC13540	Compacted Sandfill - Zone D2 - (CH355 to 405) to +2.5mPD	6	24-Jun-14A	03-Jul-14A	■ Compacted Sandfill - Zone D2 - (CH355 to 405) to +2.5mPD											
NRC13550	Compacted Sandfill - Zone D2 - (CH405 to 443) to +2.5mPD	5	01-Jul-14A	05-Jul-14A	■ Compacted Sandfill - Zone D2 - (CH405 to 443) to +2.5mPD											
NRC13560	Public Fill - Zone D2 - (CH355 to 405) to +2.5mPD	10	05-Jul-14A	15-Jul-14A	■ Public Fill - Zone D2 - (CH355 to 405) to +2.5mPD											
NRC13570	Public Fill - Zone D2 - (CH405 to 443) to +2.5mPD	10	09-Jul-14A	25-Jul-14A	■ Public Fill - Zone D2 - (CH405 to 443) to +2.5mPD											
NRC13580	Compacted Sandfill - Zone D2 - (CH355 to 405) to +5.0mPD	4	24-Jul-14A	24-Jul-14A	■ Compacted Sandfill - Zone D2 - (CH355 to 405) to +5.0mPD											
NRC13590	Compacted Sandfill - Zone D2 - (CH405 to 443) to +5.0mPD	4	09-Jul-14A	17-Jul-14A	■ Compacted Sandfill - Zone D2 - (CH405 to 443) to +5.0mPD											
NRC13600	Public Fill - Zone D2 - (CH355 to 405) to +5.0mPD	4	15-Jul-14A	24-Jul-14A	■ Public Fill - Zone D2 - (CH355 to 405) to +5.0mPD											
NRC13620	Public Fill - Zone D2 - (CH405 to 443) to +5.0mPD	4	21-Jul-14A	06-Aug-14A	■ Public Fill - Zone D2 - (CH405 to 443) to +5.0mPD											
NRC13630	Public Fill - Zone D2 - (CH355 to 405) to +14.5mPD	11	03-Dec-14	15-Dec-14	■ Public Fill - Zone D2 - (CH355 to 405) to +14.5mPD											
NRC13640	Public Fill - Zone D2 - (CH405 to 443) to +14.5mPD	9	16-Dec-14	27-Dec-14	■ Public Fill - Zone D2 - (CH405 to 443) to +14.5mPD											
NRC15210	Surcharge Period - Zone D2 - (CH355 to 405)	180	16-Dec-14	13-Jun-15	■ Surcharge Period - Zone D2 - (CH355 to 405)											
NRC15230	Surcharge Period - Zone D2 - (CH405 to 443)	180	28-Dec-14	25-Jun-15	■ Surcharge Period - Zone D2 - (CH405 to 443)											
Zone C1		320	19-Jun-14A	13-Jun-15												
Vertical Seawall		95	15-Jul-14A	28-Oct-14												
NRC14640	VS - Granular Filter - Zone C1 - (CH443 to 493)	4	15-Jul-14A	22-Jul-14A	■ VS - Granular Filter - Zone C1 - (CH443 to 493)											
NRC14650	VS - Granular Filter - Zone C1 - (CH493 to 543)	4	22-Jul-14A	22-Jul-14A	■ VS - Granular Filter - Zone C1 - (CH493 to 543)											
NRC14670	VS - Berm Stone - Zone C1 - (CH443 to 493)	3	22-Sep-14	24-Sep-14	■ VS - Berm Stone - Zone C1 - (CH443 to 493)											

Activity ID	Activity Name	Orig Dur	Current Start	Current Finish	2014												
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
NRC11800	Reclamation - Sand Blanket - Zone B - (CH598 to 648)	2	30-Jun-14A	04-Jul-14A			■ Reclamation - Sand Blanket - Zone B - (CH598 to 648)										
NRC11810	Reclamation - Sand Blanket - Zone B - (CH648 to 698)	2	01-Jul-14A	04-Jul-14A			■ Reclamation - Sand Blanket - Zone B - (CH648 to 698)										
NRC11820	Reclamation - Sand Blanket - Zone B - (CH698 to 738)	2	11-Aug-14A	12-Aug-14A				■ Reclamation - Sand Blanket - Zone B - (CH698 to 738)									
NRC11830	Reclamation - Band Drain - Zone B - (CH598 to 648)	4	05-Jul-14A	18-Aug-14A			■ Reclamation - Band Drain - Zone B - (CH598 to 648)										
NRC11840	Reclamation - Band Drain - Zone B - (CH648 to 698)	4	08-Jul-14A	15-Aug-14A			■ Reclamation - Band Drain - Zone B - (CH648 to 698)										
NRC11850	Reclamation - Band Drain - Zone B - (CH698 to 738)	4	15-Aug-14A	21-Aug-14A			■ Reclamation - Band Drain - Zone B - (CH698 to 738)										
NRC11870	Public Fill - Zone B - (CH598 to 648) to -2.5mPD	3	14-Aug-14A	28-Aug-14A			■ Public Fill - Zone B - (CH598 to 648) to -2.5mPD										
NRC11880	Public Fill - Zone B - (CH648 to 698) to -2.5mPD	3	23-Sep-14A	01-Sep-14													
NRC11890	Public Fill - Zone B - (CH698 to 738) to -2.5mPD	3	04-Sep-14	06-Sep-14													
NRC11900	Public Fill - Zone B - (CH598 to 648) to +2.5mPD	7	02-Sep-14	10-Sep-14													
NRC11910	Public Fill - Zone B - (CH648 to 698) to +2.5mPD	7	11-Sep-14	18-Sep-14													
NRC11920	Public Fill - Zone B - (CH698 to 738) to +2.5mPD	7	19-Sep-14	26-Sep-14													
NRC11950	Public Fill - Zone B - (CH598 to 648) to +6.0mPD	7	11-Sep-14	18-Sep-14													
NRC11960	Public Fill - Zone B - (CH648 to 698) to +6.0mPD	7	19-Sep-14	26-Sep-14													
NRC11970	Public Fill - Zone B - (CH698 to 738) to +6.0mPD	7	27-Sep-14	07-Oct-14													
NRC11990	Public Fill - Zone B - (CH598 to 648) to +10mPD	6	16-Dec-14	22-Dec-14													
NRC11995	Public Fill - Zone B - (CH648 to 698) to +10mPD	6	27-Sep-14	06-Oct-14													
NRC12010	Public Fill - Zone B - (CH698 to 738) to +10mPD	6	15-Oct-14	21-Oct-14													
NRC15310	Surcharge Period - Zone B - (CH598 to 648)	180	23-Dec-14	20-Jun-15													
NRC15322	Surcharge Period - Zone B - (CH648 to 698) stage 1	180	07-Oct-14	04-Apr-15													
NRC15350	Surcharge Period - Zone B - (CH698 to 738)	180	22-Oct-14	19-Apr-15													
Zone A1		297	27-May-14A	29-Jun-15													
Vertical Seawall		103	02-Jul-14A	20-Oct-14													
NRC12060	VS - Seawall Block - Zone A1 - (CH738 to 793)	11	02-Jul-14A	20-Aug-14A			■ VS - Seawall Block - Zone A1 - (CH738 to 793)										
NRC12080	VS - Rockfill Type A - Zone A1 - (CH738 to 793)	3	12-Aug-14A	30-Aug-14A			■ VS - Rockfill Type A - Zone A1 - (CH738 to 793)										
NRC12090	VS - Geotextile - Zone A1 - (CH738 to 793)	2	13-Aug-14A	29-Aug-14A			■ VS - Geotextile - Zone A1 - (CH738 to 793)										
NRC12100	VS - Granular Filter - Zone A1 - (CH738 to 793)	4	03-Sep-14	06-Sep-14			■ VS - Granular Filter - Zone A1 - (CH738 to 793)										
NRC12120	VS - Berm Stone - Zone A1 - (CH738 to 793)	3	15-Oct-14	17-Oct-14			■ VS - Berm Stone - Zone A1 - (CH738 to 793)										
NRC12130	VS - Mass Concrete Coping - Zone A1 - (CH738 to 793)	8	11-Oct-14	20-Oct-14			■ VS - Mass Concrete Coping - Zone A1 - (CH738 to 793)										
Sloping Seawall		56	27-May-14A	17-Nov-14													
NRC12150	SS - Rock Grade 400 - Zone A1 - (CH738 to 793) to +2.5mPD (4k/d)	10	27-May-14A	01-Aug-14A			■ SS - Rock Grade 400 - Zone A1 - (CH738 to 793) to +2.5mPD (4k/d)										
NRC12180	SS - Armour Rock Underlayer - Zone A1 - (CH738 to 793)	5	09-Oct-14	14-Oct-14			■ SS - Armour Rock Underlayer - Zone A1 - (CH738 to 793)										
NRC12190	SS - Armour Rock - Zone A1 - (CH738 to 793)	4	23-Oct-14	27-Oct-14			■ SS - Armour Rock - Zone A1 - (CH738 to 793)										
NRC12210	SS - Mass Concrete Coping - Zone A1 - (CH738 to 793)	7	10-Nov-14	17-Nov-14			■ SS - Mass Concrete Coping - Zone A1 - (CH738 to 793)										
NRC12220	Sloping - Rockfill Type A - Zone A1 - (CH738 to 793)	1	26-Aug-14A	28-Aug-14A			■ Sloping - Rockfill Type A - Zone A1 - (CH738 to 793)										
NRC12230	Sloping - Geotextile - Zone A1 - (CH738 to 793)	2	01-Sep-14	02-Sep-14			■ Sloping - Geotextile - Zone A1 - (CH738 to 793)										
NRC12250	Sloping - Granular Filter - Zone A1 - (CH738 to 793)	3	03-Sep-14	05-Sep-14			■ Sloping - Granular Filter - Zone A1 - (CH738 to 793)										
Reclamation		234	06-Sep-14	29-Jun-15													
NRC12260	Reclamation - Geotextile - Zone A1 - (CH738 to 793)	4	06-Sep-14	11-Sep-14			■ Reclamation - Geotextile - Zone A1 - (CH738 to 793)										
NRC12270	Reclamation - Sand Blanket - Zone A1 - (CH738 to 793)	2	12-Sep-14	13-Sep-14			■ Reclamation - Sand Blanket - Zone A1 - (CH738 to 793)										
NRC12280	Reclamation - Band Drain - Zone A1 - (CH738 to 793)	4	15-Sep-14	18-Sep-14			■ Reclamation - Band Drain - Zone A1 - (CH738 to 793)										
NRC12300	Public Fill - Zone A1 - (CH738 to 793) to -2.5mPD	3	08-Sep-14	11-Sep-14			■ Public Fill - Zone A1 - (CH738 to 793) to -2.5mPD										
NRC12310	Public Fill - Zone A1 - (CH738 to 793) to +2.5mPD	7	27-Sep-14	07-Oct-14			■ Public Fill - Zone A1 - (CH738 to 793) to +2.5mPD										
NRC12320	Public Fill - Zone A1 - (CH738 to 793) to +6.0mPD	7	08-Oct-14	15-Oct-14			■ Public Fill - Zone A1 - (CH738 to 793) to +6.0mPD										
NRC12340	Public Fill - Zone A1 - (CH738 to 793) to +10mPD	6	23-Dec-14	31-Dec-14			■ Public Fill - Zone A1 - (CH738 to 793) to +10mPD										
NRC15370	Surcharge Period - Zone A1 - (CH738 to 793)	180	01-Jan-15	29-Jun-15			■ Surcharge Period - Zone A1 - (CH738 to 793)										
Zone A2		307	17-Apr-14A	13-Jul-15													
Vertical Seawall		137	14-Jun-14A	28-Nov-14													
NRC12390	VS - Rock Grade 400 - Zone A2 - (CH843 to 893)	10	14-Jun-14A	04-Jul-14A			■ VS - Rock Grade 400 - Zone A2 - (CH843 to 893)										
NRC12400	VS - Rock Grade 400 - Zone A2 - (CH893 to 956)	30	23-Jun-14A	01-Aug-14A			■ VS - Rock Grade 400 - Zone A2 - (CH893 to 956)										
NRC12410	VS - Levelling Stone - Zone A2 - (CH793 to 843)	4	08-Jul-14A	17-Jul-14A			■ VS - Levelling Stone - Zone A2 - (CH793 to 843)										
NRC12420	VS - Levelling Stone - Zone A2 - (CH843 to 893)	4	23-Jul-14A	24-Jul-14A			■ VS - Levelling Stone - Zone A2 - (CH843 to 893)										
NRC12440	VS - Levelling Stone - Zone A2 - (CH893 to 956)	9	18-Aug-14A	18-Aug-14A			■ VS - Levelling Stone - Zone A2 - (CH893 to 956)										
NRC12450	VS - Seawall Block - Zone A2 - (CH793 to 843)	7	16-Jul-14A	28-Aug-14A			■ VS - Seawall Block - Zone A2 - (CH793 to 843)										
NRC12460	VS - Seawall Block - Zone A2 - (CH843 to 893)	7	13-Aug-14A	01-Sep-14			■ VS - Seawall Block - Zone A2 - (CH843 to 893)										
NRC12470	VS - Seawall Block - Zone A2 - (CH893 to 956)	17	23-Aug-14A	20-Sep-14			■ VS - Seawall Block - Zone A2 - (CH893 to 956)										
NRC12480	VS - Rockfill Type A - Zone A2 - (CH793 to 843)	3	02-Sep-14	04-Sep-14			■ VS - Rockfill Type A - Zone A2 - (CH793 to 843)										
NRC12490	VS - Rockfill Type A - Zone A2 - (CH843 to 893)	3	22-Sep-14	24-Sep-14			■ VS - Rockfill Type A - Zone A2 - (CH843 to 893)										
NRC12500	VS - Rockfill Type A - Zone A2 - (CH893 to 956)	7	25-Sep-14	04-Oct-14			■ VS - Rockfill Type A - Zone A2 - (CH893 to 956)										
NRC12510	VS - Geotextile - Zone A2 - (CH793 to 843)	2	25-Sep-14	26-Sep-14			■ VS - Geotextile - Zone A2 - (CH793 to 843)										
NRC12520	VS - Geotextile - Zone A2 - (CH843 to 893)	2	27-Sep-14	29-Sep-14			■ VS - Geotextile - Zone A2 - (CH843 to 893)										
NRC12530	VS - Geotextile - Zone A2 - (CH893 to 956)	5	30-Sep-14	07-Oct-14			■ VS - Geotextile - Zone A2 - (CH893 to 956)										
NRC12540	VS - Granular Filter - Zone A2 - (CH793 to 843)	4	30-Sep-14	06-Oct-14			■ VS - Granular Filter - Zone A2 - (CH793 to 843)										
NRC12550	VS - Granular Filter - Zone A2 - (CH843 to 893)	4	07-Oct-14	10-Oct-14			■ VS - Granular Filter - Zone A2 - (CH843 to 893)										
NRC12560	VS - Granular Filter - Zone A2 - (CH893 to 956)	10	11-Oct-14	22-Oct-14			■ VS - Granular Filter - Zone A2 - (CH893 to 956)										
NRC12570	VS - Berm Stone - Zone A2 - (CH793 to 843)	3	18-Oct-14	21-Oct-14			■ VS - Berm Stone - Zone A2 - (CH793 to 843)										
NRC12580	VS - Berm Stone - Zone A2 - (CH843 to 893)	3	22-Oct-14	24-Oct-14			■ VS - Berm Stone - Zone A2 - (CH843 to 893)										
NRC12590	VS - Berm Stone - Zone A2 - (CH893 to 956)	7	25-Oct-14	01-Nov-14			■ VS - Berm Stone - Zone A2 - (CH893 to 956)										
NRC12600	VS - Mass Concrete Coping - Zone A2 - (CH793 to 843)	8	21-Oct-14	29-Oct-14			■ VS - Mass Concrete Coping - Zone A2 - (CH793 to 843)										
NRC12610	VS - Mass Concrete Coping - Zone A2 - (CH843 to 893)	8	30-Oct-14	07-Nov-14			■ VS - Mass Concrete Coping - Zone A2 - (CH843 to 893)										
NRC12620	VS - Mass Concrete Coping - Zone A2 - (CH893 to 956)	18	08-Nov-14	28-Nov-14			■ VS - Mass Concrete Coping - Zone A2 - (CH893 to 956)										
Sloping Seawall		72	17-Apr-14A	11-Dec-14													
NRC12630	SS - Dredging - Zone A2 - (CH793 to 843)	5	17-Apr-14A	01-Jul-14A			■ SS - Dredging - Zone A2 - (CH793 to 843)										
NRC12640	SS - Dredging - Zone A2 - (CH843 to 893)	6	17-May-14A	02-Jul-14A			■ SS - Dredging - Zone A2 - (CH843 to 893)										
NRC12650	SS - Dredging - Zone A2 - (CH893 to 956)	7	03-Jul-14A	26-Jul-14A			■ SS - Dredging - Zone A2 - (CH893 to 956)										
NRC12660	SS - Rock Grade 400 - Zone A2 - (CH793 to 843) to +2.5mPD (4k/d)	10	10-Jun-14A	16-Aug-14A			■ SS - Rock Grade 400 - Zone A2 - (CH793 to 843) to +2.5mPD (4k/d)										
NRC12670	SS - Rock Grade 400 - Zone A2 - (CH843 to 893) to +2.5mPD (4k/d)	12	11-Aug-14A	03-Sep-14			■ SS - Rock Grade 400 - Zone A2 - (CH843 to 893) to +2.5mPD (4k/d)										

Activity ID	Activity Name	Orig Dur	Current Start	Current Finish	2014																			
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec												
NRC1290	Sloping - Granular Filter - Zone A2 - (CH843 to 893)	3	11-Sep-14	13-Sep-14																				
NRC12900	Sloping - Granular Filter - Zone A2 - (CH893 to 956)	3	24-Sep-14	26-Sep-14																				
Reclamation		234	12-Sep-14	13-Jul-15																				
NRC12910	Reclamation - Geotextile - Zone A2 - (CH793 to 843)	4	12-Sep-14	16-Sep-14																				
NRC12920	Reclamation - Geotextile - Zone A2 - (CH843 to 893)	4	17-Sep-14	20-Sep-14																				
NRC12930	Reclamation - Geotextile - Zone A2 - (CH893 to 956)	3	27-Sep-14	30-Sep-14																				
NRC12940	Reclamation - Sand Blanket - Zone A2 - (CH793 to 843)	2	17-Sep-14	18-Sep-14																				
NRC12960	Reclamation - Sand Blanket - Zone A2 - (CH843 to 893)	3	22-Sep-14	24-Sep-14																				
NRC12970	Reclamation - Sand Blanket - Zone A2 - (CH893 to 956)	5	03-Oct-14	08-Oct-14																				
NRC12980	Reclamation - Band Drain - Zone A2 - (CH793 to 843)	4	19-Sep-14	23-Sep-14																				
NRC12990	Reclamation - Band Drain - Zone A2 - (CH843 to 893)	4	25-Sep-14	29-Sep-14																				
NRC13000	Reclamation - Band Drain - Zone A2 - (CH893 to 956)	5	09-Oct-14	14-Oct-14																				
NRC13010	Public Fill - Zone A2 - (CH793 to 843) to -2.5mPD	6	24-Sep-14	30-Sep-14																				
NRC13020	Public Fill - Zone A2 - (CH843 to 893) to -2.5mPD	6	03-Oct-14	09-Oct-14																				
NRC13030	Public Fill - Zone A2 - (CH893 to 956) to -2.5mPD	4	15-Oct-14	18-Oct-14																				
NRC13040	Public Fill - Zone A2 - (CH793 to 843) to +2.5mPD	7	20-Oct-14	27-Oct-14																				
NRC13050	Public Fill - Zone A2 - (CH843 to 893) to +2.5mPD	7	28-Oct-14	04-Nov-14																				
NRC13070	Public Fill - Zone A2 - (CH893 to 956) to +2.5mPD	6	05-Nov-14	11-Nov-14																				
NRC13080	Public Fill - Zone A2 - (CH793 to 843) to +6.0mPD	7	28-Oct-14	04-Nov-14																				
NRC13090	Public Fill - Zone A2 - (CH843 to 893) to +6.0mPD	7	05-Nov-14	12-Nov-14																				
NRC13100	Public Fill - Zone A2 - (CH893 to 956) to +6.0mPD	6	13-Nov-14	19-Nov-14																				
NRC13120	Public Fill - Zone A2 - (CH843 to 893) to +10mPD	7	02-Jan-15	09-Jan-15																				
NRC13130	Public Fill - Zone A2 - (CH893 to 956) to +10mPD	4	10-Jan-15	14-Jan-15																				
NRC15390	Surcharge Period - Zone A2 - (CH793 to 843)	180	15-Jan-15	13-Jul-15																				
Zone F		80	18-Jun-14A	09-Nov-14																				
CH137 to CH184		39	07-Jul-14A	15-Oct-14																				
A6416100	F - Backfilling up to -7.5mPD & T1 Installation - CH137 to CH184	4	07-Jul-14A	11-Aug-14																				
A6416110	F - Backfilling up to -4.5mPD - CH137 to CH184	2	01-Sep-14	02-Sep-14																				
A6416115	F - Backfilling up to +0.5mPD & T3 Installation - CH137 to CH184	6	03-Sep-14	08-Sep-14																				
A6416118	F - Backfilling up to +3.0mPD - CH137 to CH184	2	09-Sep-14	10-Sep-14																				
A6416120	F - Backfilling up to +6.0mPD - CH137 to CH184	2	11-Sep-14	12-Sep-14																				
A6416320	F - Anchor Wall Installation - CH160 to CH184	2	14-Oct-14	15-Oct-14																				
CH184 to CH231		44	01-Aug-14A	28-Oct-14																				
A6416060	F - Backfilling up to -7.5mPD & T1 Installation - CH184 to CH231	4	01-Aug-14A	16-Aug-14A																				
A6416070	F - Backfilling up to -4.5mPD - CH184 to CH231	2	03-Sep-14	04-Sep-14																				
A6416080	F - Backfilling up to +0.5mPD & T3 Installation - CH184 to CH231	6	09-Sep-14	14-Sep-14																				
A6416085	F - Backfilling up to +3.0mPD - CH184 to CH231	2	15-Sep-14	16-Sep-14																				
A6416090	F - Backfilling up to +6.0mPD - CH184 to CH231	2	17-Sep-14	18-Sep-14																				
A6416230	F - Anchor wall Installation - CH184 to CH231	4	16-Oct-14	20-Oct-14																				
A6416290	F - Backfilling up to 0.0mPD & G2 Installation to Anchor Wall - CH184 to CH231	3	21-Oct-14	23-Oct-14																				
A6416295	F - Backfilling up to +3.0mPD & G1 Installation to Anchor Wall - CH184 to CH231	2	24-Oct-14	25-Oct-14																				
A6416300	F - Backfilling up to +6.0mPD to Anchor Wall - CH184 to CH231	2	26-Oct-14	27-Oct-14																				
A6416400	F - Backfilling up to +6.0mPD to Existing Seawall - CH184 to CH231	1	28-Oct-14	28-Oct-14																				
CH231 to CH278		66	18-Jun-14A	31-Oct-14																				
A6416240	F - Marine Sheet Piling (H1) - CH231 to CH278	4	18-Jun-14A	09-Aug-14A																				
A6416250	F - Marine Sheet Piling (H2) - CH231 to CH278	4	24-Jun-14A	16-Aug-14A																				
A6416260	F - Backfilling up to -7.5mPD & T1 Installation - CH231 to CH278	4	30-Sep-14	03-Oct-14																				
A6416270	F - Backfilling up to -4.5mPD - CH231 to CH278	2	05-Oct-14	06-Oct-14																				
A6416273	F - Backfilling up to +0.5mPD & T3 Installation - CH231 to CH278	6	09-Oct-14	14-Oct-14																				
A6416278	F - Backfilling up to +3.0mPD - CH231 to CH278	2	15-Oct-14	16-Oct-14																				
A6416280	F - Backfilling up to +6.0mPD - CH231 to CH278	2	17-Oct-14	18-Oct-14																				
A6416310	F - Anchor wall Installation - CH231 to CH278	4	20-Oct-14	23-Oct-14																				
A6416480	F - Backfilling up to 0.0mPD & G2 Installation to Anchor Wall - CH231 to CH278	3	24-Oct-14	26-Oct-14																				
A6416490	F - Backfilling up to +3.0mPD & G1 Installation to Anchor Wall - CH231 to CH278	2	27-Oct-14	28-Oct-14																				
A6416500	F - Backfilling up to +6.0mPD to Anchor Wall - CH231 to CH278	2	29-Oct-14	30-Oct-14																				
A6416510	F - Backfilling up to +6.0mPD to Existing Seawall - CH231 to CH278	1	31-Oct-14	31-Oct-14																				
CH278 to CH327		66	26-Jul-14A	07-Nov-14																				
A6416180	F - Pre-boring for Marine Sheet Pile - CH278 to CH327	6	26-Jul-14A	27-Aug-14A																				
A6416190	F - Marine Sheet Piling (H1) - CH278 to CH327	5	08-Sep-14	13-Sep-14																				
A6416195	F - Marine Sheet Piling (H2) - CH278 to CH327	5	24-Sep-14	29-Sep-14																				
A6416200	F - Backfilling up to -3.5mPD & T2 Installation - CH278 to CH327	5	30-Sep-14	04-Oct-14																				
A6416210	F - Backfilling up to +0.5mPD - CH278 to CH327	4	05-Oct-14	08-Oct-14																				
A6416215	F - Backfilling up to +3.0mPD & T4 Installation - CH278 to CH327	5	09-Oct-14	13-Oct-14																				
A6416220	F - Backfilling up to +6.0mPD - CH278 to CH327	2	14-Oct-14	15-Oct-14																				
A6416340	F - Anchor wall Installation - CH278 to CH327	4	24-Oct-14	28-Oct-14																				
A6416520	F - Backfilling up to 0.0mPD & G2 Installation to Anchor Wall - CH278 to CH327	3	29-Oct-14	31-Oct-14																				
A6416530	F - Backfilling up to +3.0mPD & G1 Installation to Anchor Wall - CH278 to CH327	3	01-Nov-14	03-Nov-14																				
A6416540	F - Backfilling up to +6.0mPD to Anchor Wall - CH278 to CH327	3	04-Nov-14	06-Nov-14																				
A6416550	F - Backfilling up to +6.0mPD to Existing Seawall - CH278 to CH327	1	07-Nov-14	07-Nov-14																				
CH327 to CH381		64	02-Aug-14A	09-Nov-14																				
A6416130	F - Pre-boring for Marine Sheet Pile - CH327 to CH381	6	02-Aug-14A	30-Aug-14A																				
A6416140	F - Marine Sheet Piling (H1) - CH327 to CH381	4	15-Sep-14	18-Sep-14																				
A6416145	F - Marine Sheet Piling (H2) - CH327 to CH381	4	19-Sep-14	23-Sep-14																				
A6416150	F - Backfilling up to -3.5mPD & T2 Installation - CH327 to CH381	4	24-Sep-14	27-Sep-14																				
A6416155	F - Backfilling up to +0.5mPD - CH327 to CH381	3	28-Sep-14	30-Sep-14																				
A6416160	F - Backfilling up to +3.0mPD & T4 Installation - CH327 to CH381	5	01-Oct-14	05-Oct-14																				
A6416170	F - Backfilling up to +6.0mPD - CH327 to CH381	3	06-Oct-14	08-Oct-14																				
A6416370	F - Anchor wall Installation - CH327 to CH381	3	29-Oct-14	31-Oct-14																				
A6416560	F - Backfilling up to 0.0mPD & G2 Installation to Anchor Wall - CH327 to CH381	3	01-Nov-14	0																				

Activity ID	Activity Name	Orig Dur	Current Start	Current Finish	2014													
					May	Jun	Jul	Aug	Sep	Oct	Nov	Dec						
A6416730	Bored Pile Construction - A34 to A27	156	29-Oct-14	14-May-15														
CH231 to CH278		143	01-Nov-14	02-May-15														
A6416630	Predrilling - CH231 to CH278	24	01-Nov-14	28-Nov-14														
A6416740	Bored Pile Construction - A26 to A19	143	01-Nov-14	02-May-15														
CH278 to CH327		141	08-Nov-14	07-May-15														
A6416640	Predrilling - CH278 to CH327	24	08-Nov-14	05-Dec-14														
A6416750	Bored Pile Construction - A18 to A11	117	06-Dec-14	07-May-15														
CH327 to CH381		110	10-Nov-14	27-Mar-15														
A6416650	Predrilling - CH327 to CH381	24	10-Nov-14	06-Dec-14														
A6416760	Bored Pile Construction - A10 to A03	86	08-Dec-14	27-Mar-15														
CH381 to CH399 (Box Culvert Connection)		58	01-Sep-14	11-Nov-14														
A6416660	F - Prebored H-piles for CKS Temporary Land Access	6	01-Sep-14	06-Sep-14														
A6417000	F - Steel Bridge Installation for Land Access to Zone E	52	08-Sep-14	10-Nov-14														
A6417010	F - Available of Land Access to Zone E	0	11-Nov-14															

North Shafts Construction & Tunnel Structure 249 07-Jun-14A 27-Mar-15

Construction				249	07-Jun-14A	27-Mar-15
North Launching Shaft ELS Foundation & Capping Beam (Cell 1 to 3)						
NSH1340	E - Cell 1-3 - Diaphragm Wall & Toe Grouting - Shaft ELS	66	07-Jun-14A	24-Sep-14		
NSH1350	E - Cell 1-3 - Diaphragm Wall & Toe Grouting - Perm Barrette	9	25-Sep-14	29-Sep-14		
NSH1360	E - Cell 1-3 - Capping beam Installation	18	26-Aug-14A	15-Oct-14		
NSH1370	E - Cell 1-3 - Instrumentation & Pump well Installation	6	30-Sep-14	08-Oct-14		
NSH1430	E - Pumping Test for TBM Launching Shaft ELS - Cell 1-3	5	09-Oct-14	13-Oct-14		

North Launching Shaft Excavation (Cell 1 to 3) 82 16-Oct-14 22-Jan-15

NSH1440	E - Cell 1 to 3 - Shaft Excavation	82	16-Oct-14	22-Jan-15		
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North Launching Shaft Base Slab for TBM Launching 33 23-Jan-15 09-Mar-15

NSH1455	E - Tympanum construction for TBM break-in	12	30-Jan-15	12-Feb-15		
NSH1460	E - Cell 1 to 2 - Base Slab construction	21	23-Jan-15	16-Feb-15		
NSH1470	E - Cell 3 - Base Slab construction	12	17-Feb-15	09-Mar-15		

North Ventilation Shaft ELS Foundation & Capping Beam 114 05-Nov-14 27-Mar-15

A6415775	A - Setup for Shaft ELS Foundation	19	05-Nov-14	26-Nov-14		
A6415780	A - Diaphragm Wall - Shaft ELS	95	27-Nov-14	27-Mar-15		

CLP Temporary Substation 196 02-Jul-14A 02-Mar-15

Construction				196	02-Jul-14A	02-Mar-15
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DDP12800	1st Batch - CLP Installation & Commissioning	108	02-Jul-14A	07-Nov-14		
DDP12810	11kV Equipment / Switch Room installation by JV	48	01-Sep-14	29-Oct-14		
DDP12820	FS Installation by JV	24	11-Oct-14	08-Nov-14		
DDP12830	1st batch - Noise Measurement (to be clarified)	12	08-Nov-14	21-Nov-14		
DDP12840	Final FS Installation by JV	6	08-Nov-14	14-Nov-14		
DDP12850	FSD inspection for 1st Transformer Energization	12	15-Nov-14	28-Nov-14		
DDP12860	1st Batch - Commissioning & Energization	0		28-Nov-14*		
DDP12870	2nd Batch - CLP Installation & Commissioning	109	15-Oct-14*	28-Feb-15		
DDP1287010	10 days stoppage of power supply to site	10	02-Feb-15	12-Feb-15		
DDP12880	FS Installation by JV	24	26-Jan-15	02-Mar-15		

North Surface works for TBM Tunnelling 276 21-Jul-14A 27-May-15

Construction				276	21-Jul-14A	27-May-15
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Zone E 215 21-Jul-14A 28-Mar-15

A6416431	Zone E - Vibro-compaction (CH150-205)	51	21-Jul-14A	20-Aug-14A		
A6416436	Zone E - Unreinforced Separation D-wall	21	25-Aug-14A	22-Sep-14		
A6416438	Zone E - Ground Treatment for CP55	21	01-Sep-14	25-Sep-14		
A6416439	Zone E - Granular Material for B/Cement Base	10	26-Sep-14	09-Oct-14		
A641643910	Zone E - TBM Crown Ground Treatment	62	01-Sep-14	14-Nov-14		
A6416440	Zone E - Slurry Wall for Break-in Plug	38	25-Nov-14	10-Jan-15		
A6416450	Zone E - Jet grouting	60	12-Jan-15	28-Mar-15		

Zone D1 173 11-Aug-14A 20-Jan-15

NRC13940	Zone D1 - Vibro-compaction (CH205 to 255)	60	11-Aug-14A	30-Aug-14A		
NRC13950	Zone D1 - Vibro-compaction (CH255 to 305)	60	28-Aug-14A	24-Oct-14		
NRC13960	Zone D1 - Vibro-compaction (CH305 to 355)	60	20-Aug-14A	28-Sep-14		
NRC14000	Zone D1 - Compacted Sand Excavation down to +2.0mPD	6	18-Aug-14A	25-Aug-14A		
NRC14010	Zone D1 - Unreinforced Separation D-wall (1st 55m)	16	26-Aug-14A	17-Sep-14		
NRC14012	Zone D1 - Unreinforced Separation D-wall (Remaining)	19	18-Sep-14	11-Oct-14		
NRC14015	Zone D1 - Ground Treatment at TBM Tunnel Crown	61	07-Nov-14	20-Jan-15		
NRC14020	Zone D1 - B/C Slurry Substitution for CP54	20	01-Sep-14	24-Sep-14		
NRC14030	Zone D1 - Granular Material for B/Cement Base	6	13-Oct-14	18-Oct-14		
NRC14040	Zone D1 - Compacted Granular Material to +6.0mPD	6	20-Oct-14	25-Oct-14		

Zone D2 89 01-Sep-14 25-Nov-14

NRC13970	Zone D2 - Vibro-compaction (CH355 to 405)	60	01-Sep-14	30-Oct-14		
NRC13980	Zone D2 - Vibro-compaction (CH405 to 443)	60	01-Sep-14	30-Oct-14		
NRC13990	Zone D2 - Unreinforced Separation D-wall	21	31-Oct-14	24-Nov-14		
NRC14110	Zone D2 - B/C Slurry Substitution for CP53	22	31-Oct-14	25-Nov-14		

Zone C1 83 01-Sep-14 01-Dec-14

NRC1202100	Zone C1 - Vibro-compaction (CH355 to 405)	60	01-Sep-14	30-Oct-14		
NRC1202110	Zone C1 - Vibro-compaction (CH405 to 443)	60	01-Sep-14	30-Oct-14		
NRC1202120	Zone C1 - Unreinforced Separation D-wall	27	31-Oct-14	01-Dec-14		
NRC1202130	Zone C1 - B/C Slurry Substitution for CP52	26	31-Oct-14	29-Nov-14		

Zone C2 59 02-Sep-14 12-Nov-14

NRC1202140	Zone C2 - Unreinforced Separation D-wall	15	15-Oct-14	31-Oct-14		
NRC1202150	Zone C2 - Drilling for Rock Fissure Grouting for CP51	21	02-Sep-14	26-Sep-14		
NRC1202155	Zone C2 - Rock Fissure Grouting for CP51	44	13-Sep-14	05-Nov-14		
NRC1202160	Zone C2 - Jet Grouting for CP51	18	23-Oct-14	12-Nov-14		

Zone B 13 27-Sep-14 14-Oct-14

A6415897	Zone B - Unreinforced Separation D-wall	13	27-Sep-14	14-Oct-14		
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Ground Treatment 113 02-Jan-15 27-May-15

A6417430	Zone A - B/C Slurry Substitution for CP49	30	02-Jan-15	05-Feb-15		
A6417440	Zone A - Drilling for Rock Fissure Grouting for CP48	65	15-Jan-15	11-Apr-15		
A6417450	Zone A - Rock Fissure Grouting for CP48	90	29-Jan-15	27-May-15		

North Approach TBM Tunnelling & Cross Passage 106 16-Oct-14 02-Mar-15

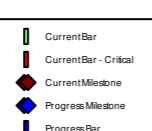
Construction				106	16-Oct-14	02-Mar-15
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Northern Landfall Surface Setup for TBM operation 92 16-Oct-14 16-Jan-15

A6415930	Gantry Setup at North TBM Launching Shaft	48	16-Oct-14	10-Dec-14		
A6415937	Slurry Treatment Plant Foundation	25	16-Dec-14	16-Jan-15		

S880 TBM Assembly at North TBM Launching Shaft 3 28-Feb-15 02-Mar-15

NSH1900	S880 - TBM Launching - Front Shield Assembly	3	28-Feb-15	02-Mar-15		
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Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approved
12-Feb-14	TMCLK/DBJ/GEN/PRG/96507	SPa	WYu

Appendix C

Environmental Mitigation
and Enhancement Measure
Implementation Schedules

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
Air Quality									
4.8.1	3.8	An effective watering programme of twice daily watering with complete coverage, is estimated to reduce by 50%. This is recommended for all areas in order to reduce dust levels to a minimum;	All areas / throughout construction period	Contractor	TMEIA Avoid smoke impacts and disturbance		Y		✓
4.8.1	3.8	Watering of the construction sites in Lantau for 8 times/day and in Tuen Mun for 12 times/day to reduce dust emissions by 87.5% and 91.7% respectively and shall be undertaken.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	The Contractor shall, to the satisfaction of the Engineer, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the Site boundary and any nearby sensitive receiver, dust levels are kept to acceptable levels.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	The Contractor shall not burn debris or other materials on the works areas.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	In hot, dry or windy weather, the watering programme shall maintain all exposed road surfaces and dust sources wet.	All unpaved haul roads / throughout construction period in hot, dry or windy weather	Contractor	TMEIA Avoid smoke impacts and disturbance		Y		✓
4.8.1	3.8	Where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. 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.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		<>
4.8.1	3.8	Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	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.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓

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						D	C	O	
4.8.1	3.8	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.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	No earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site.	All site exits / throughout construction period	Contractor	TMEIA Avoid dust		Y		✓
4.8.1	3.8	Areas of exposed soil shall be minimised to areas in which works have been completed shall be restored as soon as is	All exposed surfaces / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	All stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy condition.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		<>
4.11	Section 3	EM&A in the form of 1 hour and 24 hour dust monitoring and site audit.	All representative existing ASRs / throughout construction period	Contractor	EM&A Manual		Y		✓

WATER QUALITY

Marine Works (Sequence A)

6.1	Annex A	Construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. The protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2a and detailed in Appendix D6a. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation;	All areas/ prior to dredging and backfilling works	Contractor	TM-EIAO		Y		<>
6.1	-	a maximum of 50% public fill to be used for all seawall filling below +2.5mPD for TM-CLKL southern and northern landfalls.	TM-CLKL seawall filling	Contractor	TM-EIAO		Y		✓

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						D	C	O	
6.1	-	a maximum of 30% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL southern landfall	TM-CLKL southern landfall reclamation filling	Contractor	TM-EIAO		Y		N/A
6.1	-	a maximum of 100% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL northern landfall	TM-CLKL northern landfall reclamation filling	Contractor	TM-EIAO		Y		✓
6.1	-	Use of cage type silt curtains round all grab dredgers during the HKBCF, HKLR and TM-CLKL southern reclamation works.	All areas dredging works	Contractor	TM-EIAO		Y		✓
	Figure 1.1 of Annex C	A layer of floating type silt curtain will be applied when dredging and reclamation works are being undertaken at Portion N-a as shown in Figure 1.1 of Annex C of the EM&A Manual.	All areas/ through out marine works	Contractor	TM-EIAO		Y		✓
6.1	-	Trailer suction hopper dredgers shall not allow mud to overflow.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	The use of Lean Material Overboard (LMOB) systems shall be prohibited.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	Annex A Figure 6.2b Appendix D6b	For other parts of the reclamation works construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. It should be noted that the protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2b and detailed in Appendices D6b. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation; - Reclamation filling for Portion D of HKBCF; Reclamation filling for FSD berth of HKBCF; and	TM-CLKL northern landfall, Portion D of HKBCF and HKLR	Contractor	TM-EIAO		Y		✓

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Northern Connection Sub-sea Tunnel Section
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						D	C	O	
		- Reclamation dredging and filling for Portion 1 of HKLR;							
6.1	-	The filling material for the other parts of the works are the same as Sequence A;	All other areas/backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	5.7	Cage type silt curtain (with steel enclosure) shall be used for grab dredgers working in the site of HKBCF and TM- CLKL southern reclamation. Cage type silt curtains will be applied round all grab dredgers at other works area.	HKBCF, HKLR and TM-CLKL grab dredging	Contractor	TM-EIAO		Y		✓
6.1	Annex A	A layer of floating type silt curtain will be applied around all works as defined in Appendix D6b.	All areas/ through out marine works	Contractor	TM-EIAO		Y		✓
6.1	-	TM-CLKL northern landfall: - Reclamation filling shall not proceed until at least 200m section of leading seawall at both the east and west sides of the reclamation are formed above +2.5 mPD, except for 100m gaps for marine access;	All areas/ through out marine works	Contractor	TM-EIAO		Y		✓
<i>General Marine Works</i>									
6.1	-	Use of TMB for the construction of the submarine tunnel.	Tunnel works / Construction phase	Contractor	TM-EIAO		Y		N/A
6.1	-	Export dredged spoils from NWWCZ.	All areas as much as possible / dredging activities	Contractor	DASO Permit conditions		Y		✓
6.1	-	Where public fill is proposed for filling below +2.5mPD, the fine content in the public fill will be controlled to 25%	All areas/ backfilling works	Contractor	TM-EIAO		Y		N/A
6.1	-	Where sand fill is proposed for filling below +2.5mPD, the fine content in the sand fill will be controlled to 5%.	All areas/ backfilling works	Contractor	TM-EIAO		Y		N.A
6.1	-	Mechanical grabs shall be designed and maintained to avoid spillage and should seal tightly while being lifted.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material.	All areas/ throughout construction period	Contractor	Marine Fill Committee		Y		✓

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						D	C	O	
					Guidelines. DASO permit conditions.				
6.1	-	Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		✓
6.1	-	Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action;	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit conditions.		Y		N/A
6.1	-	The works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site.	All areas/ throughout construction period	Contractor	Marine Fill Committee Guidelines. DASO permit		Y		<>

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						D	C	O	
					conditions.				
6.1	5.2	Silt curtain shall have proved effectiveness from the producer and shall be fully maintained throughout the works by the contractor.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.1	-	The daily maximum production rates shall not exceed those assumed in the water quality assessment.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	The dredging and filling works shall be scheduled to spread the works evenly over a working day.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
<i>Land Works</i>									
6.1	-	Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.1	-	Temporary access roads should be surfaced with crushed stone or gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>

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						D	C	O	
6.1	-	Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.1	-	Open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	5.8	Manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.1	-	Section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	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 off site disposal.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		N/A

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						D	C	O	
6.1	-	The Contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance.	All areas/ throughout construction period	Contractor	TM-EIAO Waste Disposal Ordinance		Y		✓
6.1	-	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.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Roadside gullies to trap silt and grit shall be provided prior to discharging the stormwater into the marine environment. The sumps will be maintained and cleaned at regular intervals.	Roadside/ design and operation	Design Consultant/ Contractor	TM-EIAO	Y		Y	✓
6.1	Section 5	All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice.	All areas/ throughout construction period	Contractor	EM&A Manual		Y		✓
<i>Water Quality Monitoring</i>									
6.1	Section 5	Water quality monitoring shall be undertaken for suspended solids, turbidity, and dissolved oxygen. Nutrients and metal parameters shall also be measured for Mf sediment operations (only HKBCF and HKLR required handling of Mf sediment) during baseline, backfilling and post construction period. One year operation phase water quality monitoring at designated stations.	Designated monitoring stations as defined in EM&A Manual, Section 5/ Before, through-out marine construction period, post construction and monthly operational phase water quality monitoring for a year.	Contractor	EM&A Manual		Y	Y	✓
ECOLOGY									

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						D	C	O	
8.14	6.3	Specification for and implement pre, during and post construction dolphin abundance monitoring.	All Areas/Detailed Design/ during construction works/ post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y	✓
8.14	6.3,6.5	Specification and implementation of 250m dolphin exclusion zone.	All dredging and reclamation areas/Detailed Design/ during all reclamation and dredging works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.3, 6.5	Specification and deployment of an artificial reef of an area of 3,600m2 in an area where fishing activities are prohibited.	Area of prohibited fishing activities/Detailed Design/towards end of construction period	TM-CLKL/ HKBCF Design Consultant/TM-CLKL/ HKBCF Contractor	TMEIA	Y		Y	N/A. To be implemented by AFCD.
8.14	6.3, 6.5	Specification and implementation of marine vessel control specifications	All areas/Detailed Design/during construction works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.14	6.3, 6.5	Design and implementation of acoustic decoupling methods for dredging and reclamation works	All areas/ Detailed Design/during dredging and reclamation works	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.3, 6.4	Pre-construction phase survey and coral translocation	Detailed Design/Prior to construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
8.15	6.5	Audit coral translocation success	Post translocation	Contractor	TMEIA		Y		✓
7.13	6.5	The loss of habitat shall be supplemented by enhancement planting in accordance with the landscape mitigation schedule.	All areas / As soon as accessible	Contractor	TMEIA		Y		N/A.
7.13	6.5	Spoil heaps shall be covered at all times.	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
7.13	6.5	Avoid damage and disturbance to the remaining and surrounding natural habitat	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
7.13	6.5	Placement of equipment in designated areas within the existing disturbed land	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
7.13	6.5	Disturbed areas to be reinstated immediately after completion of the works.	All areas / Throughout construction period	Contractor	TMEIA		Y		✓

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						D	C	O	
7.13	6.5	Construction activities should be restricted to the proposed works boundary.	All areas / Throughout construction period	Contractor	TMEIA		Y		✓
LANDSCAPE AND VISUAL									
10.9	7.6	The colour and shape of the toll control buildings, ventilation building and administration building shall adopt a design which could blend it into the vicinity elements, and the details will be developed in detailed design stage (DM2)	All areas/detailed design	Design Consultant	TMEIA	Y			N/A
10.9	7.6	Aesthetic design of the viaduct, retaining wall and other structures will be developed under ACABAS submission (DM5)	All areas/detailed design	Design Consultant	TMEIA	Y			N/A
10.9	7.6	Screening of construction works by hoardings around works area in visually unobtrusive colours, to screen works (CM5)	All areas/detailed design/ during construction/post construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Control night-time lighting and glare by hooding all lights (CM6)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		N/A
10.9	7.6	Ensure no run-off into water body adjacent to the Project Area (CM7)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (CM8)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Aesthetically pleasing design (visually unobtrusive and non-reflective) as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities (OM5)	All areas/detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	N/A
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (OM6)	All areas/detailed design/ during construction / during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	N/A
WASTE									
12.6		The Contractor shall identify a coordinator for the management of waste.	Contract mobilisation	Contractor	TMEIA		Y		✓

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						D	C	O	
12.6		The Contractor shall prepare and implement a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of wastes does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. A recording system for the amount of waste generated, recycled and disposed (locations) should be established.	Contract mobilisation	Contractor	TMEIA, Works Branch Technical Circular No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material		Y		✓
12.6		The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	Contract mobilisation	Contractor	TMEIA, Land (Miscellaneous Provisions) Ordinance (Cap 28); Waste Disposal Ordinance (Cap 354); Dumping at Sea Ordinance (Cap 466); Water Pollution Control Ordinance.		Y		✓
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedures including waste reduction, reuse and recycling.	Contract Mobilisation	Contractor	TMEIA		Y		✓
12.6	8.1	The extent of cutting operation should be optimised where possible. Earth retaining structures and bored pile walls should be proposed to minimise the extent of cutting.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	The surplus surcharge should be transferred to a fill bank	Reclamation areas / after surcharge works	Contractor	TMEIA		Y		N/A
12.6	8.1	Rock armour from the existing seawall should be reused on the new sloping seawall as far as possible	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	The site and surroundings shall be kept tidy and litter free.	All areas / throughout construction period	Contractor	TMEIA		Y		✓

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6	8.1	No waste shall be burnt on site.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Provisions to be made in contract documents to allow and promote the use of recycled aggregates where appropriate.	Detailed Design	Design Consultant	TMEIA	Y			✓
12.6	8.1	The Contractor shall be prohibited from disposing of C&D materials at any sensitive locations. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust/ surface run off.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Dredged marine mud shall be disposed of in a gazetted marine disposal ground under the requirements of the Dumping at Seas Ordinance.	Reclamation areas / throughout dredging works	Contractor	TMEIA		Y		✓
12.6	8.1	Standard formwork or pre-fabrication should be used as far as practicable so as to minimise the C&D materials arising. The use of more durable formwork/plastic facing for construction works should be considered. The use of wooden hoardings should be avoided and metal hoarding should be used to facilitate recycling. Purchasing of construction materials should avoid over-ordering and wastage.	All areas / throughout construction period	Contractor	TMEIA		Y		✓

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Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6	8.1	The Contractor should recycle as many C&D materials (this is a waste section) as possible on-site. The public fill and C&D waste should be segregated and stored in separate containers or skips to facilitate the reuse or recycling of materials and proper disposal. Where practicable, the concrete and masonry should be crushed and used as fill materials. Steel reinforcement bar should be collected for use by scrap steel mills. Different areas of the sites should be considered for segregation and storage activities.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	All falsework will be steel instead of wood.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Chemical waste producers should register with the EPD. Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows: <i>f</i> suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed; <i>f</i> Having a capacity of <450L unless the specifications have been approved by the EPD; and <i>f</i> Displaying a label in English and Chinese according to the instructions prescribed in Schedule 2 of the Regulations. <i>f</i> Clearly labelled and used solely for the storage of chemical wastes; <i>f</i> Enclosed with at least 3 sides; <i>f</i> Impermeable floor and bund with capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in the area, whichever is greatest; <i>f</i> Adequate ventilation; <i>f</i> Sufficiently covered to prevent rainfall	All areas / throughout construction period	Contractor	TMEIA		Y		<>

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
		entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and f Incompatible materials are adequately separated.							
12.6	8.1	Waste oils, chemicals or solvents shall not be disposed of to drain,	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Adequate numbers of portable toilets should be provided for on-site workers. Portable toilets should be maintained in reasonable states, which will not deter the workers from utilising them.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Night soil should be regularly collected by licensed collectors.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A
12.6	8.1	General refuse arising on-site should be stored in enclosed bins or compaction units separately from C&D and chemical wastes. Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station. Burning of refuse on construction sites is prohibited.	All areas / throughout construction period	Contractor	TMEIA		Y		<>
12.6	8.1	All waste containers shall be in a secure area on hardstanding;	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Office wastes can be reduced by recycling of paper if such volume is sufficiently large to warrant collection. Participation in a local collection scheme by the Contractor should be advocated. Waste separation facilities for paper, aluminium cans, plastic bottles, etc should be provided on-site.	Site Offices/ throughout construction period	Contractor	TMEIA		Y		✓

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
12.6	Section 8	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All areas / throughout construction period	Contractor	EM&A Manual		Y		✓
CULTURAL HERITAGE									
11.8	Section 9	EM&A in the form of audit of the mitigation measures	All areas / throughout construction period	Highways Department	EIAO-TM		Y		N/A

*** Remarks:**

- ✓ Compliance of Mitigation Measures
- <> Compliance of Mitigation but need improvement
- x Non-compliance of Mitigation Measures
- ▲ Non-compliance of Mitigation Measures but rectified by Contractor
- Δ Deficiency of Mitigation Measures but rectified by Contractor
- N/A Not Applicable in Reporting Period

Legend: D=Design, C=Construction, O=Operation

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

Appendix D

Summary of Action and Limit Levels

Table D1 *Action and Limit Levels for 1-hour and 24-hour TSP*

Parameters	Action	Limit
24 Hour TSP Level in $\mu\text{g}/\text{m}^3$	ASR1 = 213 ASR5 = 238 AQMS1 = 213 AQMS2 = 238 ASR10 = 214	260
1 Hour TSP Level in $\mu\text{g}/\text{m}^3$	ASR1 = 331 ASR5 = 340 AQMS1 = 335 AQMS2 = 338 ASR10 = 337	500

Table D2 *Action and Limit Levels for Water Quality*

Parameter	Action Level#	Limit Level#
DO in mg/L ^(a)	<u>Surface and Middle</u> 5.0 mg/L	<u>Surface and Middle</u> 4.2 mg/L
	<u>Bottom</u> 4.7 mg/L	<u>Bottom</u> 3.6 mg/L
Turbidity in NTU (Depth-averaged ^{(b), (c)})	120% of upstream control station at the same tide of the same day and 95%-ile of baseline data, i.e., 27.5 NTU	130% of upstream control station at the same tide of the same day and 99%-ile of baseline data, i.e., 47.0 NTU
SS in mg/L (Depth-averaged ^{(b), (c)})	120% of upstream control station at the same tide of the same day and 95%-ile of baseline data, i.e., 23.5 mg/L	130% of upstream control station at the same tide of the same day and 10mg/L for WSD Seawater Intakes at Tuen Mun and 99%-ile of baseline data, i.e., 34.4 mg/L

Notes:

Baseline data: data from HKZMB Baseline Water Quality Monitoring between 6 and 31 October 2011.

- (a) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- (b) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths
- (c) For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- (d) All figures given in the table are used for reference only, and EPD may amend the figures whenever it is considered as necessary
- (e) The 1%-ile of baseline data for surface and middle DO is 4.2 mg/L, whilst for bottom DO is 3.6 mg/L.

Table D3 *Action and Limit Levels for Impact Dolphin Monitoring*

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

Notes:

1. STG means quarterly encounter rate of number of dolphin sightings, which is **6.00 in NEL** and **9.85 in NWL** during the baseline monitoring period
2. ANI means quarterly encounter rate of total number of dolphins, which is **22.19 in NEL** and **44.66 in NWL** during the baseline monitoring period
3. For North Lantau Social Cluster, AL will be trigger if NEL or NWL fall below the criteria; LL will be triggered if both NEL and NWL fall below the criteria.

Table D4 *Derived Value of Action Level (AL) and Limit Level (LL)*

	North Lantau Social Cluster	
	NEL	NWL
Action Level	STG < 4.2 & ANI < 15.5	STG < 6.9 & ANI < 31.3
Limit Level	[STG < 2.4 & ANI < 8.9] and [STG < 3.9 & ANI < 17.9]	

Appendix E

EM&A Monitoring Schedules

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - June 2014**

Air quality monitoring stations: ASR1, ASR5, ASR6, ASR10, AQMS1

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Jun	public holiday 02-Jun	03-Jun	04-Jun	05-Jun	06-Jun	07-Jun
		1-hour TSP - 3 times 24-hour TSP - 1 time <i>Impact AQM</i>				
08-Jun	09-Jun	10-Jun	11-Jun	12-Jun	13-Jun	14-Jun
	1-hour TSP - 3 times 24-hour TSP - 1 time <i>Impact AQM</i>				1-hour TSP - 3 times 24-hour TSP - 1 time <i>Impact AQM</i>	
15-Jun	16-Jun	17-Jun	18-Jun	19-Jun	20-Jun	21-Jun
				1-hour TSP - 3 times 24-hour TSP - 1 time <i>Impact AQM</i>		
22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun
			1-hour TSP - 3 times 24-hour TSP - 1 time <i>Impact AQM</i>			
29-Jun	30-Jun					
	1-hour TSP - 3 times 24-hour TSP - 1 time <i>Impact AQM</i>					

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-sea Tunnel Section
Impact Marine Water Quality Monitoring (WQM) Schedule (June 14)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Jun	02-Jun	03-Jun	04-Jun	05-Jun	06-Jun	07-Jun
	WQM Mid-Flood 8:43 (06:58 - 10:28) Mid-Ebb 15:52 (14:07 - 17:37)		WQM Mid-Flood 9:58 (08:13 - 11:43) Mid-Ebb 17:04 (15:19 - 18:49)		WQM Mid-Flood 12:19 (10:34 - 14:04) Mid-Ebb 18:46 (17:01 - 20:31)	
08-Jun	09-Jun	10-Jun	11-Jun	12-Jun	13-Jun	14-Jun
	WQM Mid-Ebb 10:19 (08:34 - 12:04) Mid-Flood 16:42 (14:57 - 18:27)		WQM Mid-Ebb 11:39 (09:54 - 13:24) Mid-Flood 18:31 (16:48 - 20:16)		WQM Mid-Ebb 13:05 (11:20 - 14:50) Mid-Flood 20:11 (18:26 - 21:56)	
15-Jun	16-Jun	17-Jun	18-Jun	19-Jun	20-Jun	21-Jun
	WQM Mid-Flood 8:26 (06:41 - 10:11) Mid-Ebb 15:25 (13:40 - 17:10)		WQM Mid-Flood 10:15 (08:30 - 12:00) Mid-Ebb 17:04 (15:19 - 18:49)		WQM Mid-Flood 12:55 (11:10 - 14:40) Mid-Ebb 19:07 (17:22 - 20:52)	
22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun
	WQM Mid-Ebb 10:29 (08:44 - 12:14) Mid-Flood 16:57 (15:12 - 18:42)		WQM Mid-Ebb 11:57 (10:12 - 13:42) Mid-Flood 18:50 (17:05 - 20:35)		WQM Mid-Ebb 13:12 (11:27 - 14:57) Mid-Flood 20:11 (18:26 - 21:56)	
29-Jun	30-Jun	01-Jul	02-Jul	03-Jul	04-Jul	05-Jul
	WQM Mid-Flood 7:53 (06:08 - 09:38) Mid-Ebb 14:55 (13:10 - 16:40)					

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - June 2014**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Jun	public holiday 02-Jun	03-Jun	04-Jun	05-Jun	06-Jun	07-Jun
		Impact Dolphin Monitoring		Impact Dolphin Monitoring		
08-Jun	09-Jun	10-Jun	11-Jun	12-Jun	13-Jun	14-Jun
		Impact Dolphin Monitoring				
15-Jun	16-Jun	17-Jun	18-Jun	19-Jun	20-Jun	21-Jun
	Impact Dolphin Monitoring					
22-Jun	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun
29-Jun	30-Jun					

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - July 2014**

Air quality monitoring stations: ASR1, ASR5, ASR6, ASR10, AQMS1

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		public holiday 01-Jul	02-Jul	03-Jul	04-Jul	05-Jul
						1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM
06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	11-Jul	12-Jul
					1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
13-Jul	14-Jul	15-Jul	16-Jul	17-Jul	18-Jul	19-Jul
						1-hour TSP - 3 times 24-hour TSP - 1 time *Impact AQM
20-Jul	21-Jul	22-Jul	23-Jul	24-Jul	25-Jul	26-Jul
			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			
27-Jul	28-Jul	29-Jul	30-Jul	31-Jul		
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM				

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

*Note: AQM on 17-July was postponed to 19-July due to adverse weather

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-sea Tunnel Section
Impact Marine Water Quality Monitoring (WQM) Schedule (July 14)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		01-Jul	02-Jul	03-Jul	04-Jul	05-Jul
			WQM Mid-Flood 9:06 (07:21 - 10:51) Mid-Ebb 15:59 (14:14 - 17:44)		WQM Mid-Flood 10:35 (08:50 - 12:20) Mid-Ebb 17:09 (15:24 - 18:54)	
06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	11-Jul	12-Jul
	WQM Mid-Ebb 8:36 (06:51 - 10:21) Mid-Flood 14:53 (13:08 - 16:38)		WQM Mid-Ebb 10:30 (08:45 - 12:15) Mid-Flood 17:33 (15:48 - 19:18)		WQM Mid-Ebb 12:04 (10:19 - 13:49) Mid-Flood 19:14 (17:29 - 20:59)	
13-Jul	14-Jul	15-Jul	16-Jul	17-Jul	18-Jul	19-Jul
	WQM Mid-Ebb 14:25 (12:40 - 16:10) Mid-Flood 21:25 (19:40 - 23:10)		WQM Mid-Flood 9:15 (07:30 - 11:00) Mid-Ebb 15:56 (14:11 - 17:41)			
20-Jul	21-Jul	22-Jul	23-Jul	24-Jul	25-Jul	26-Jul
	WQM Mid-Ebb 9:08 (07:23 - 10:53) Mid-Flood 15:41 (13:56 - 17:26)		WQM Mid-Ebb 10:58 (09:13 - 12:43) Mid-Flood 18:03 (16:18 - 19:48)		WQM Mid-Ebb 12:19 (10:34 - 14:04) Mid-Flood 19:16 (17:31 - 21:01)	
27-Jul	28-Jul	29-Jul	30-Jul	31-Jul		
	WQM Mid-Ebb 14:02 (12:17 - 15:47) Mid-Flood 20:45 (19:00 - 22:30)		WQM Mid-Ebb 8:19 (06:34 - 10:04) Mid-Flood 15:00 (13:15 - 16:45)			

Note: WQM on 18-July was cancelled due to adverse weather.

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - July 2014**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		public holiday 01-Jul	02-Jul	03-Jul	04-Jul	05-Jul
				Impact Dolphin Monitoring		
06-Jul	07-Jul	08-Jul	09-Jul	10-Jul	11-Jul	12-Jul
				Impact Dolphin Monitoring		
13-Jul	14-Jul	15-Jul	16-Jul	17-Jul	18-Jul	19-Jul
	Impact Dolphin Monitoring					
20-Jul	21-Jul	22-Jul	23-Jul	24-Jul	25-Jul	26-Jul
	Impact Dolphin Monitoring					
27-Jul	28-Jul	29-Jul	30-Jul	31-Jul		

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - August 2014**

Air quality monitoring stations: ASR1, ASR5, ASR6, ASR10, AQMS1

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01-Aug	02-Aug
03-Aug	04-Aug	05-Aug	06-Aug	07-Aug	08-Aug	09-Aug
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM				1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
10-Aug	11-Aug	12-Aug	13-Aug	14-Aug	15-Aug	16-Aug
				1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
17-Aug	18-Aug	19-Aug	20-Aug	21-Aug	22-Aug	23-Aug
			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			
24-Aug	25-Aug	26-Aug	27-Aug	28-Aug	29-Aug	30-Aug
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM				
31-Aug						

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-sea Tunnel Section
Impact Marine Water Quality Monitoring (WQM) Schedule (August 2014)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					01-Aug	02-Aug
					WQM Mid-Flood 9:37 (07:52 - 11:22) Mid-Ebb 16:00 (14:15 - 17:45)	
03-Aug	04-Aug	05-Aug	06-Aug	07-Aug	08-Aug	09-Aug
	WQM Mid-Flood 12:52 (11:07 - 14:37) Mid-Ebb 18:29 (16:44 - 20:14)		WQM Mid-Ebb 9:02 (07:17 - 10:47) Mid-Flood 16:20 (14:35 - 18:05)		WQM Mid-Ebb 10:56 (09:11 - 12:41) Mid-Flood 18:12 (16:27 - 19:57)	
10-Aug	11-Aug	12-Aug	13-Aug	14-Aug	15-Aug	16-Aug
	WQM Mid-Ebb 13:22 (11:37 - 15:07) Mid-Flood 20:14 (18:29 - 21:59)		WQM Mid-Flood 8:18 (06:33 - 10:03) Mid-Ebb 14:51 (13:06 - 16:36)		WQM Mid-Flood 10:04 (08:19 - 11:49) Mid-Ebb 16:12 (14:27 - 17:57)	
17-Aug	18-Aug	19-Aug	20-Aug	21-Aug	22-Aug	23-Aug
	WQM Mid-Flood 13:48 (12:03 - 15:33) Mid-Ebb 18:50 (17:05 - 20:35)		WQM Mid-Ebb 9:40 (07:55 - 11:25) Mid-Flood 17:08 (15:23 - 18:53)		WQM Mid-Ebb 11:18 (09:33 - 13:03) Mid-Flood 18:19 (16:34 - 20:04)	
24-Aug	25-Aug	26-Aug	27-Aug	28-Aug	29-Aug	30-Aug
	WQM Mid-Ebb 13:06 (11:21 - 14:51) Mid-Flood 19:38 (17:53 - 21:23)		WQM Mid-Ebb 14:04 (12:19 - 15:49) Mid-Flood 20:23 (18:38 - 22:08)		WQM Mid-Flood 8:48 (07:03 - 10:33) Mid-Ebb 15:02 (13:17 - 16:47)	
31-Aug						

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - August 2014**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Aug	2-Aug
3-Aug	4-Aug	5-Aug	6-Aug	7-Aug	8-Aug	9-Aug
		Impact Dolphin Monitoring	Impact Dolphin Monitoring			
10-Aug	11-Aug	12-Aug	13-Aug	14-Aug	15-Aug	16-Aug
					Impact Dolphin Monitoring	
17-Aug	18-Aug	19-Aug	20-Aug	21-Aug	22-Aug	23-Aug
		Impact Dolphin Monitoring				
24-Aug	25-Aug	26-Aug	27-Aug	28-Aug	29-Aug	30-Aug
31-Aug						

The schedule is subject to agreement from the EPD on the monitoring times. The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

Appendix F

Impact Air Quality Monitoring Results

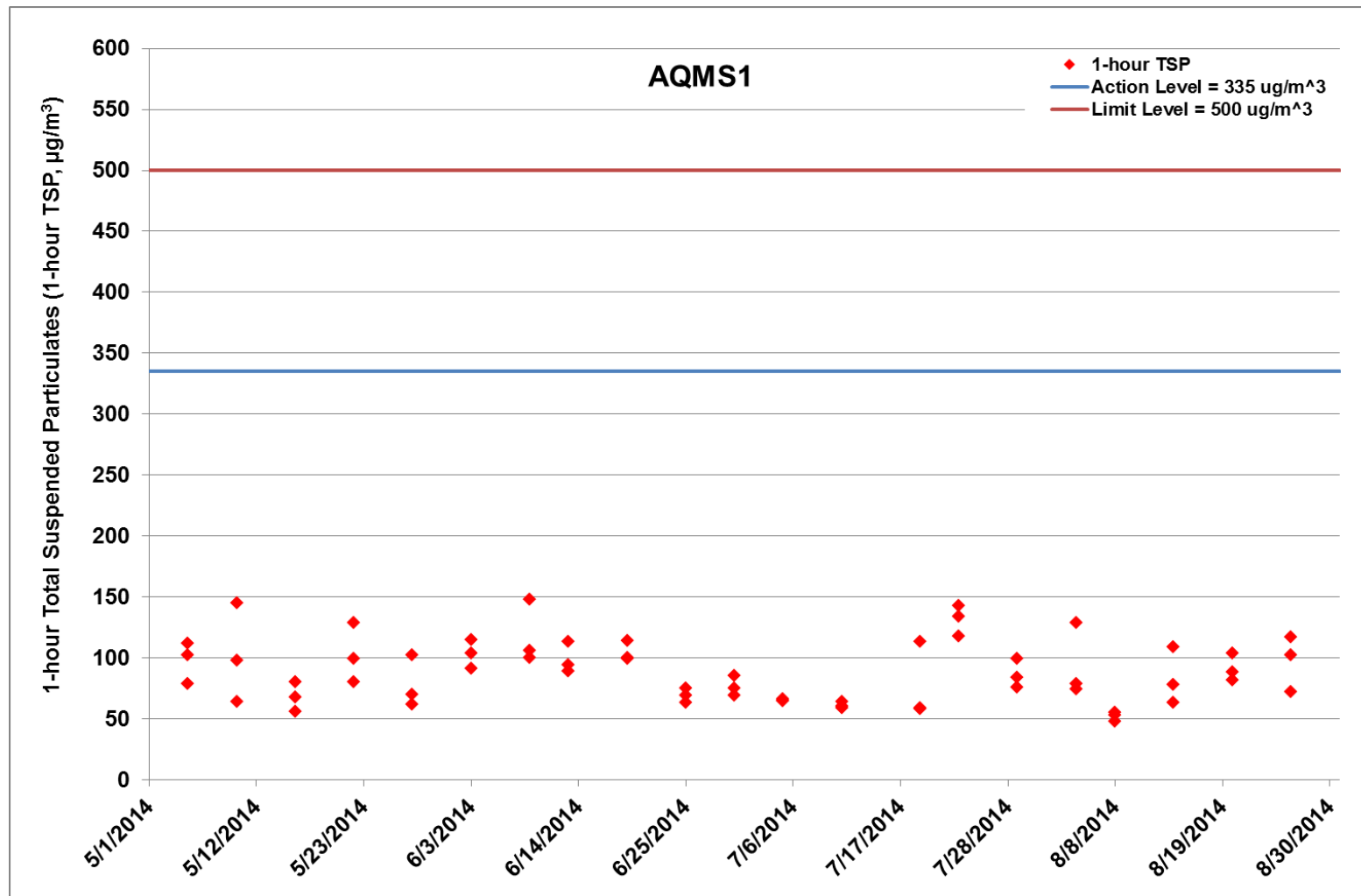


Figure F.1 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at AQMS1 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

Ref: 0212330_Impact AQM graphs_Qrpt Jun 2014_Aug 2014_REV a.xlsx



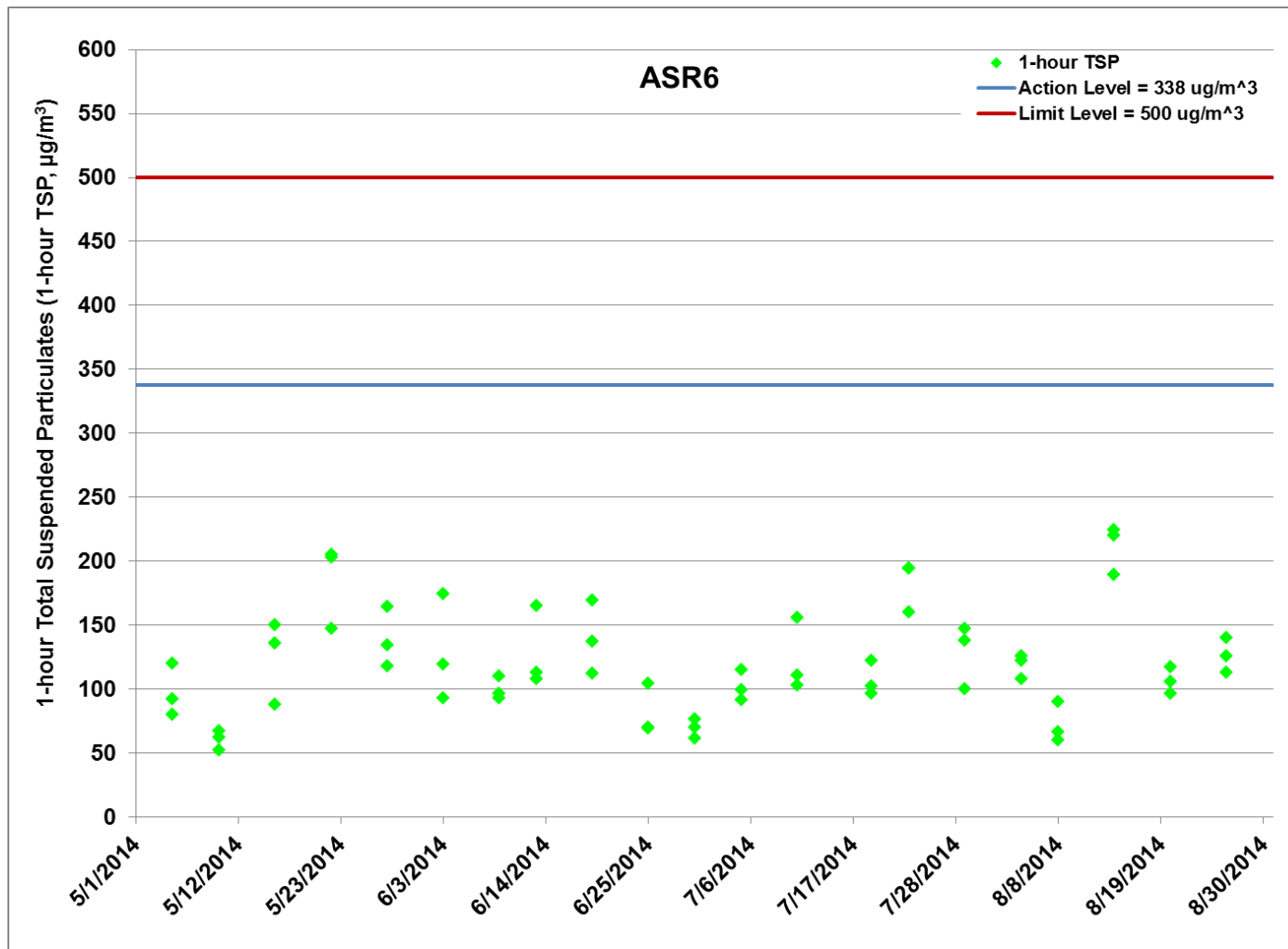


Figure F.2 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR6 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

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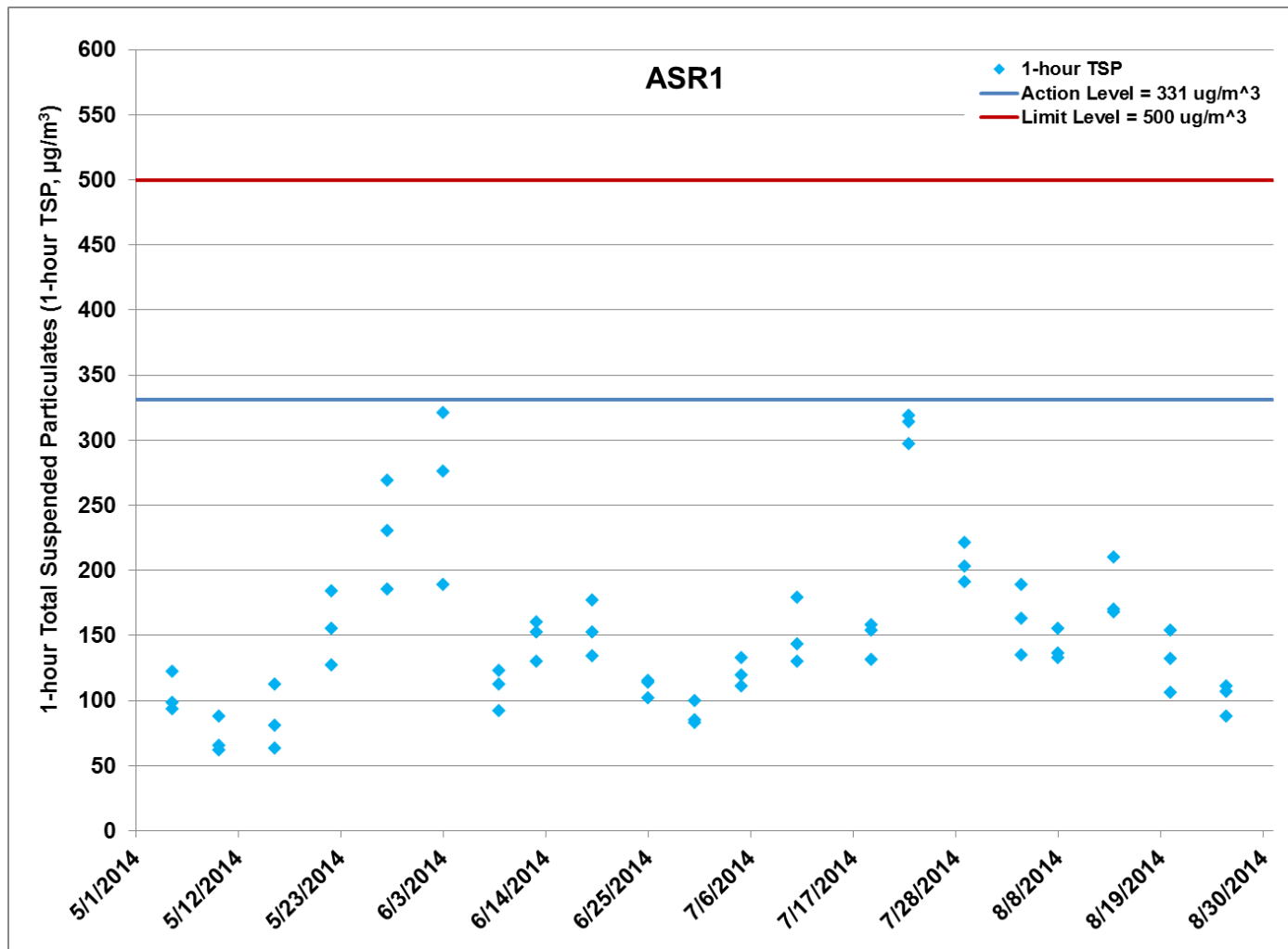


Figure F.3 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR1 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

Ref: 0212330_Impact AQM graphs_Qrpt Jun 2014_Aug 2014_REV a.xlsx



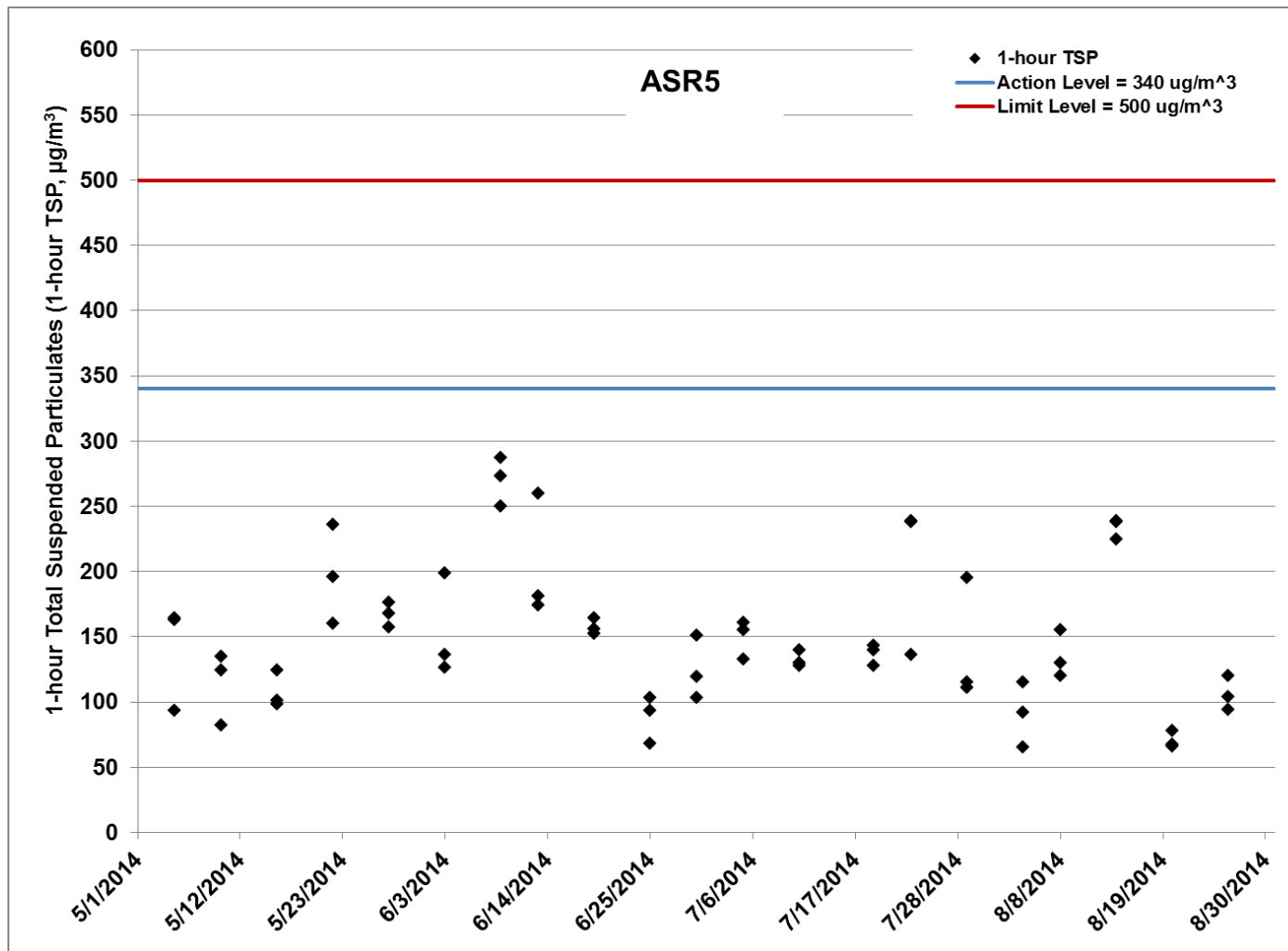


Figure F.4 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR5 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

Ref: 0212330_Impact AQM graphs_Qrpt Jun 2014_Aug 2014_REV a.xlsx



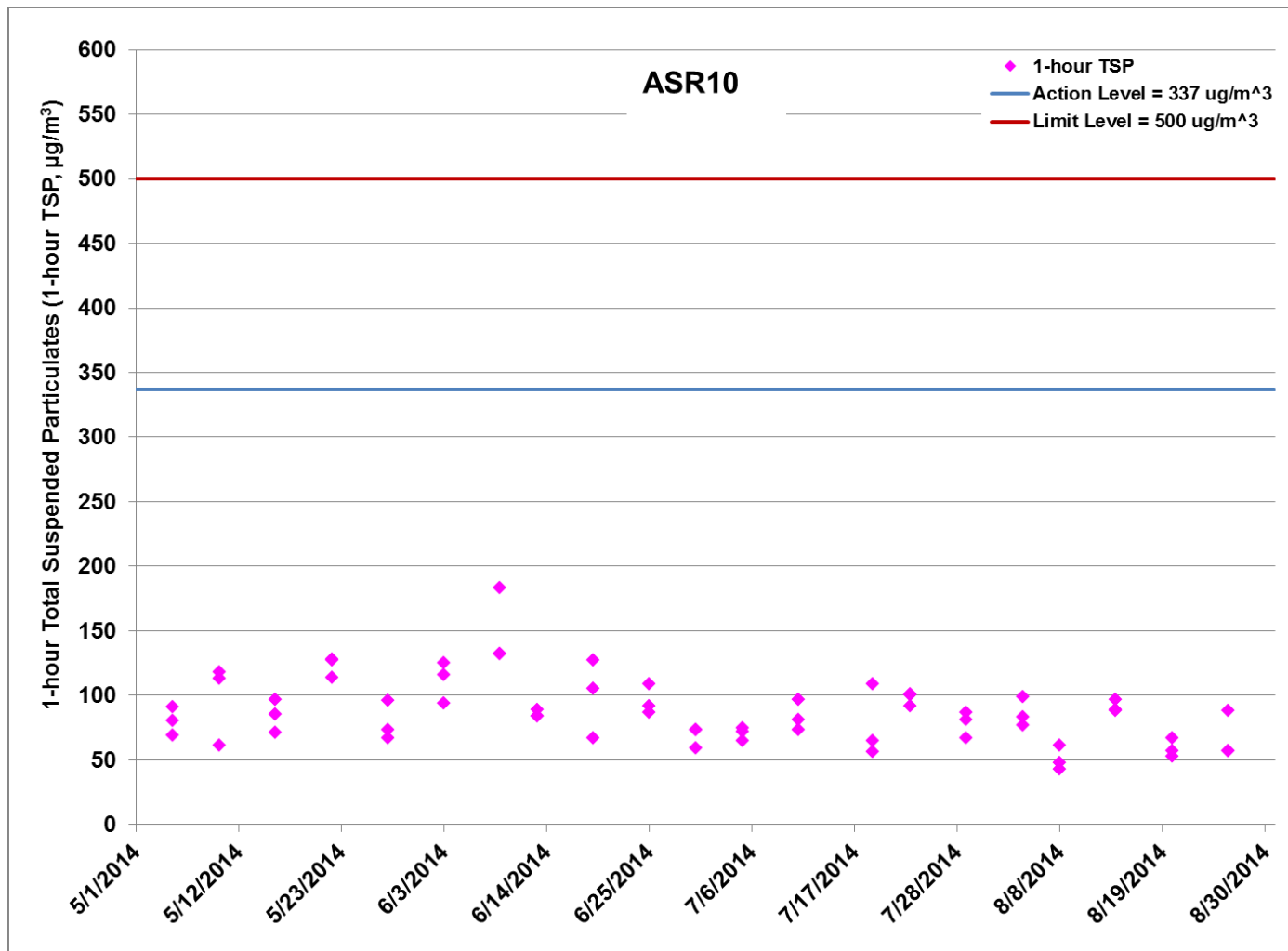


Figure F.5 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR10 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

Ref: 0212330_Impact AQM graphs_Qrpt Jun 2014_Aug 2014_REV a.xlsx



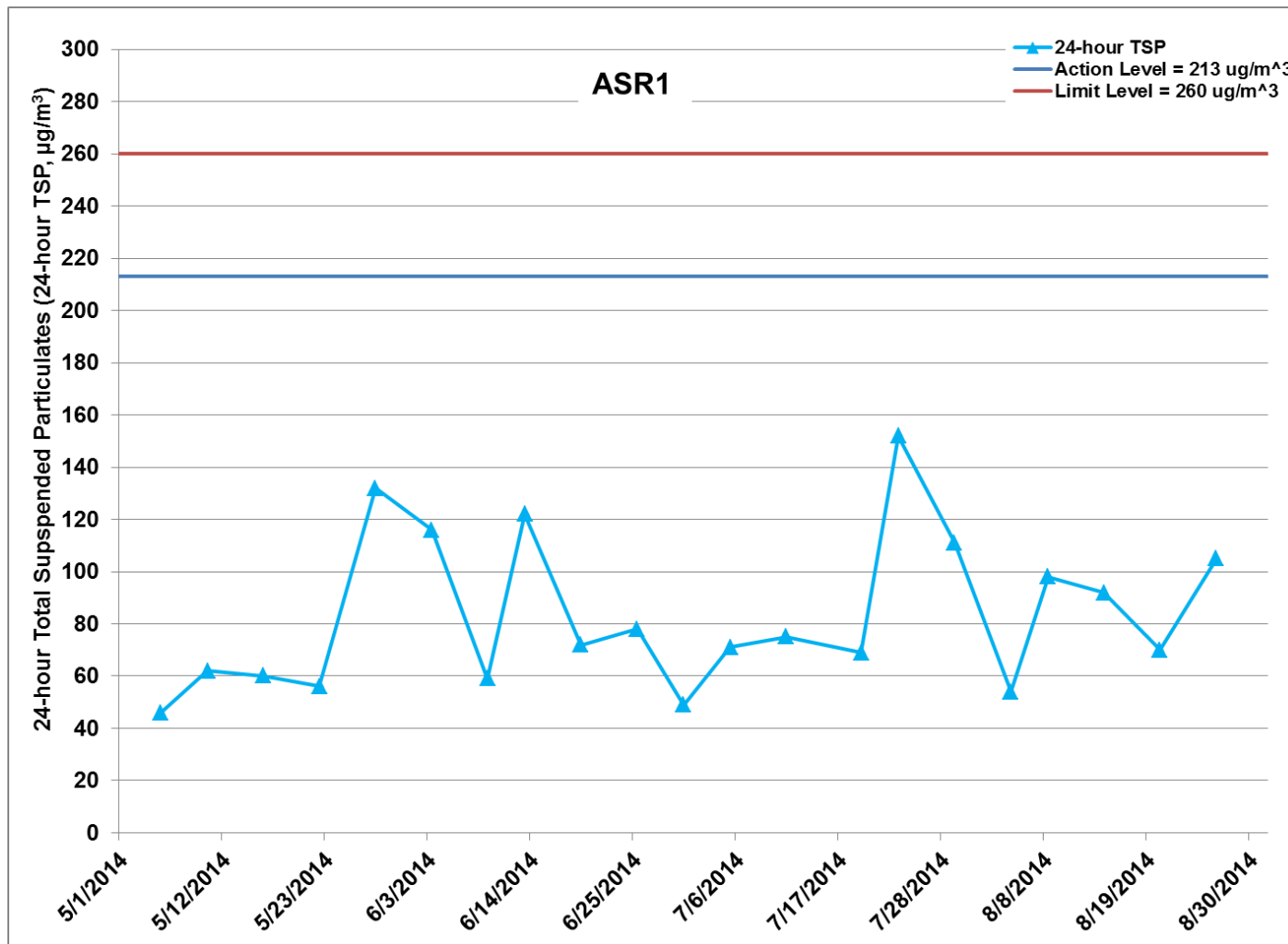


Figure F.6 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR1 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

Ref: 0212330_Impact AQM graphs_Qrpt Jun 2014_Aug 2014_REV a.xlsx



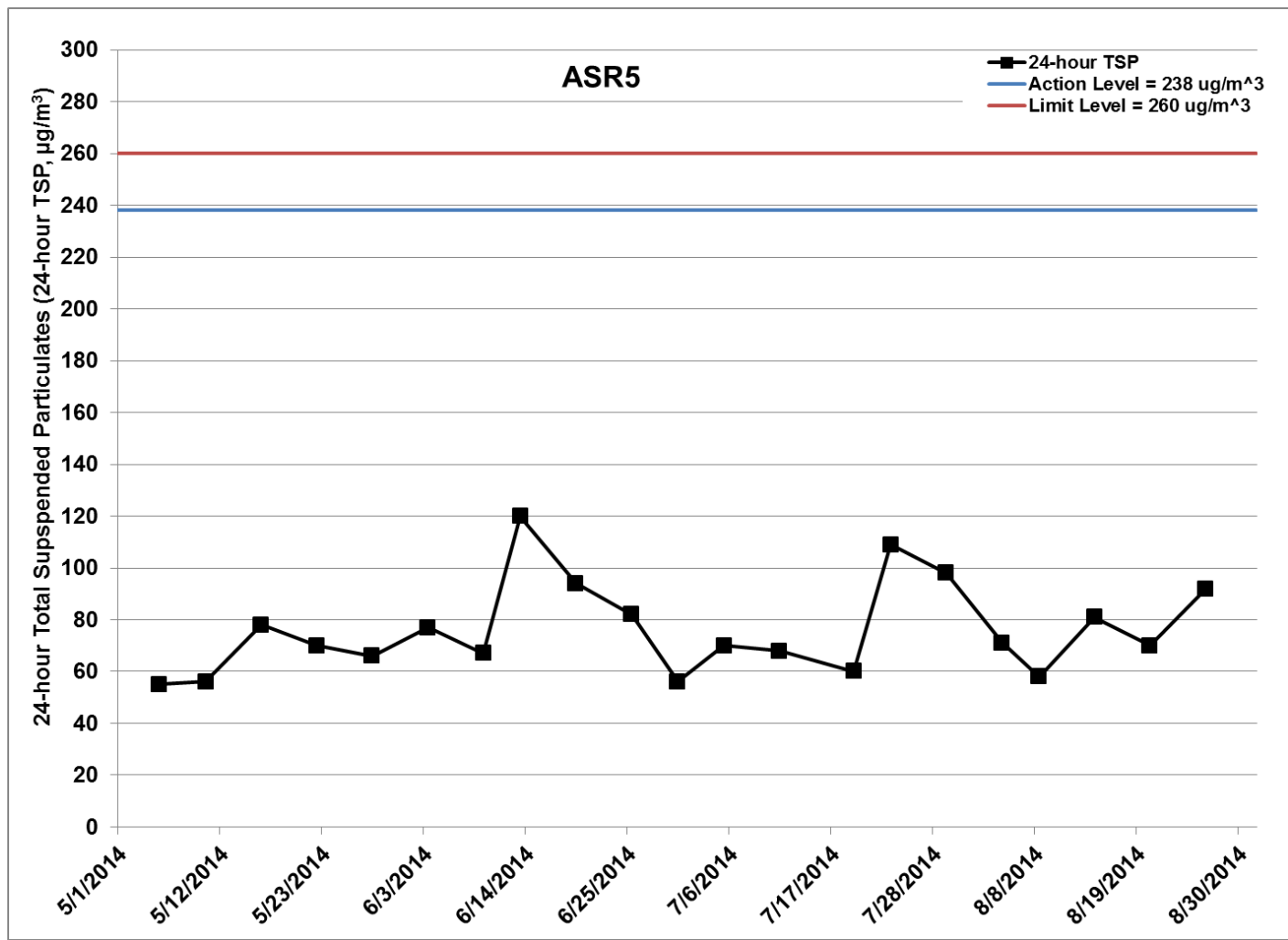


Figure F.7 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR5 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

Ref: 0212330_Impact AQM graphs_Qrpt Jun 2014_Aug 2014_REV a.xlsx



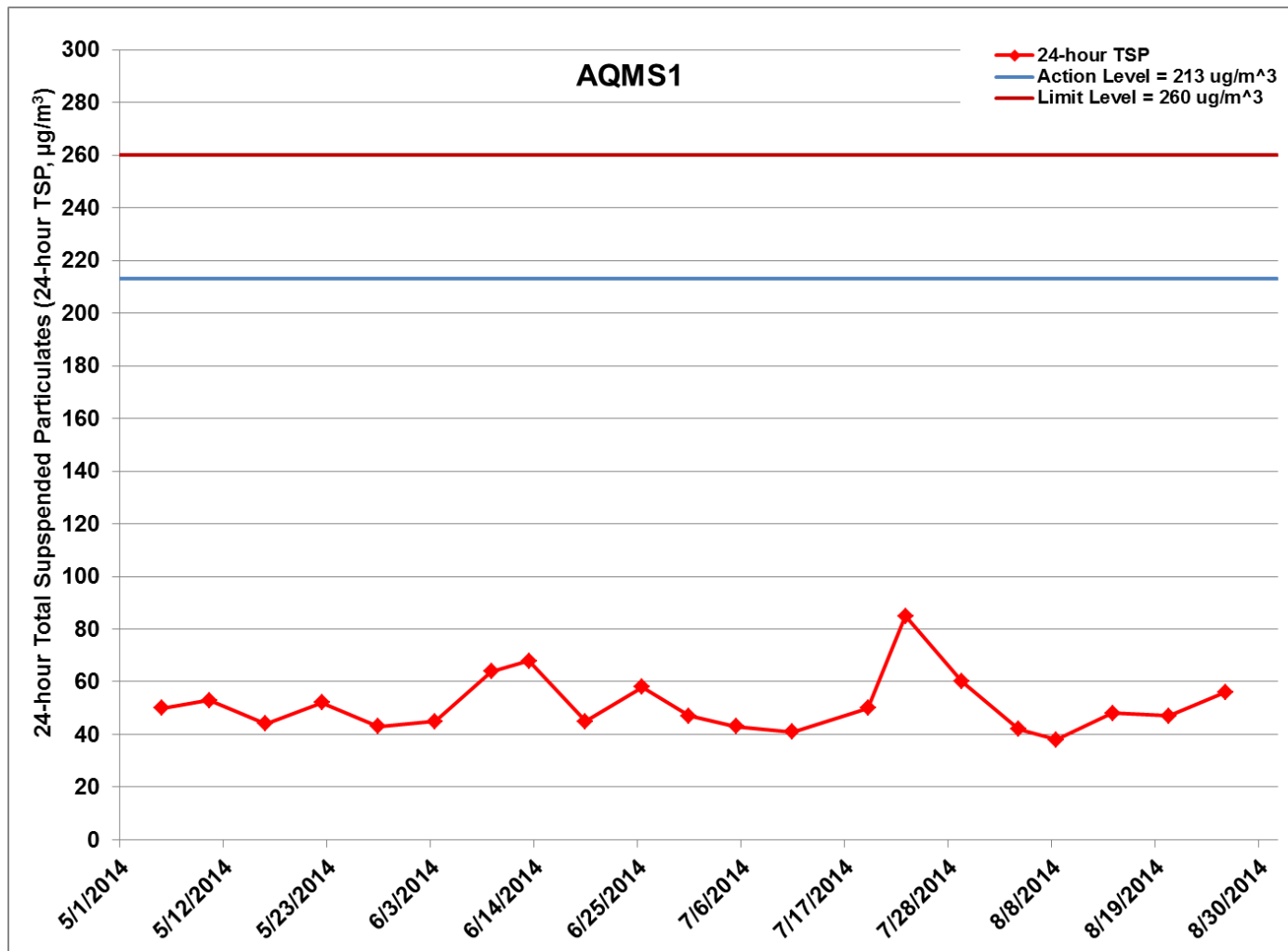


Figure F.8 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at AQMS1 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

Ref: 0212330_Impact AQM graphs_Qrpt Jun 2014_Aug 2014_REV a.xlsx



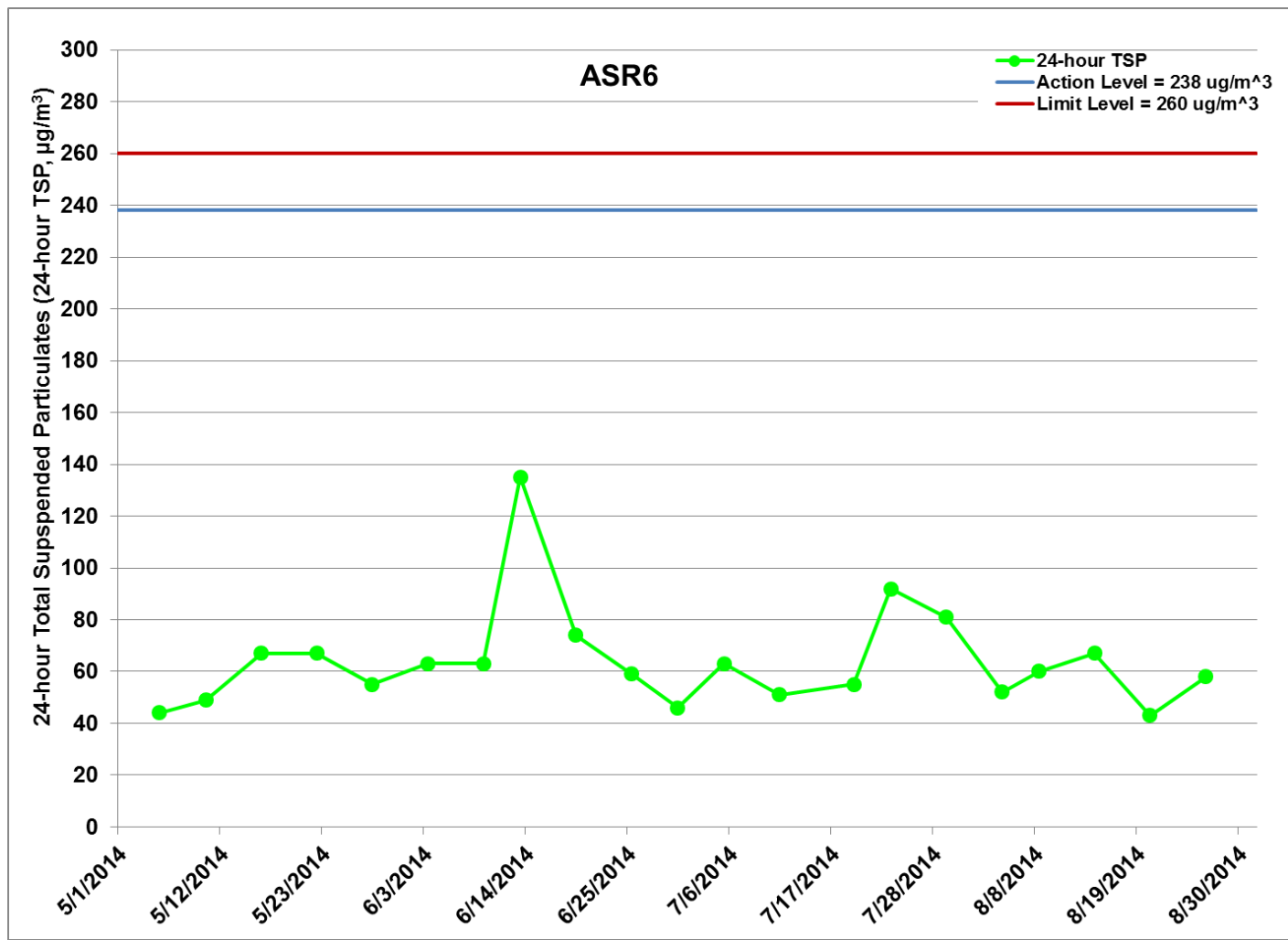


Figure F.9 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR6 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

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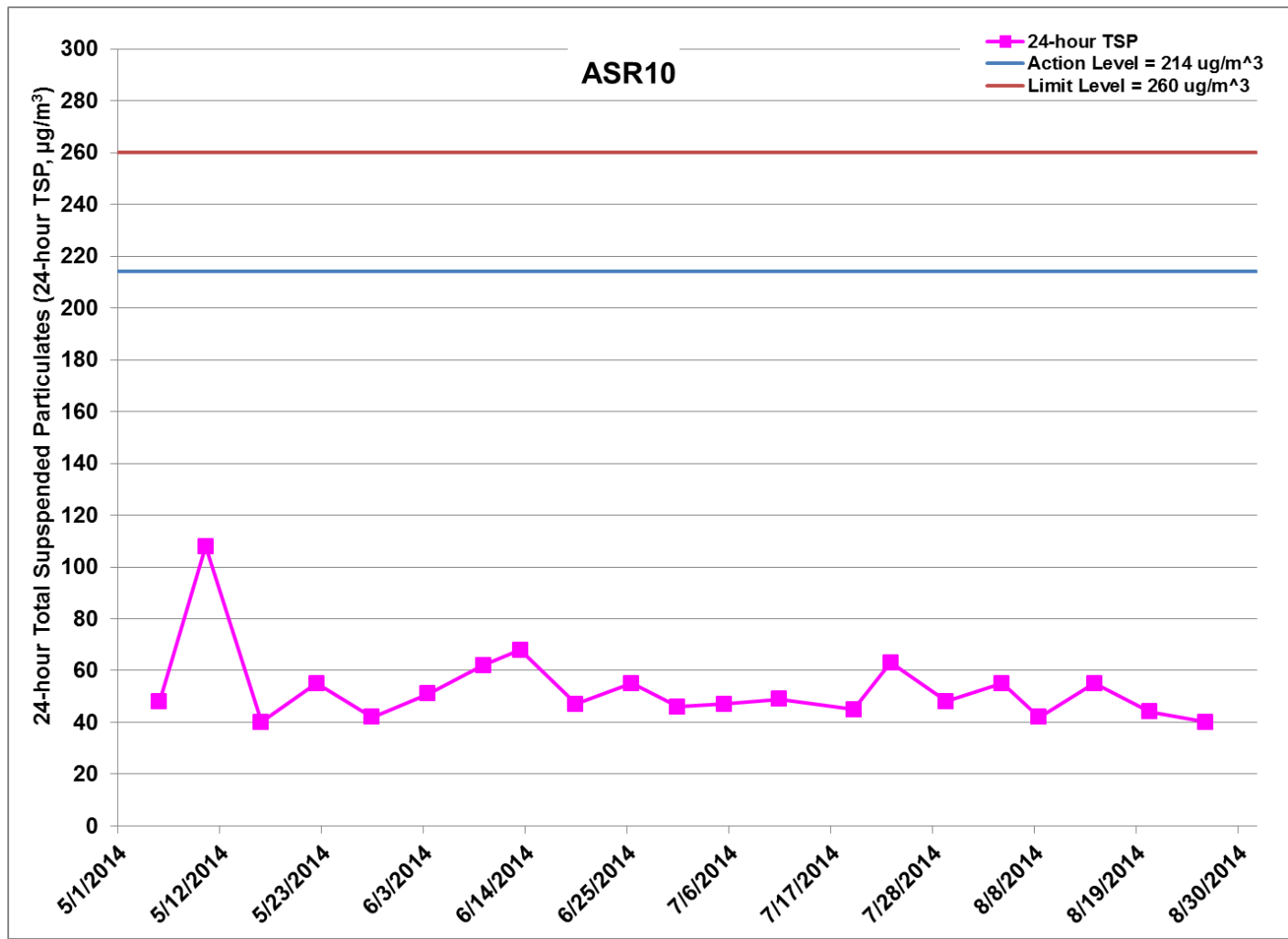


Figure F.10 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR10 between 1 May 2014 and 31 August 2014 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: Diaphragm Wall Construction at Reclamation Works Area - Portion N-A (14/5/2014 - 31/8/2014) & Construction of CLP Temporary Substation at N6 (1/5/2014 - 31/8/2014)

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Appendix G

Impact Water Quality Monitoring Results

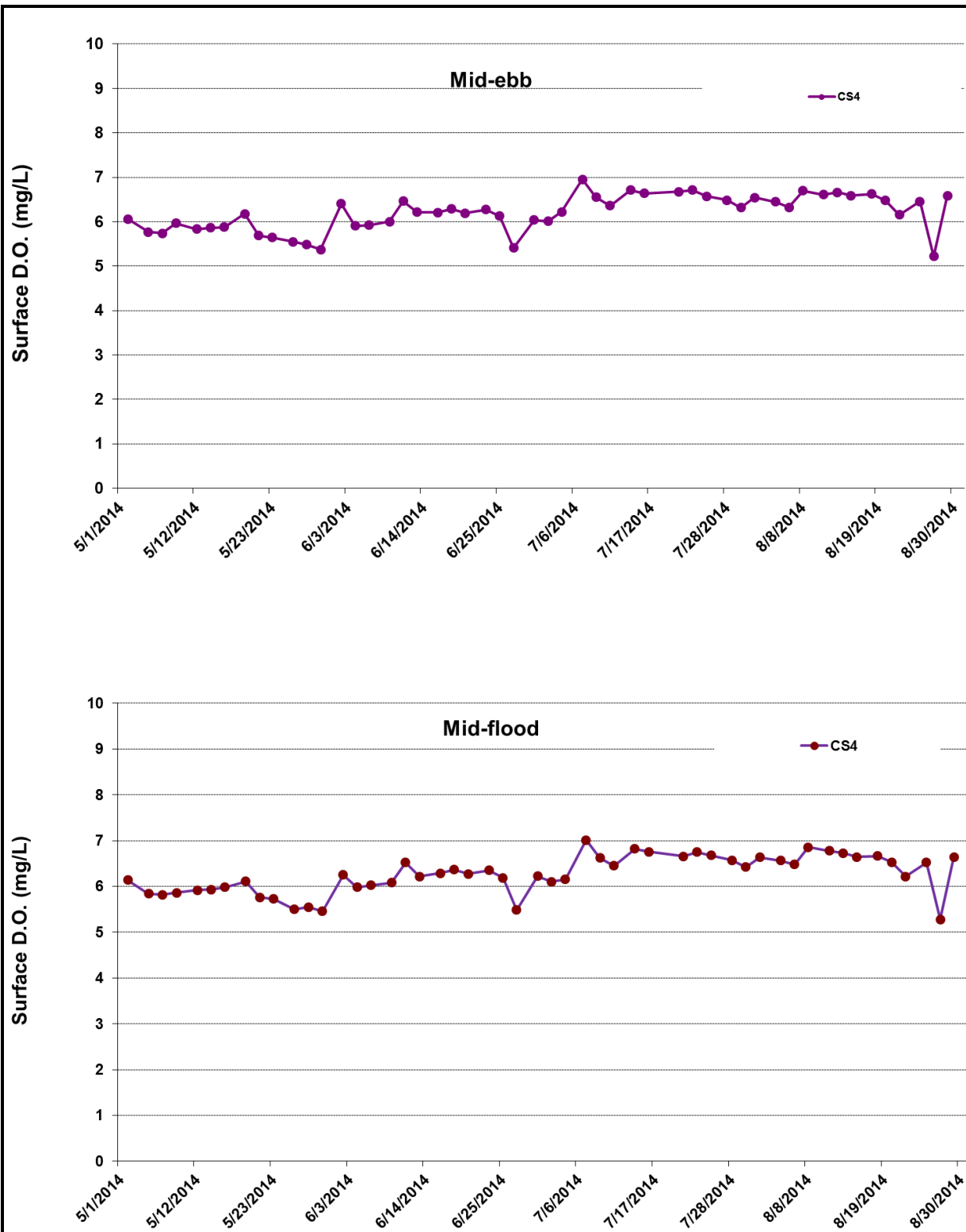
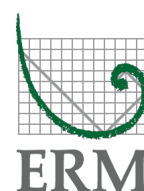


Figure G1 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



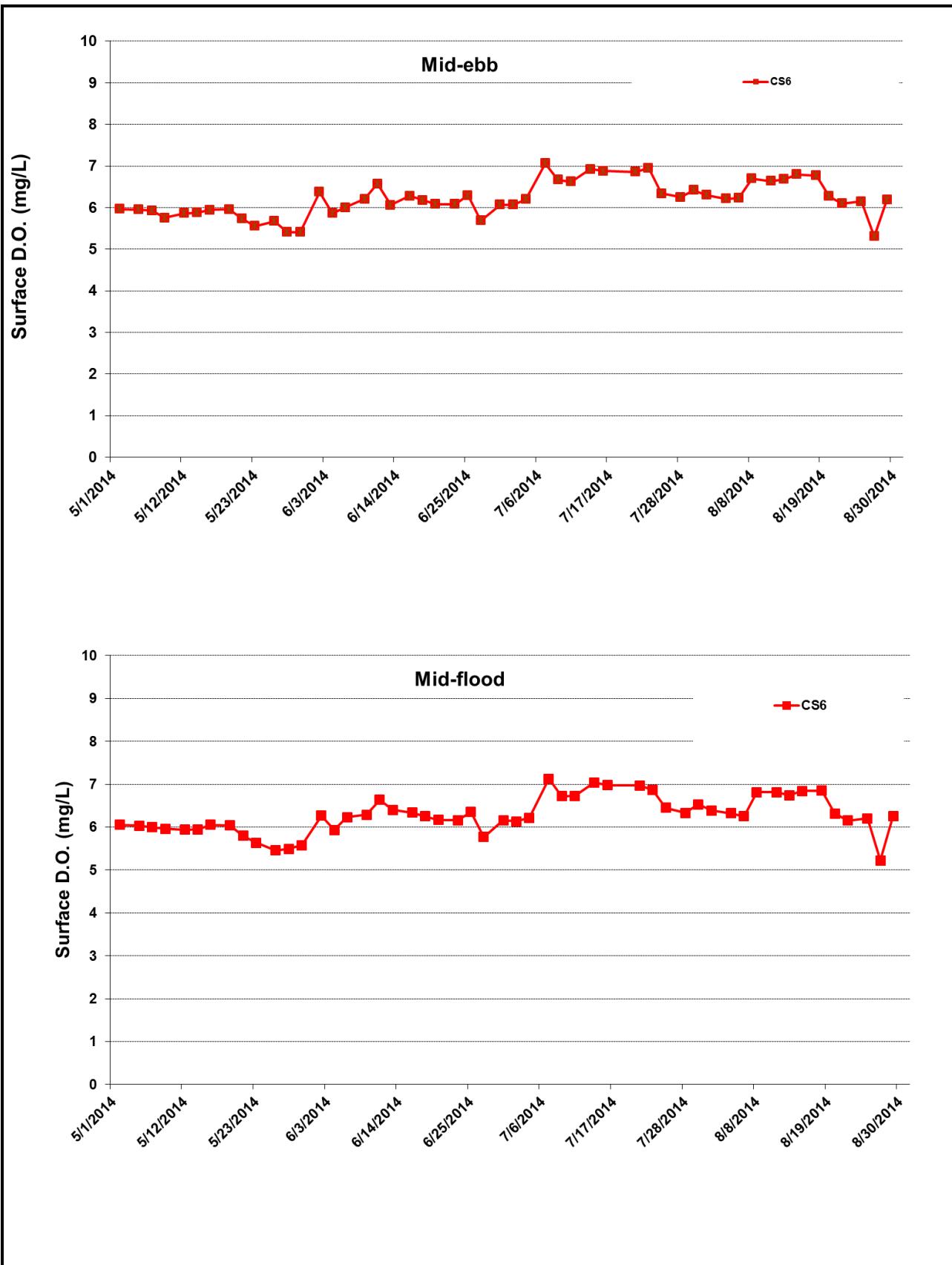


Figure G2 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



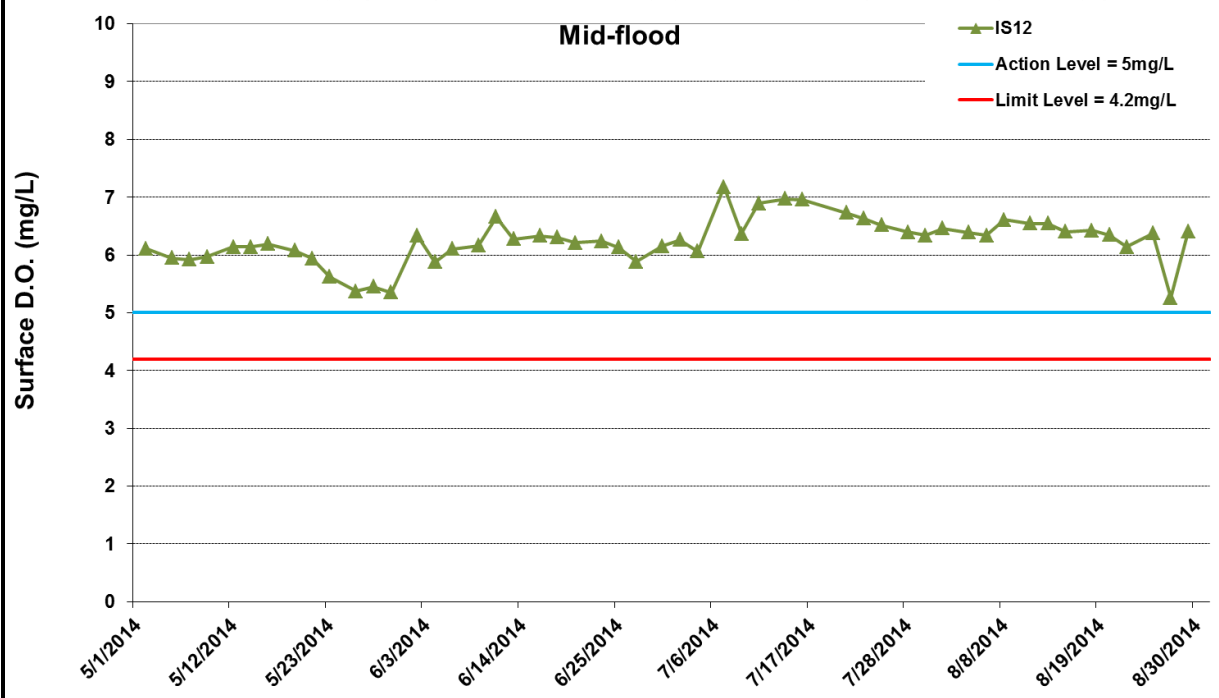
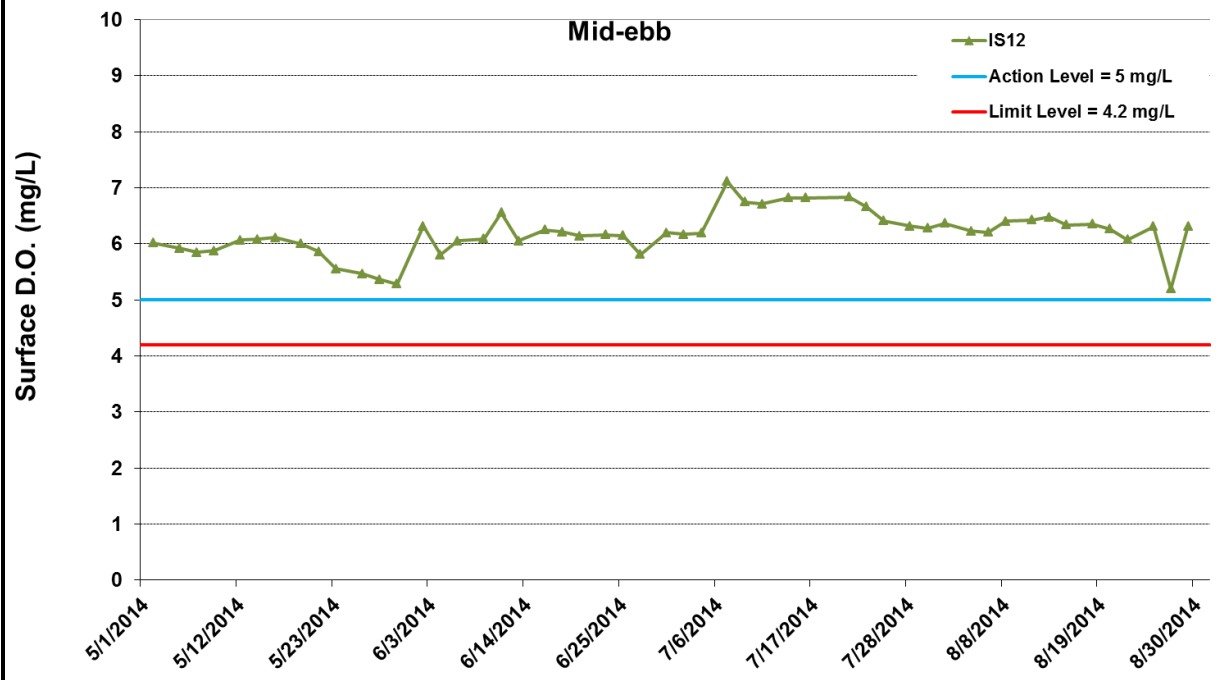


Figure G3 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



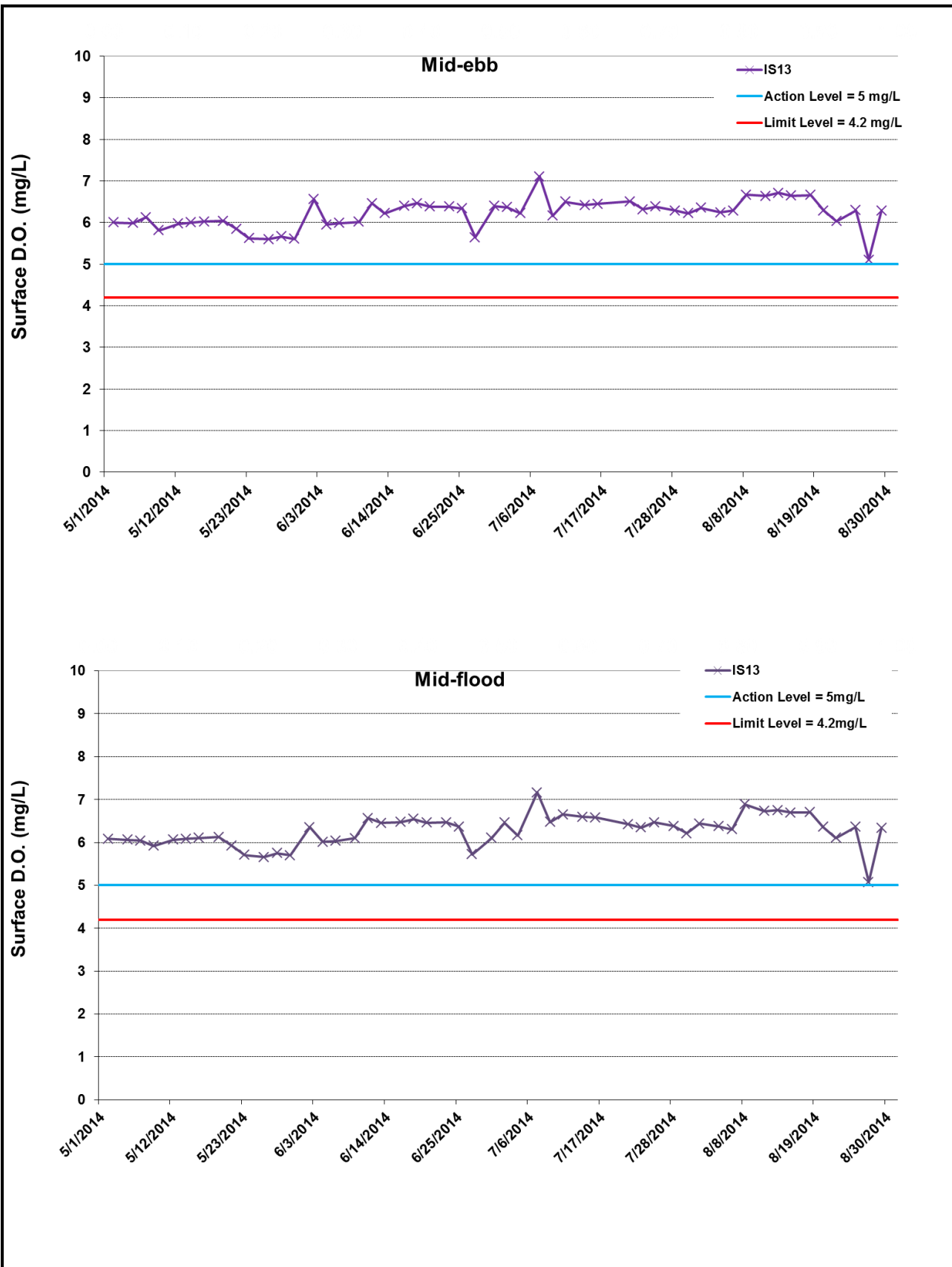
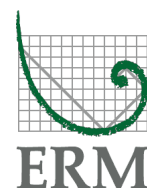


Figure G4 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



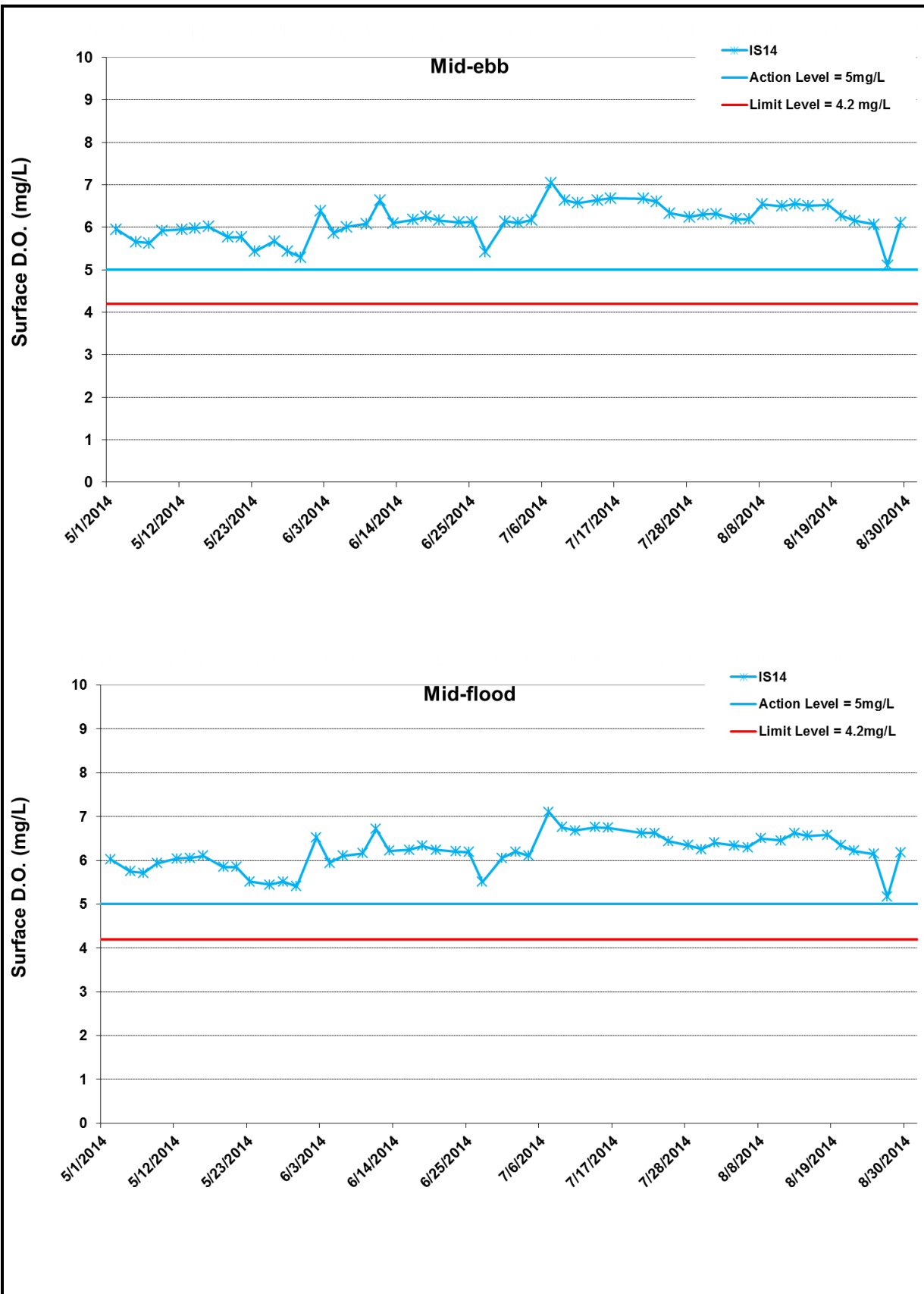


Figure G5 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



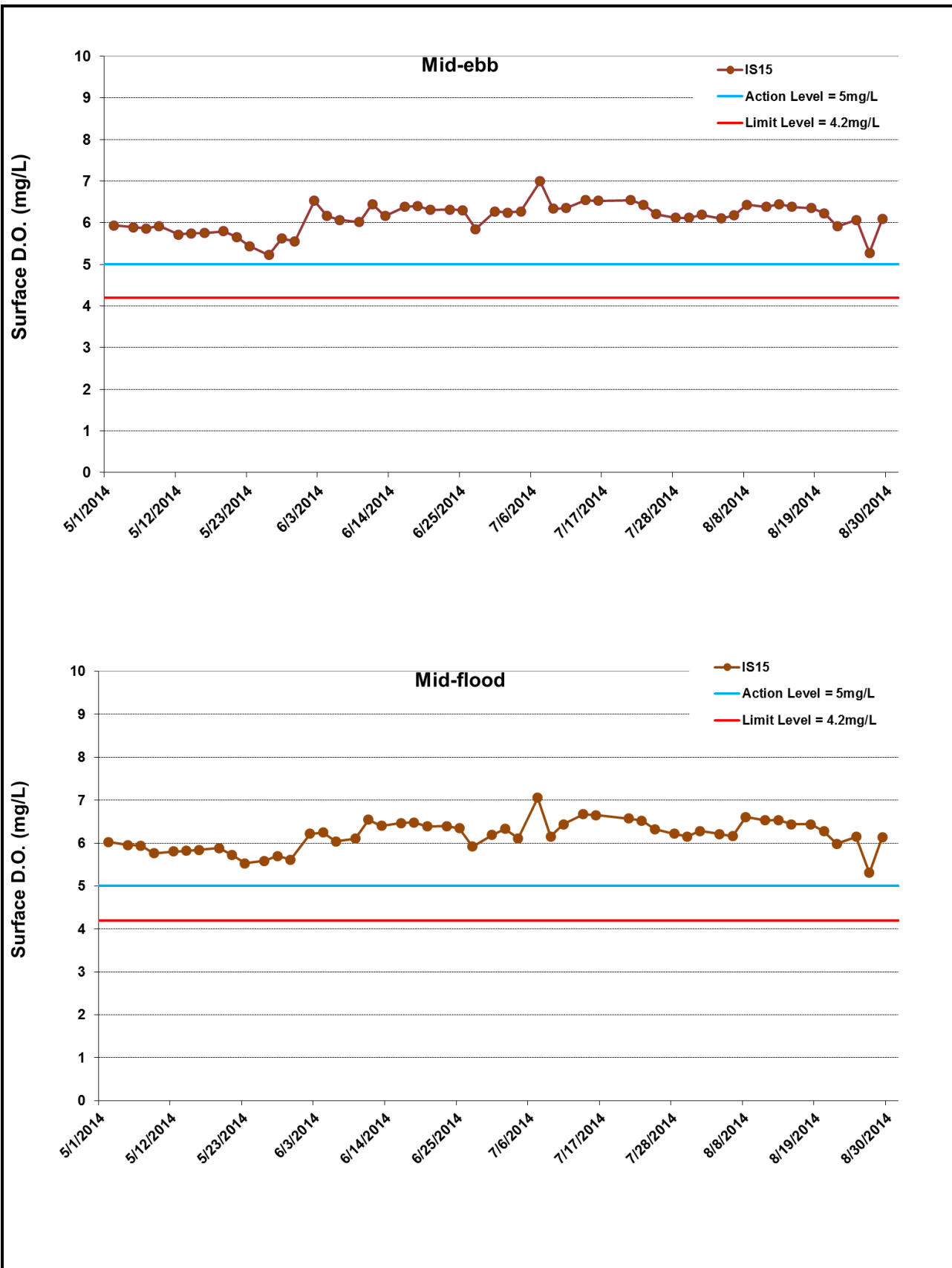


Figure G6 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



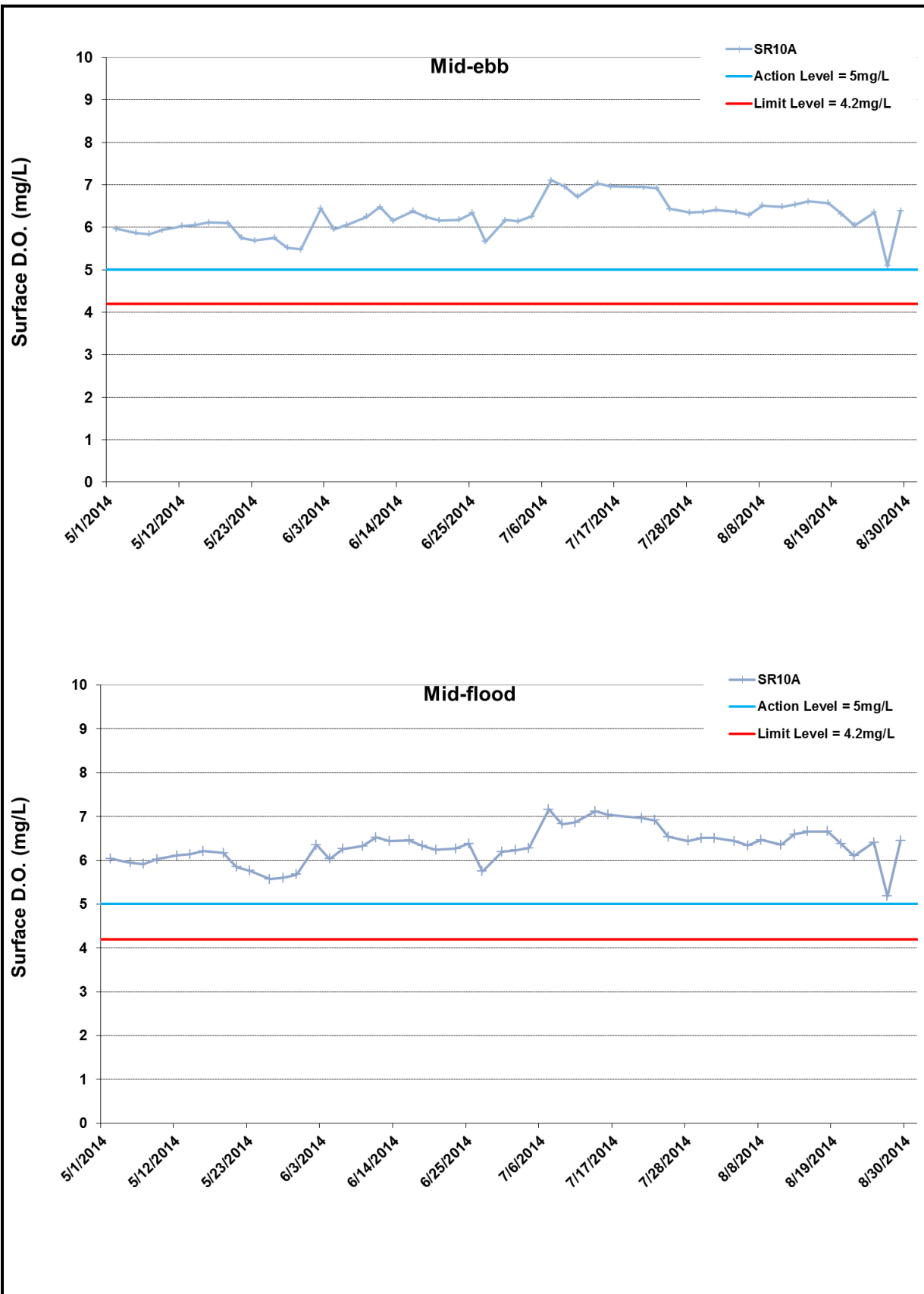


Figure G7 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



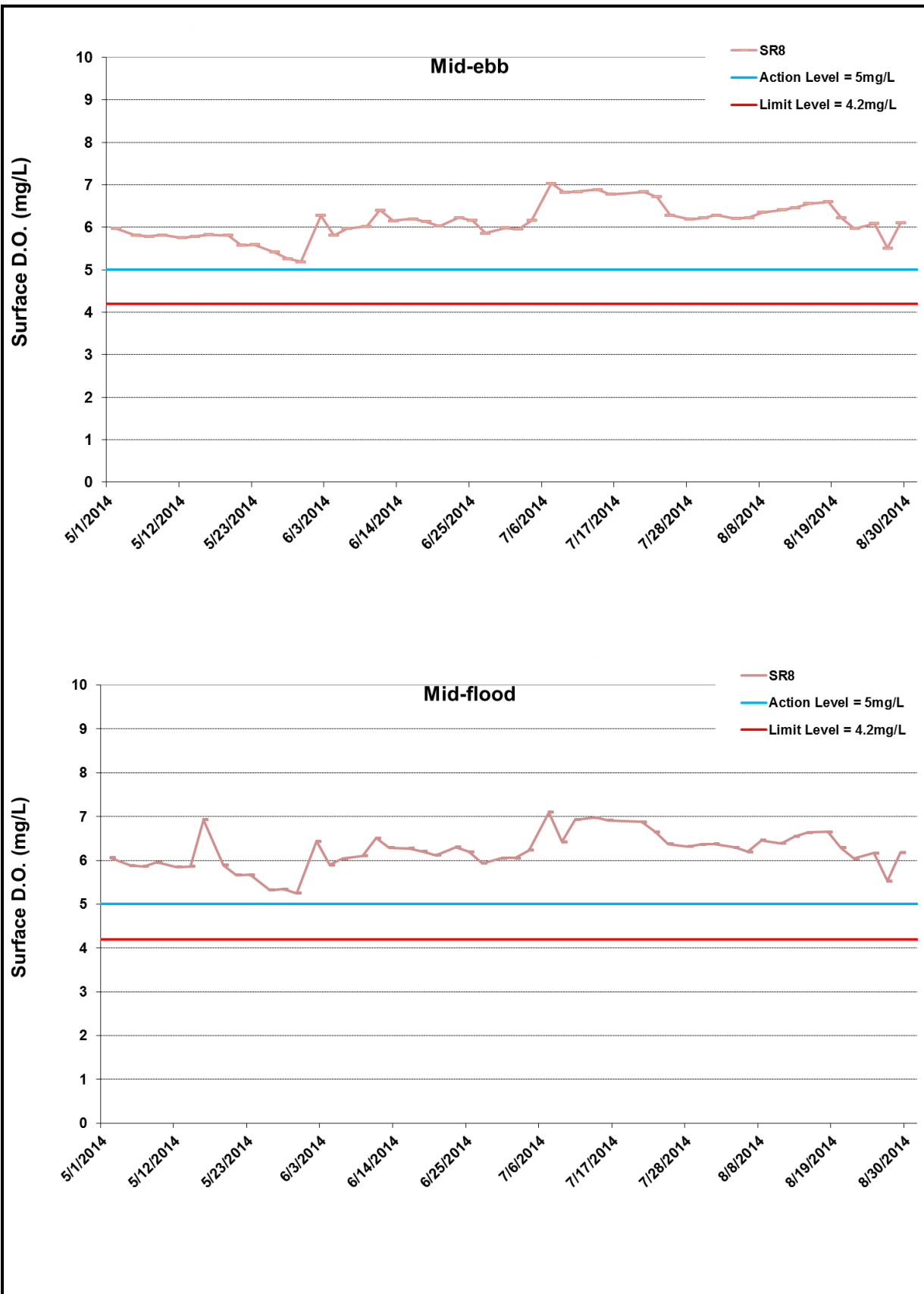


Figure G8 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



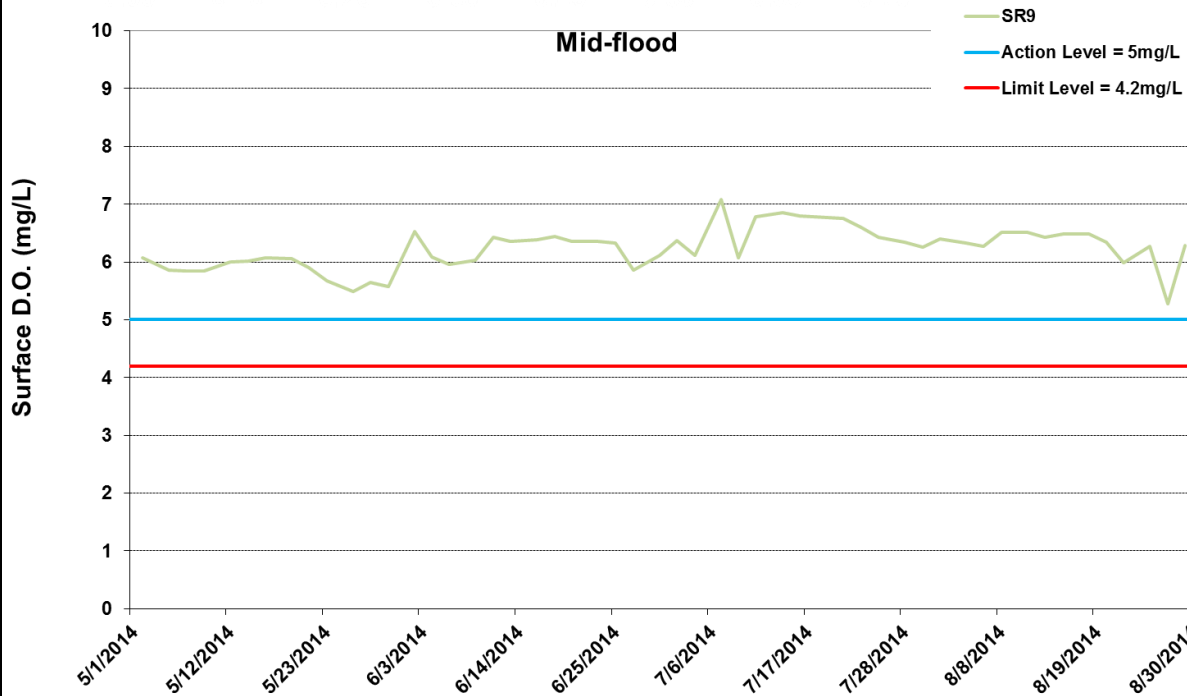
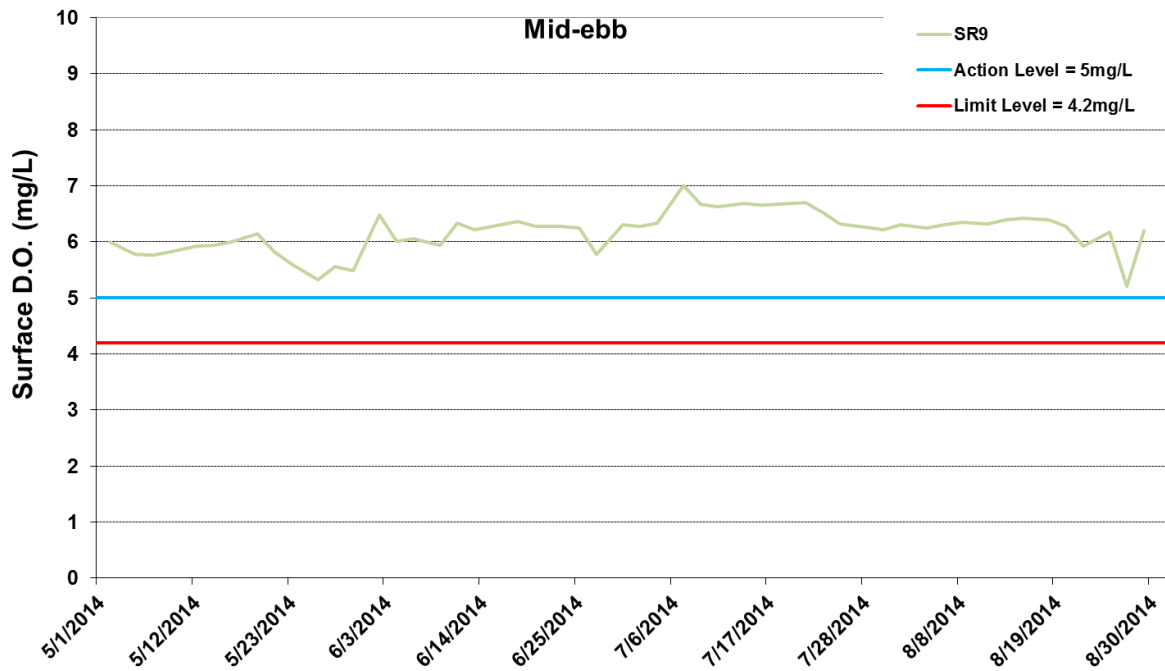
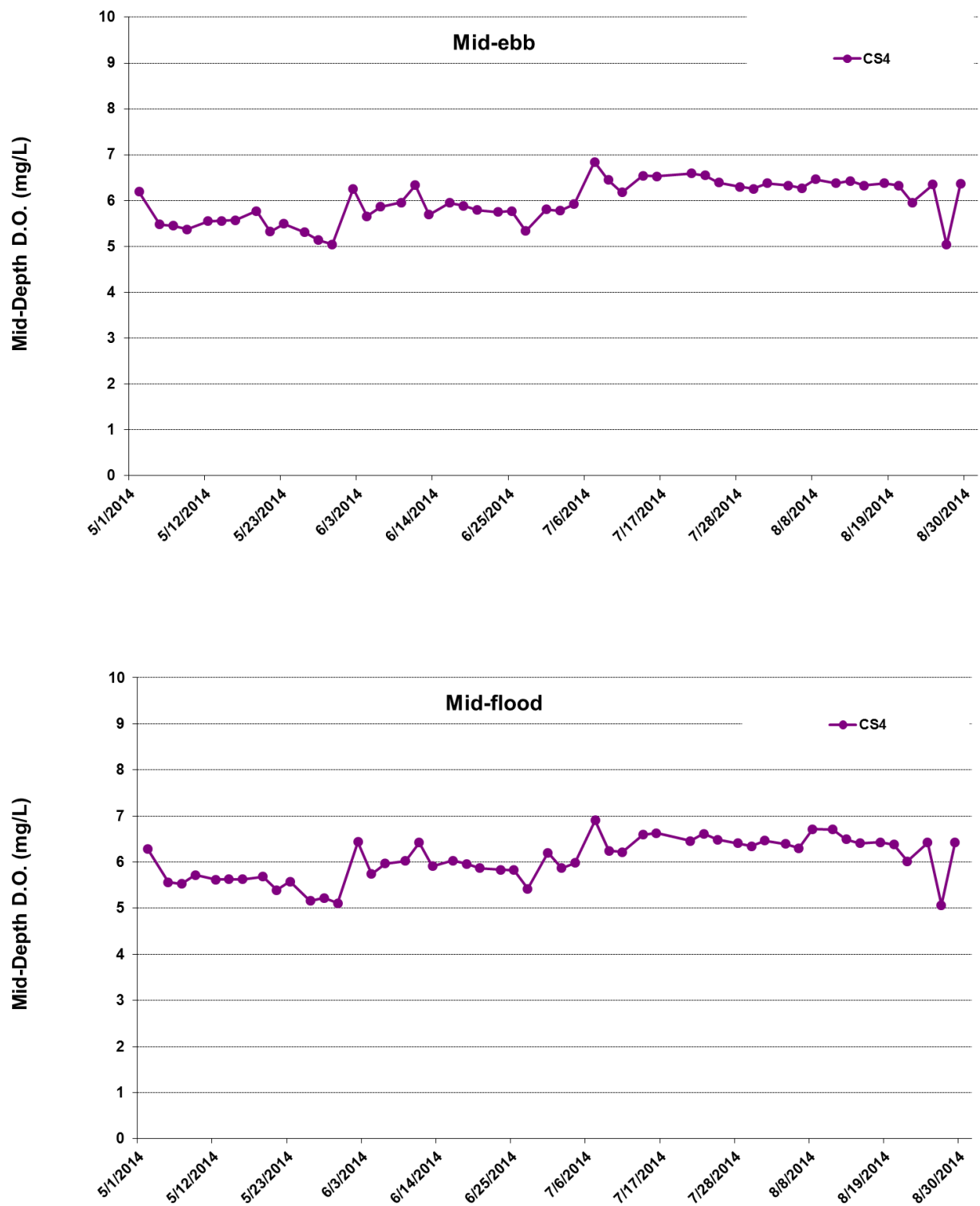


Figure G9 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in surface waters between 1 May 2014 and 31 August 2014 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition. Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls

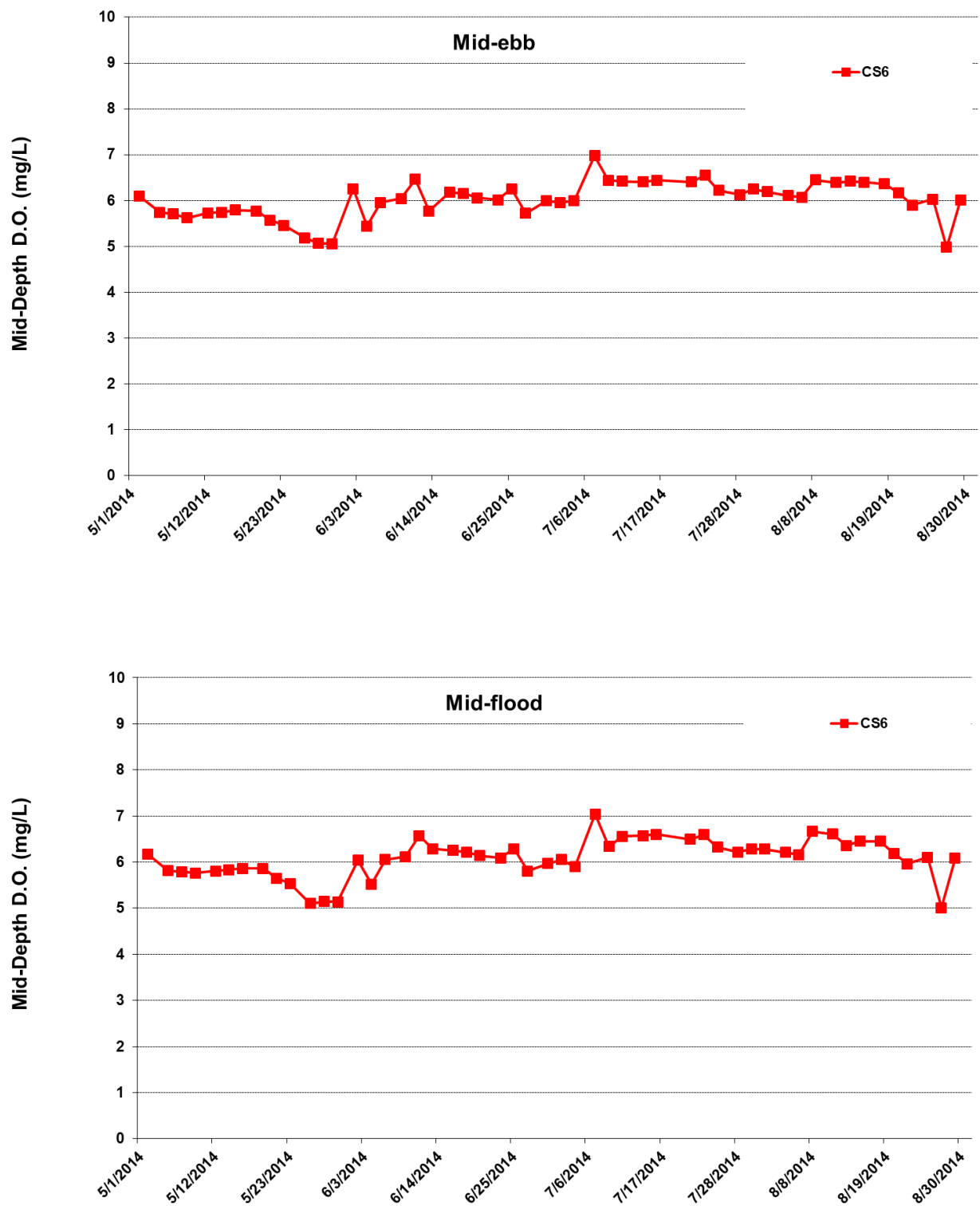




*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G10 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 May 2014 and 31 August 2014 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

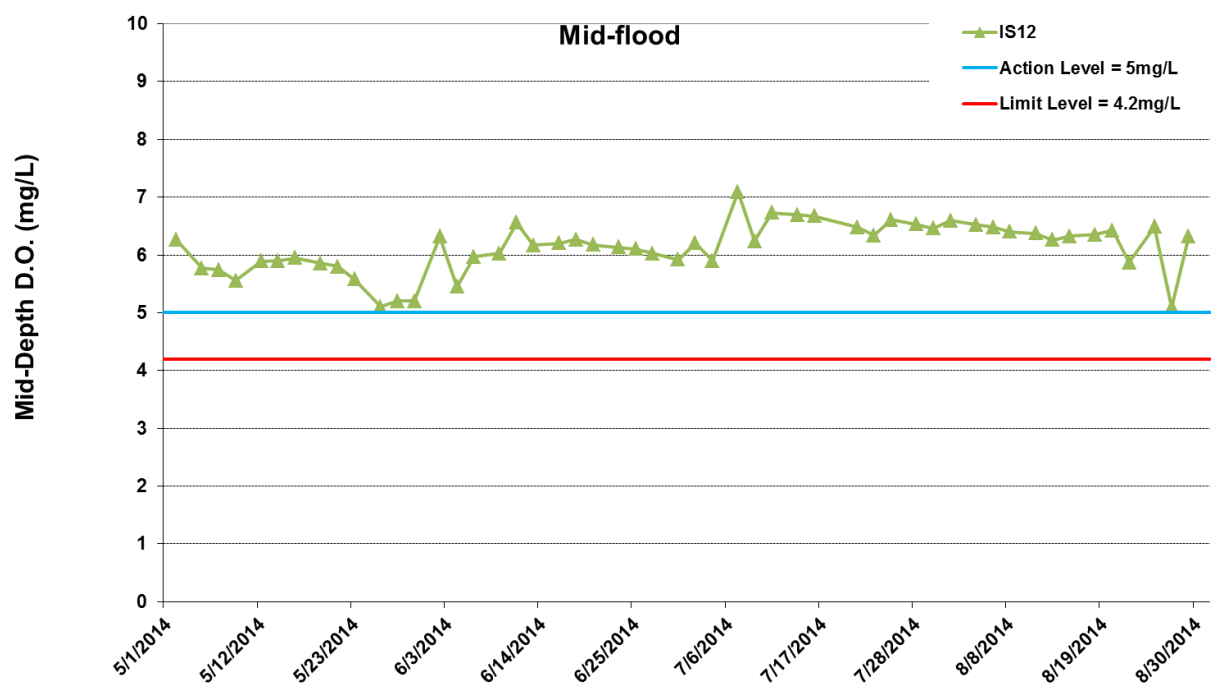
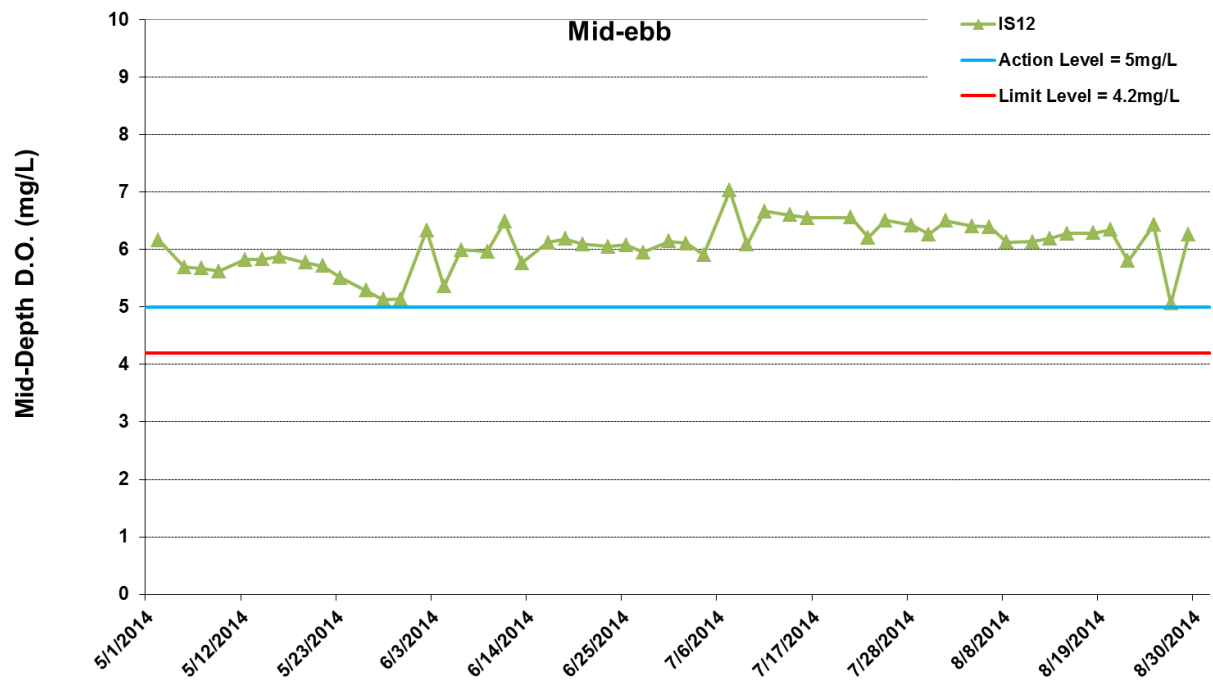




*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G11 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 May 2014 and 31 August 2014 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

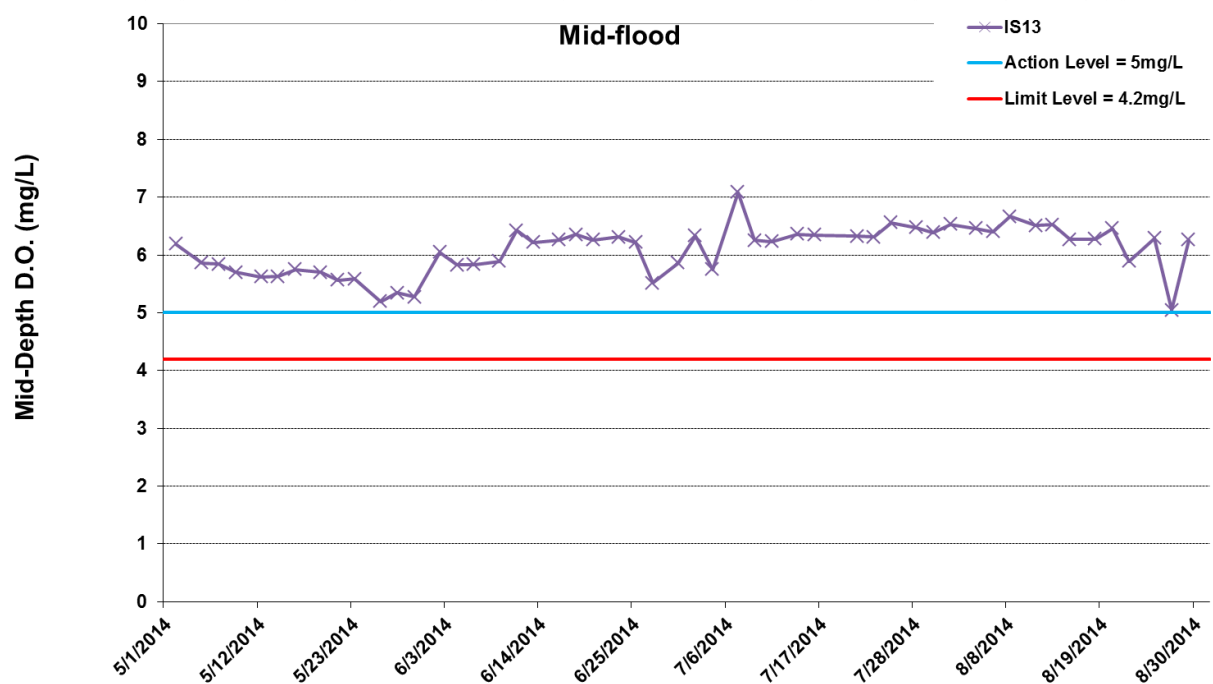
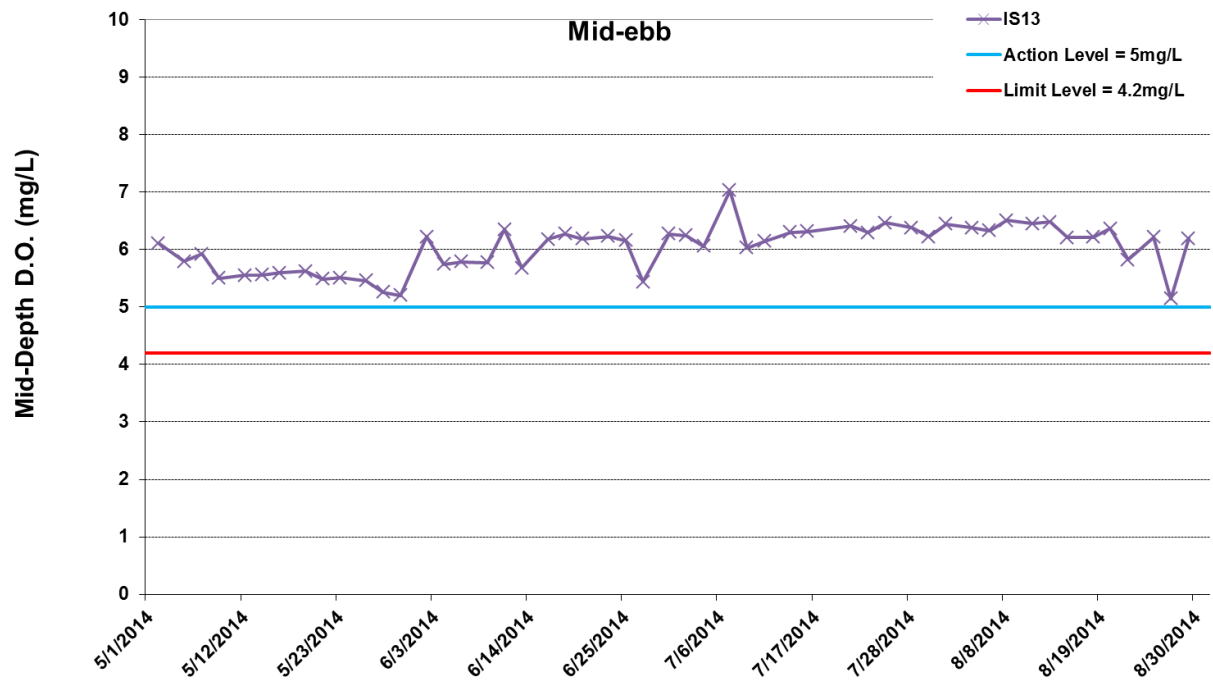




*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G12 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 May 2014 and 31 August 2014 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

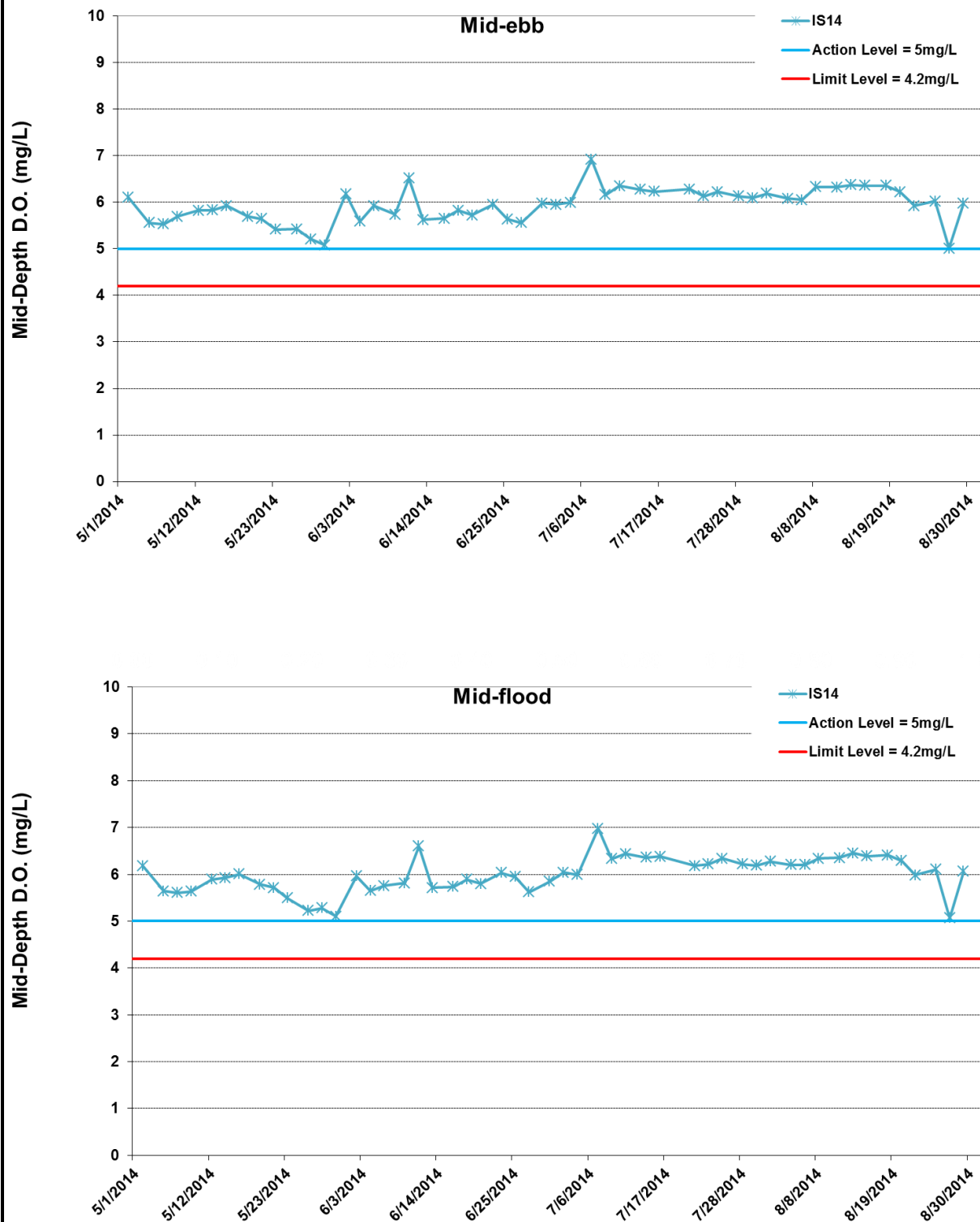




*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G13 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 May 2014 and 31 August 2014 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

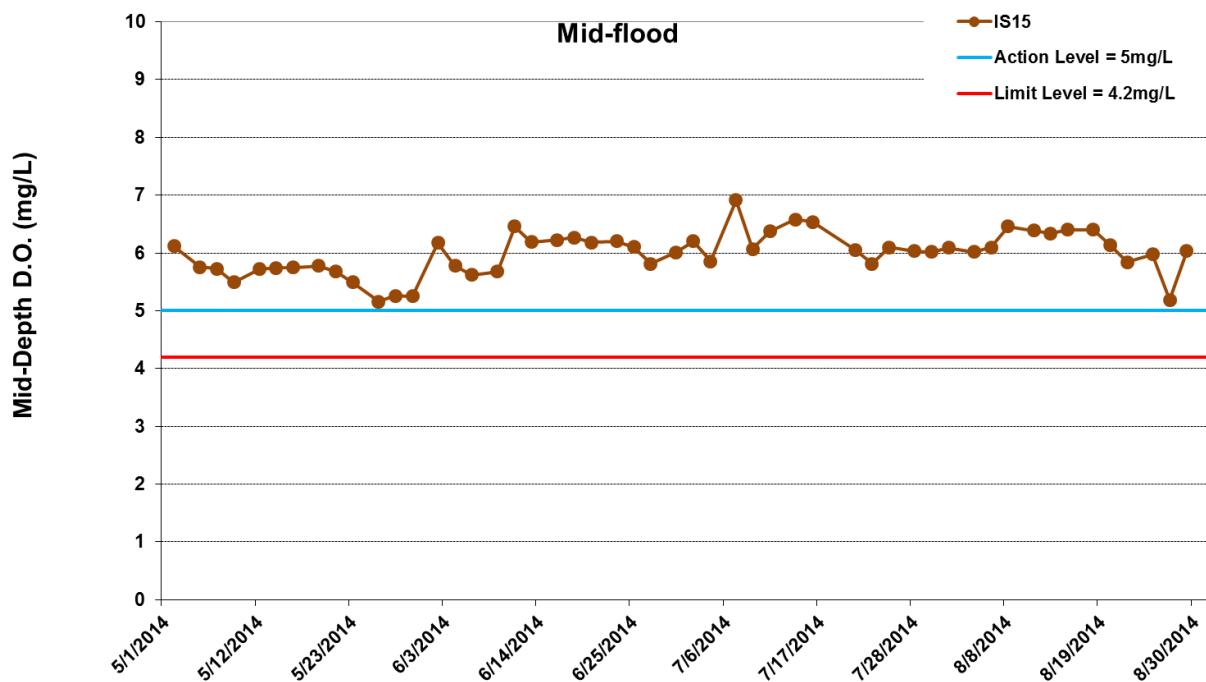
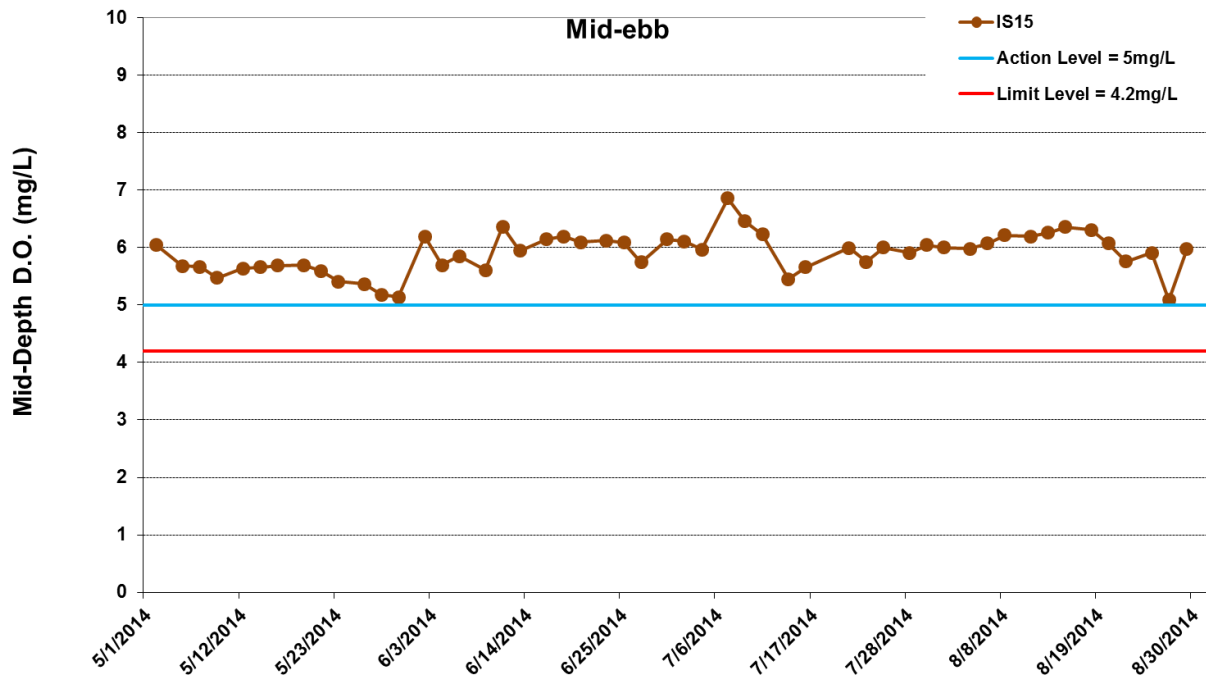




*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G14 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 May 2014 and 31 August 2014 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

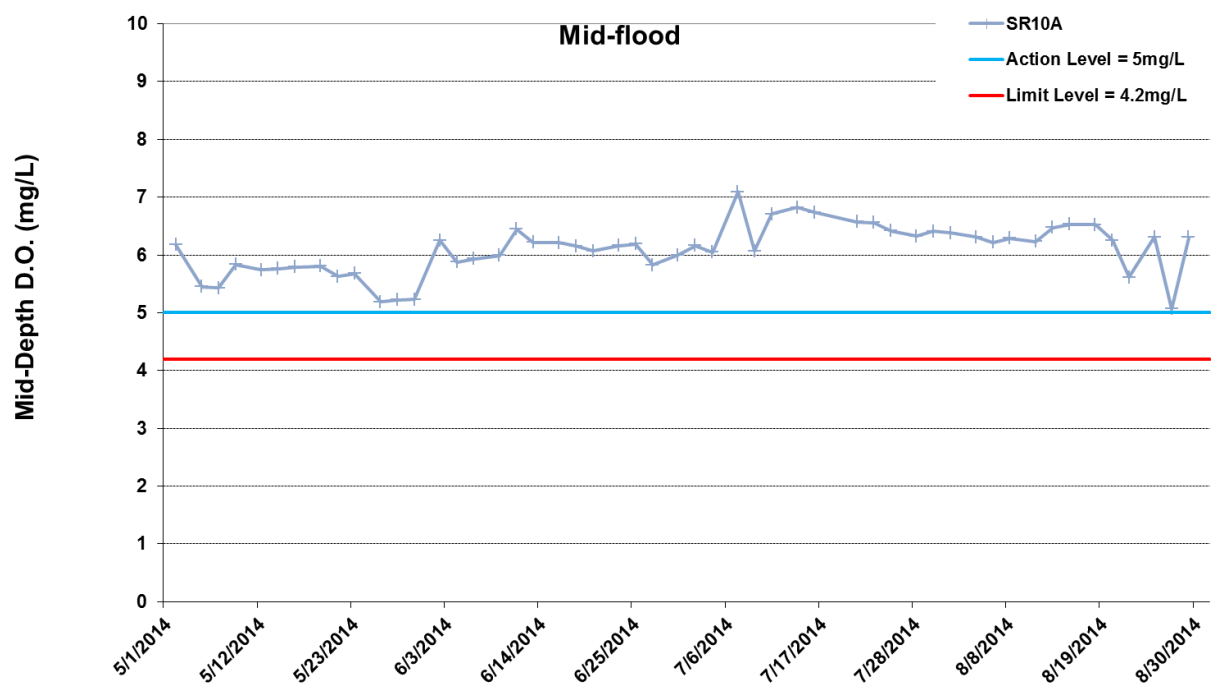
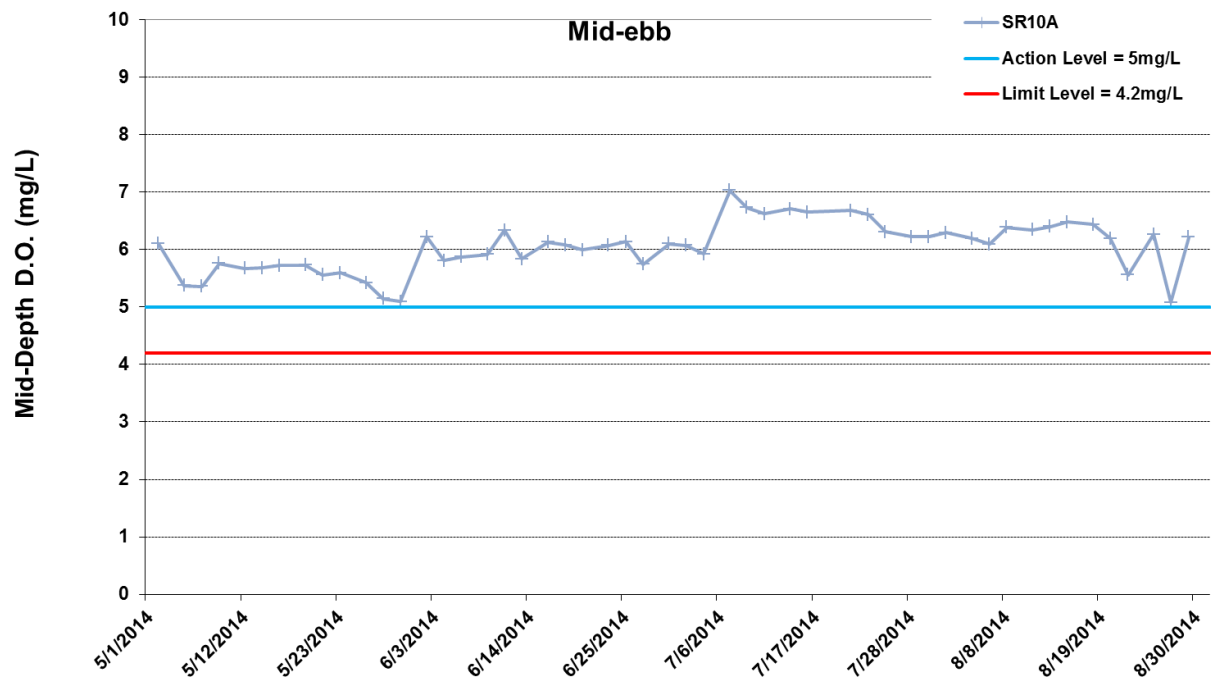




*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G15 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 May 2014 and 31 August 2014 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.





*No data for Stations SR8 and SR9 due to shallow water depth (< 6m).

Figure G16 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters between 1 May 2014 and 31 August 2014 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



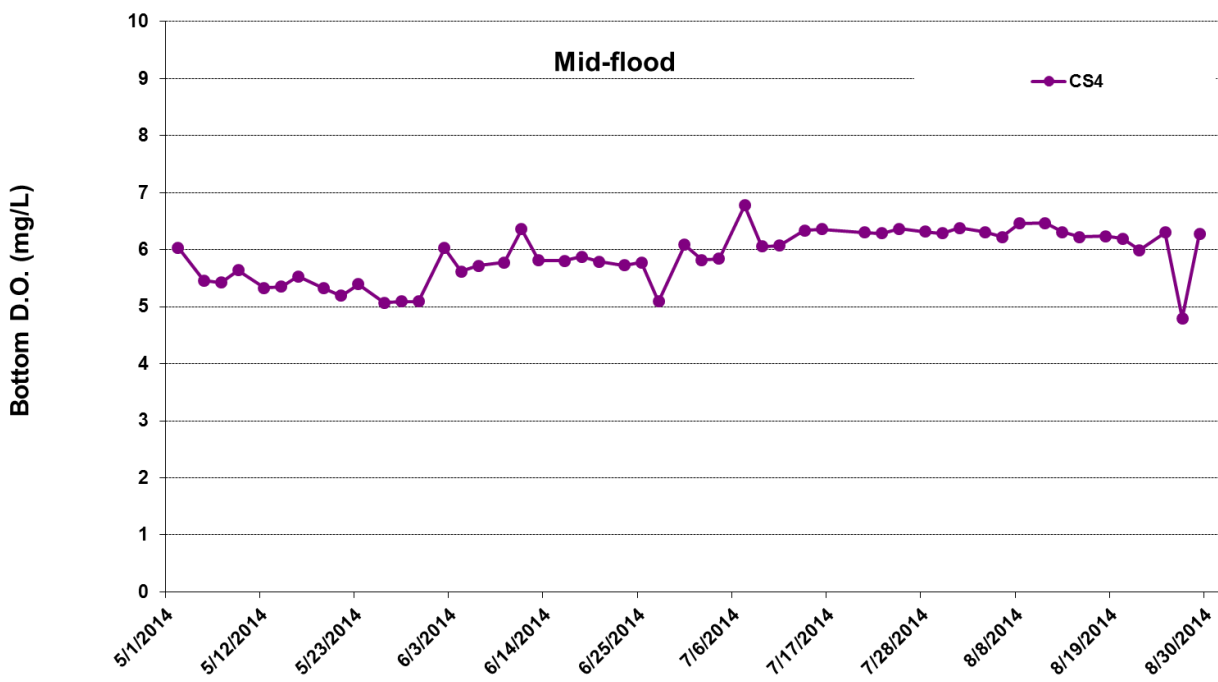
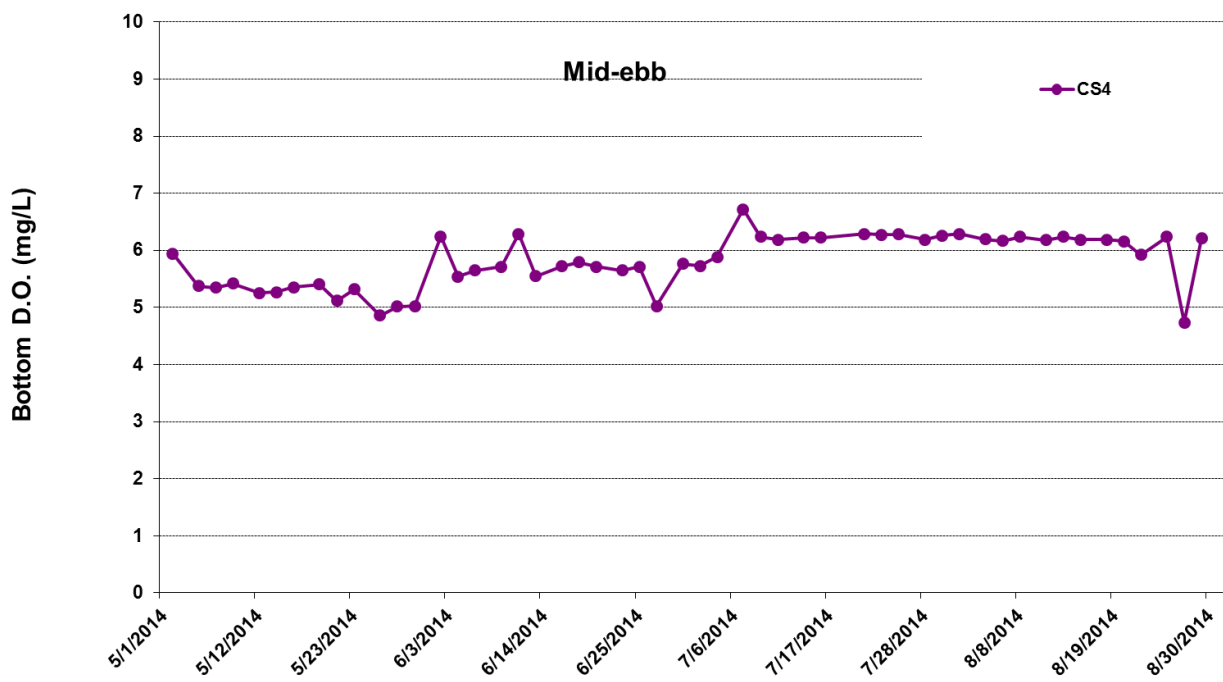
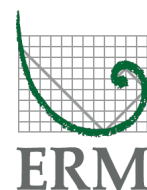


Figure G17 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



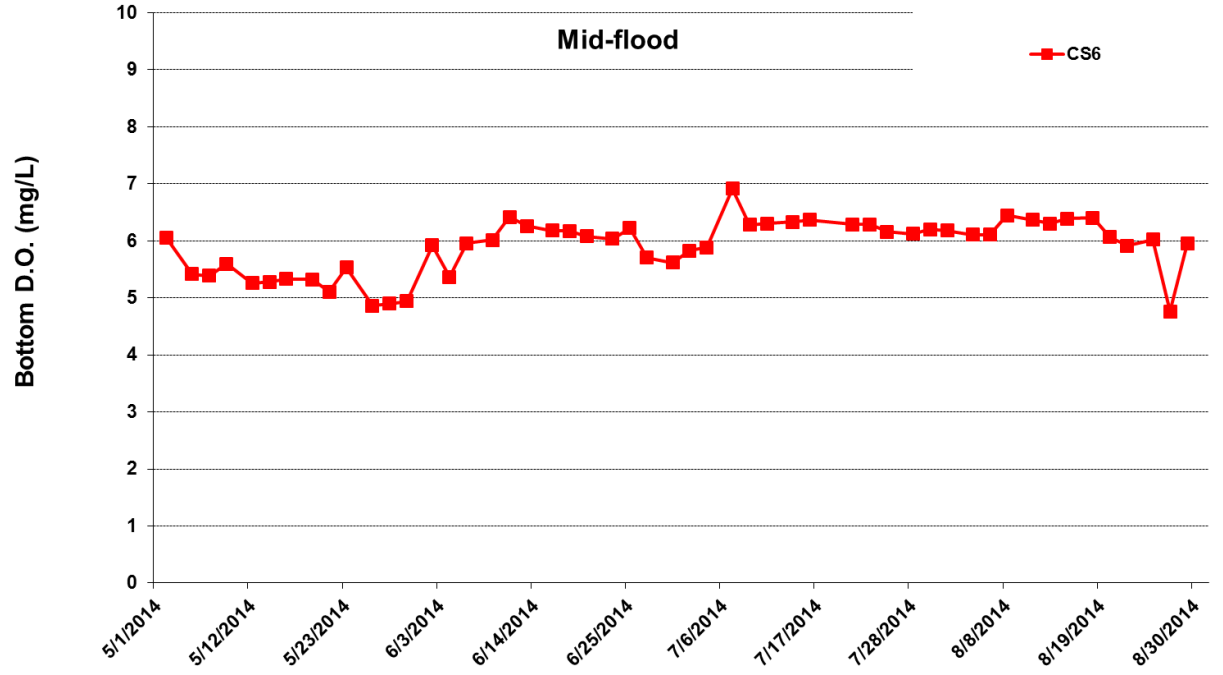
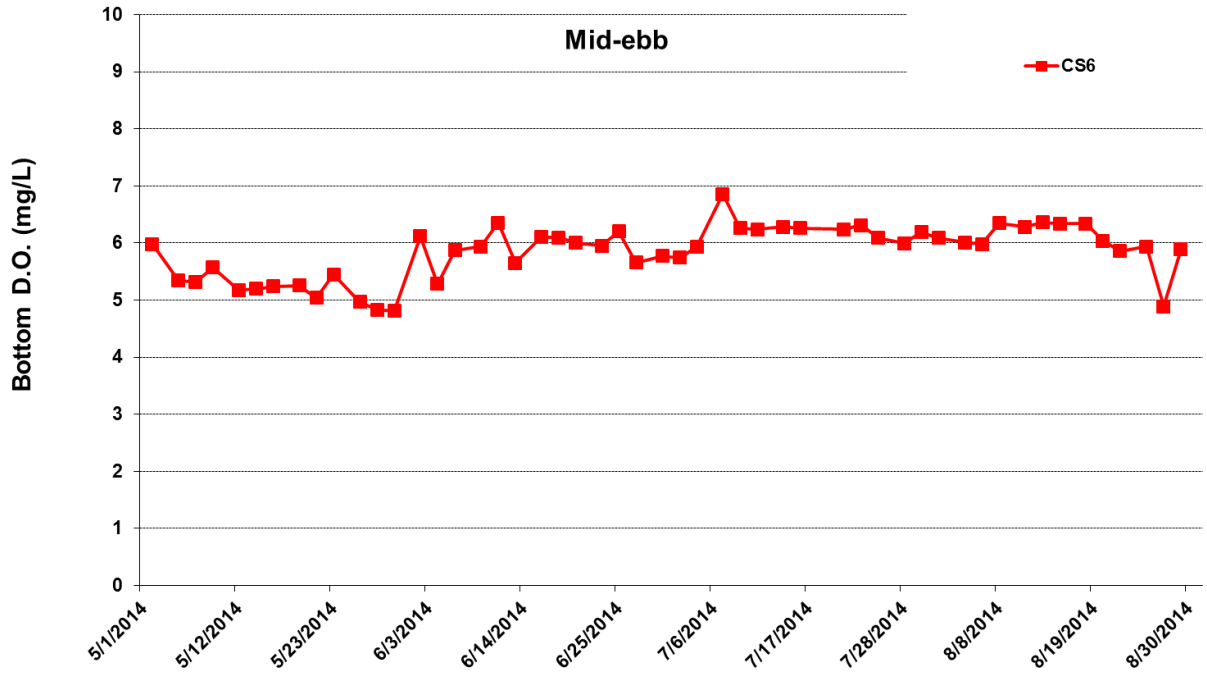


Figure G18 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.
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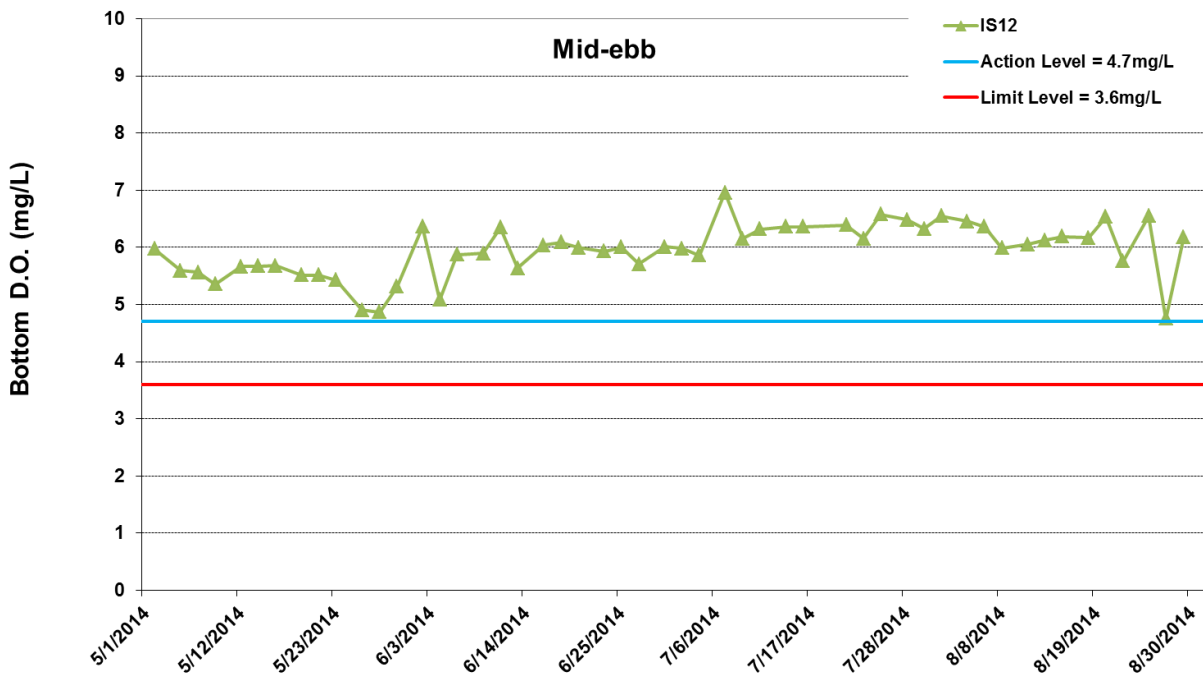
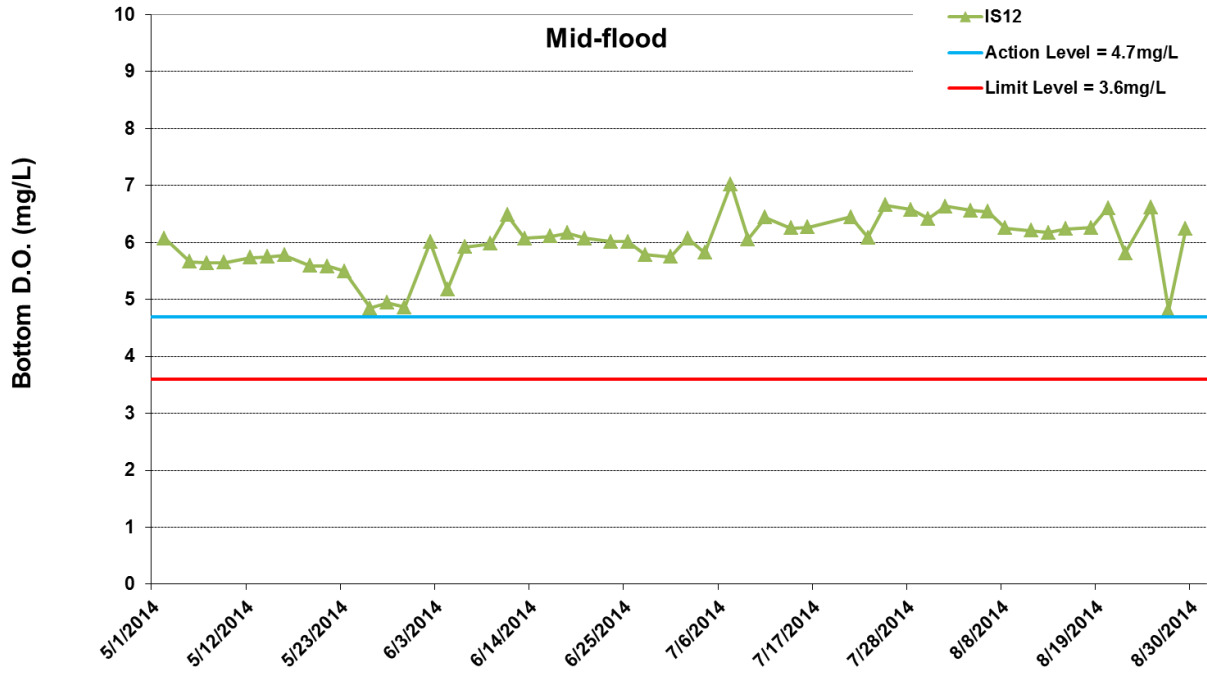


Figure G19 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



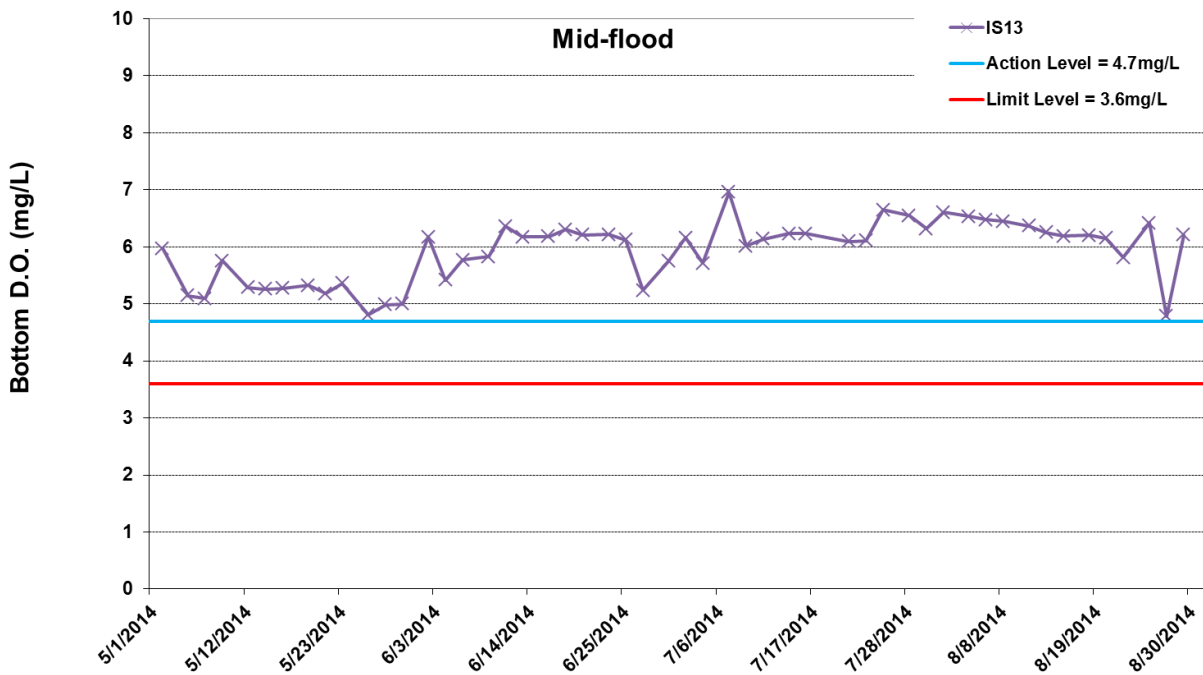
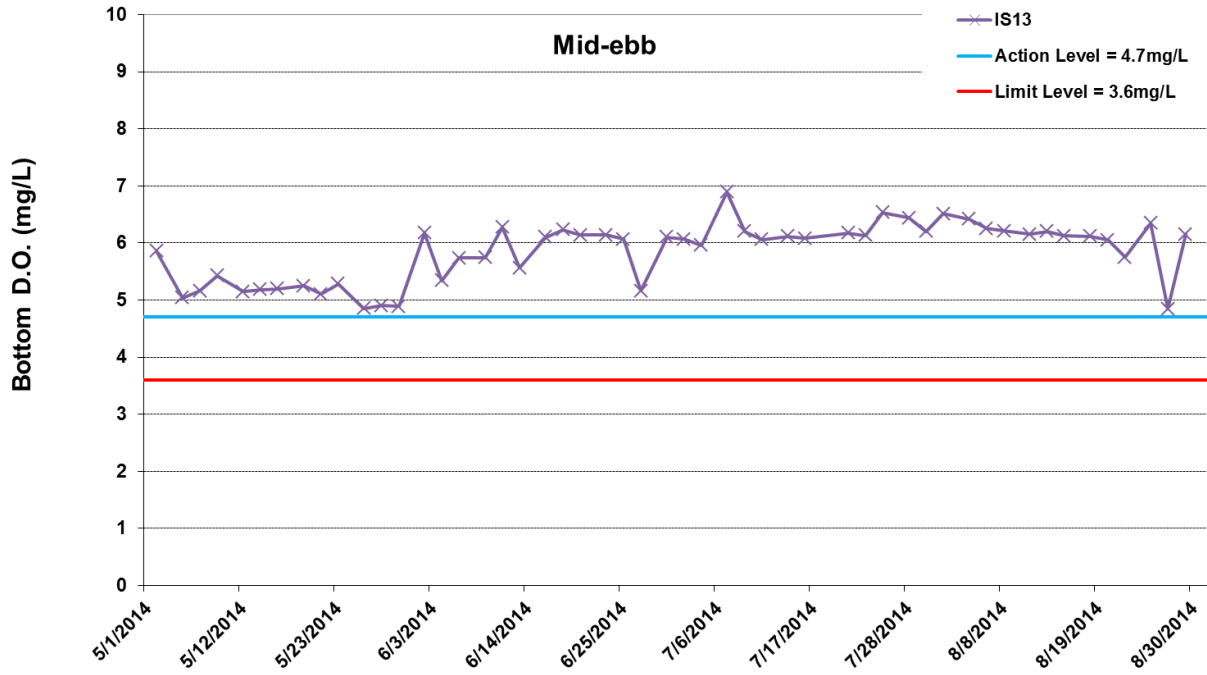


Figure G20 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



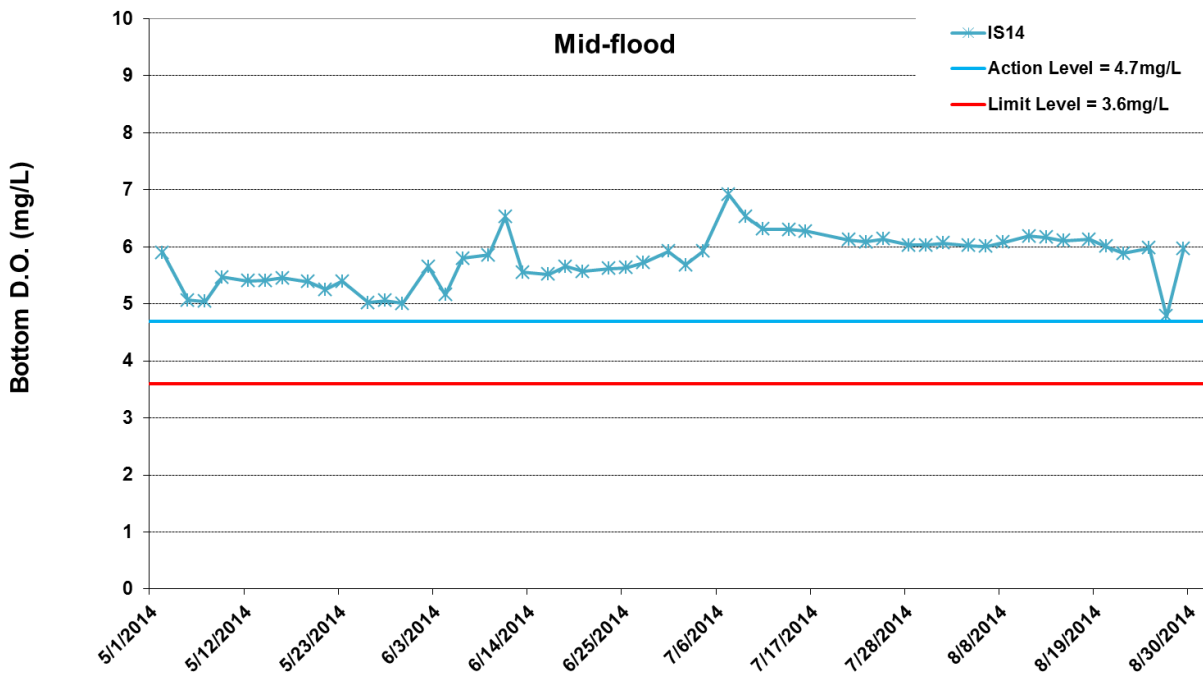
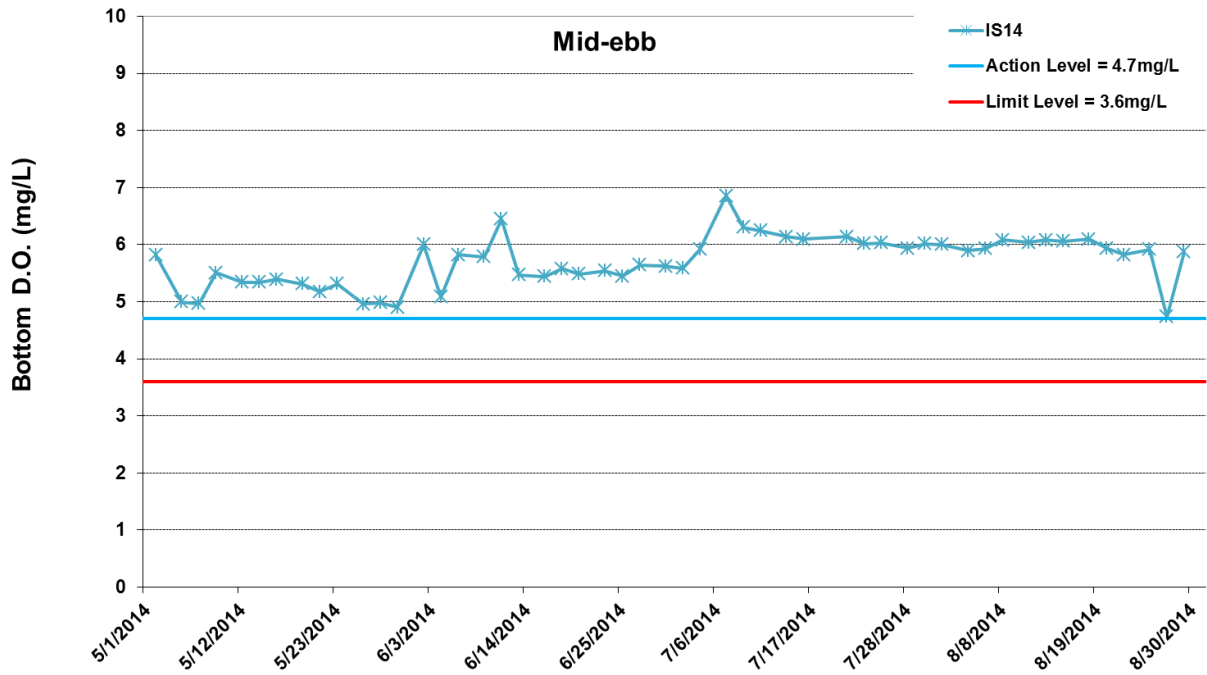


Figure G21 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



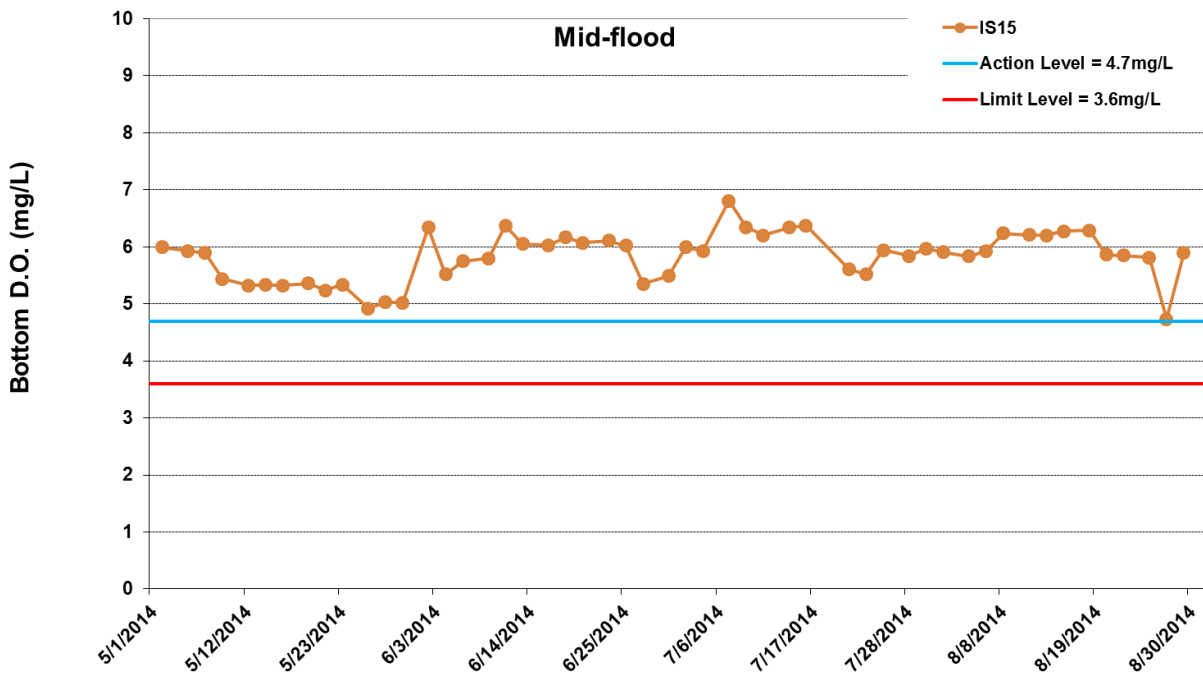
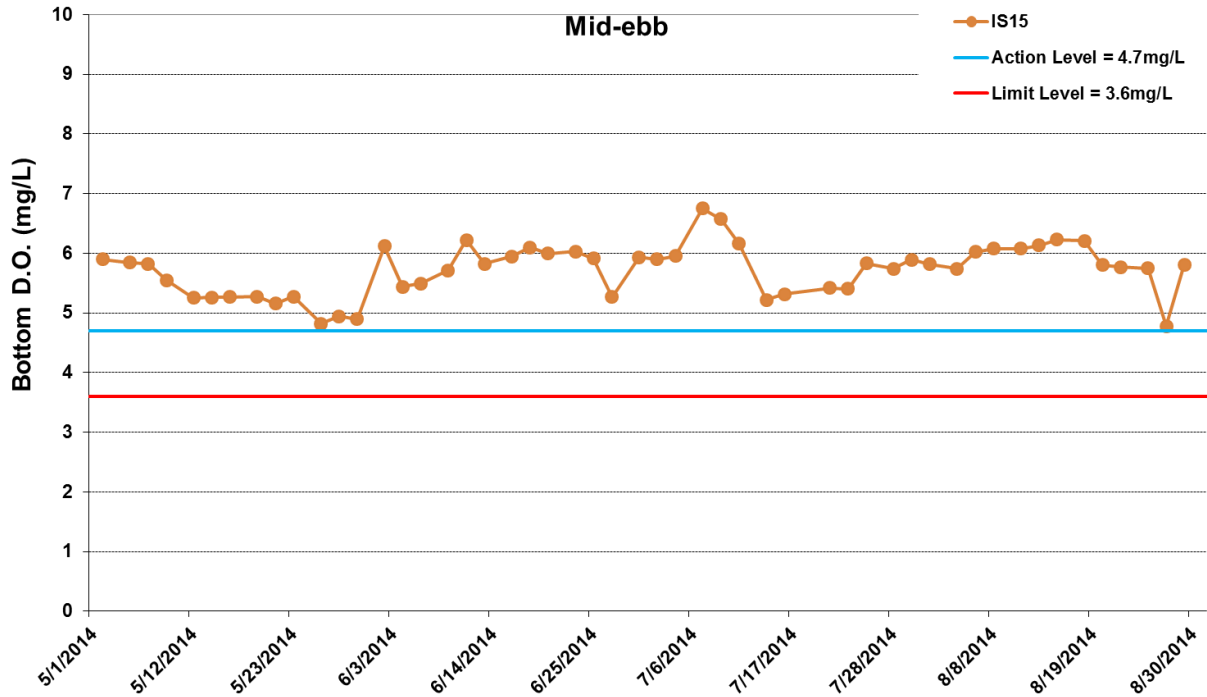


Figure G22 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



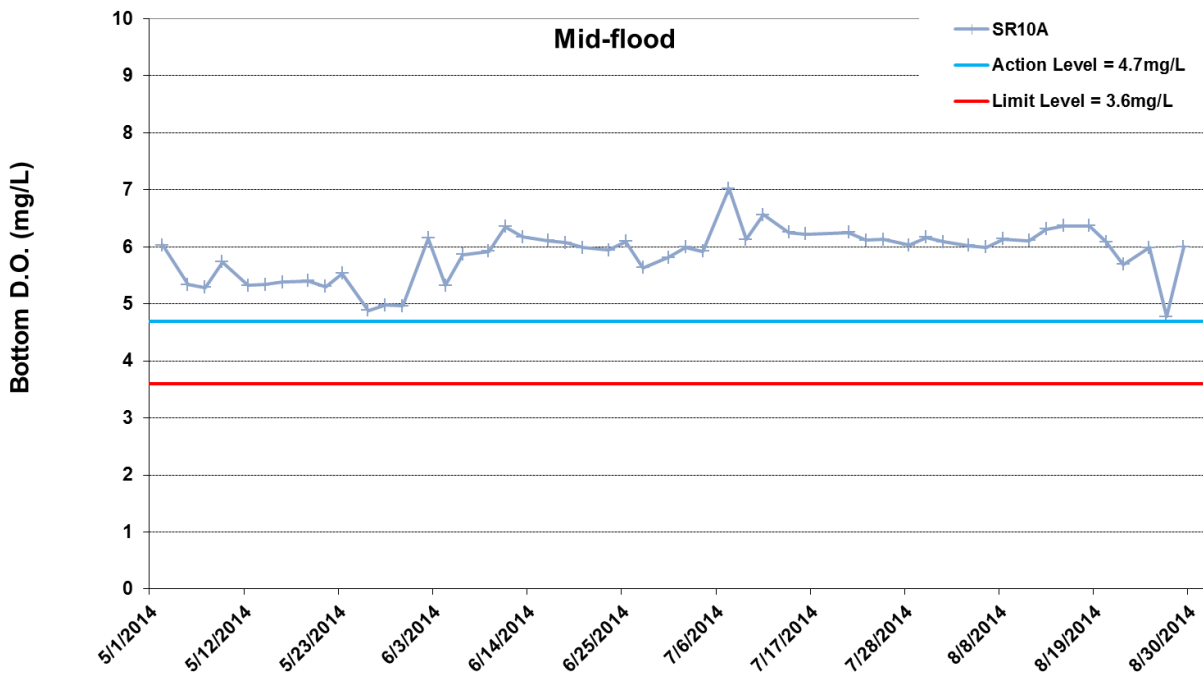
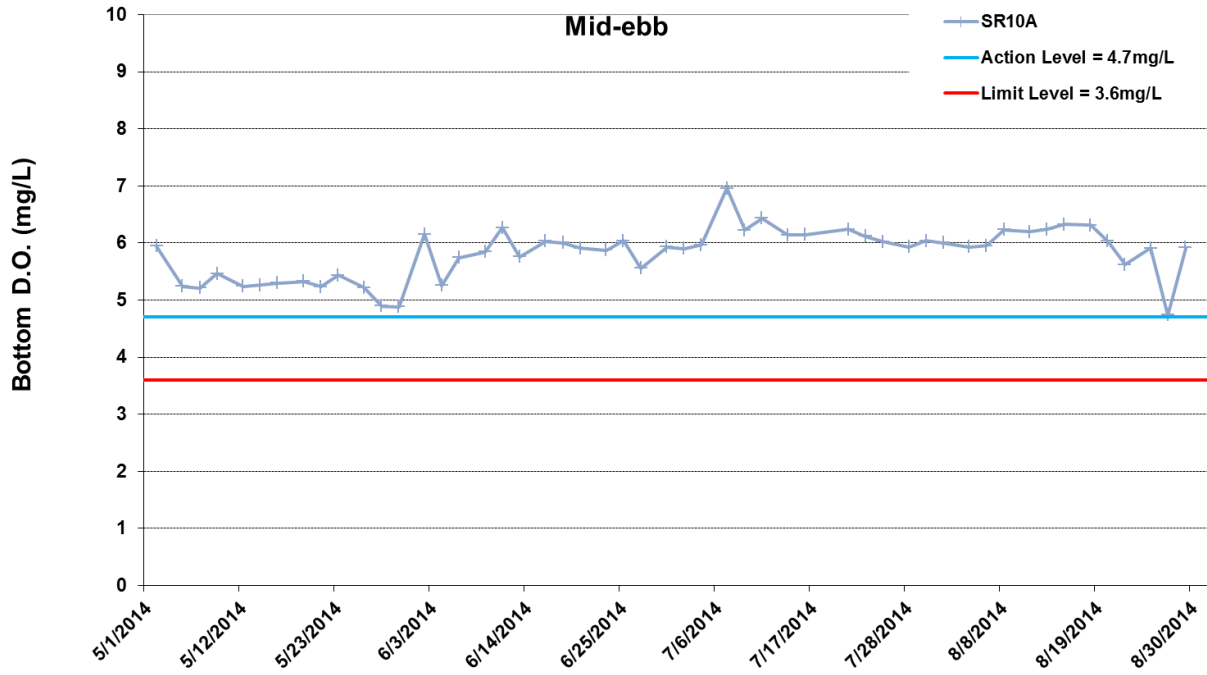


Figure G23 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



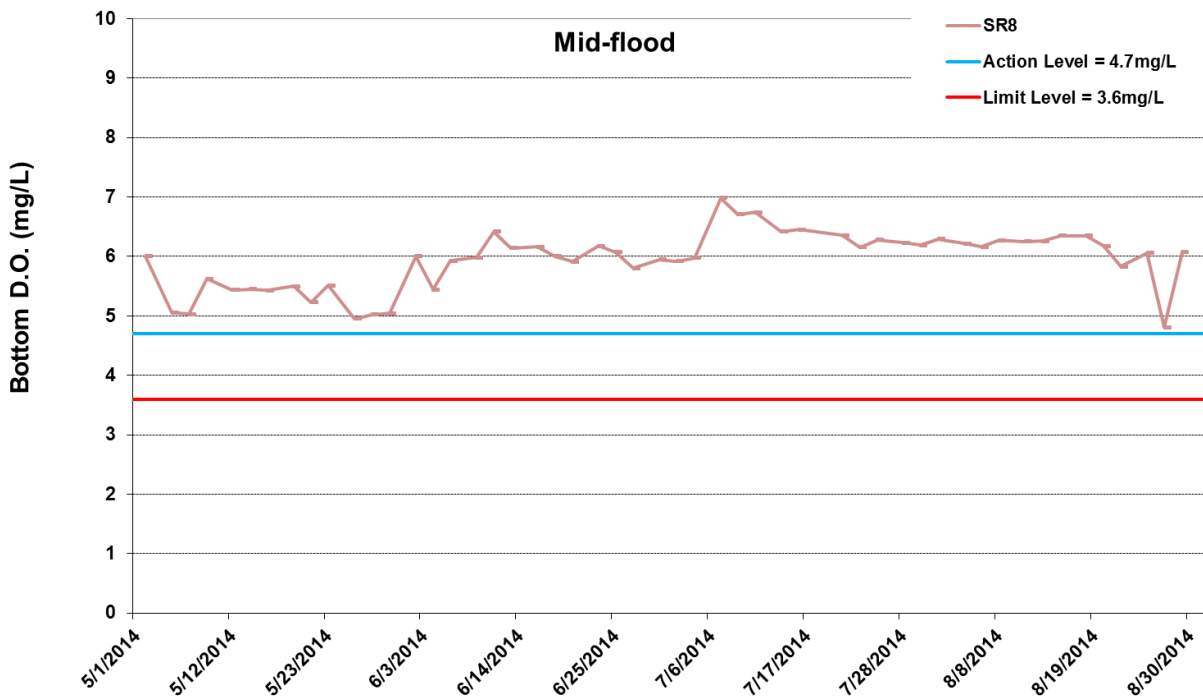
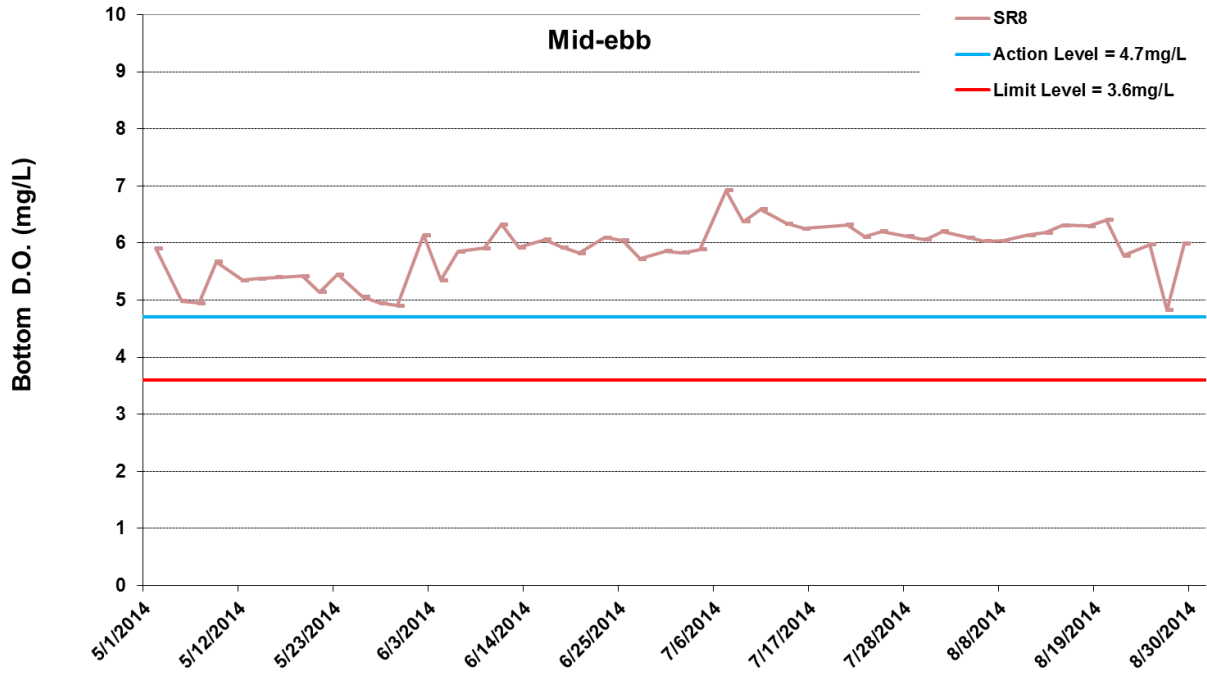


Figure G24 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



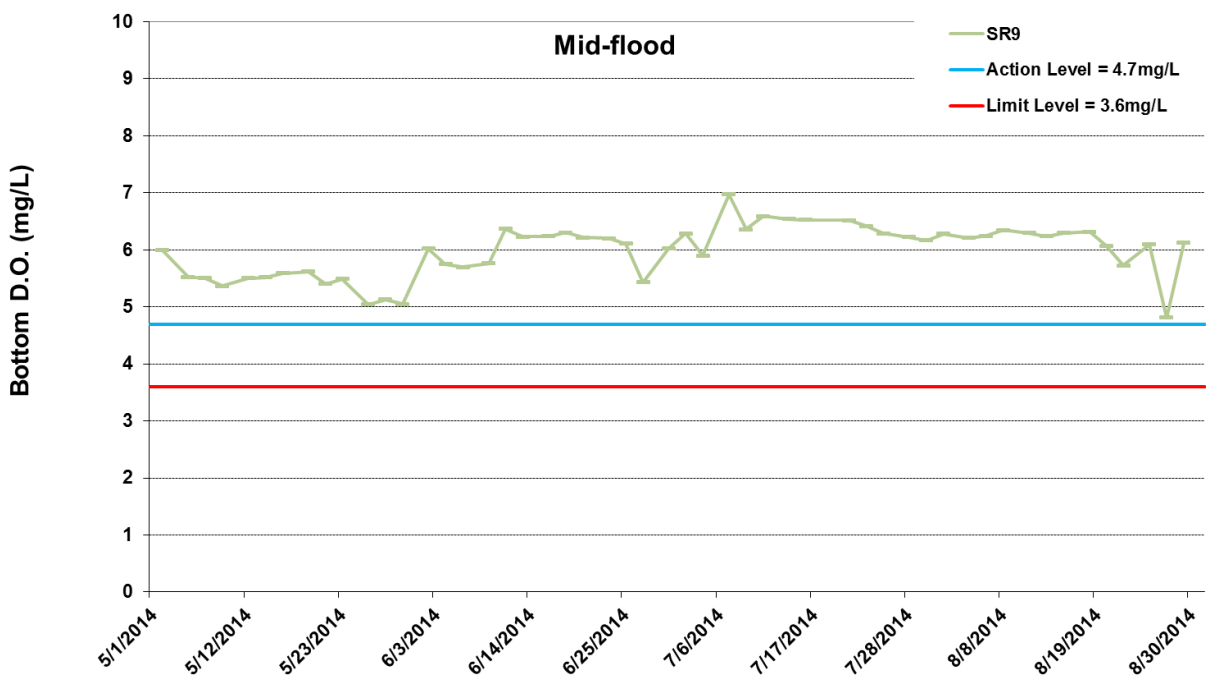
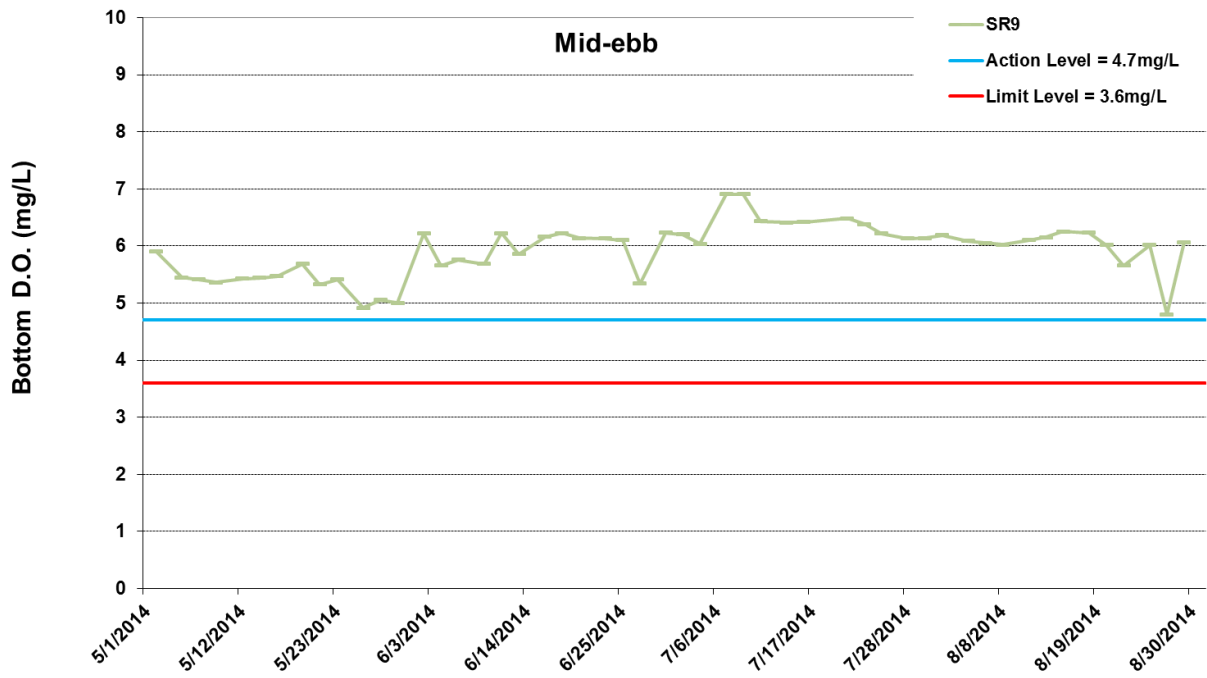


Figure G25 Impact Monitoring - Mean Level of Dissolved Oxygen (mg/L) in bottom water between 1 May 2014 and 31 August 2014 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.

Ref: 0212330_Impact-WQM_August2014_graphs_Rev a.xls



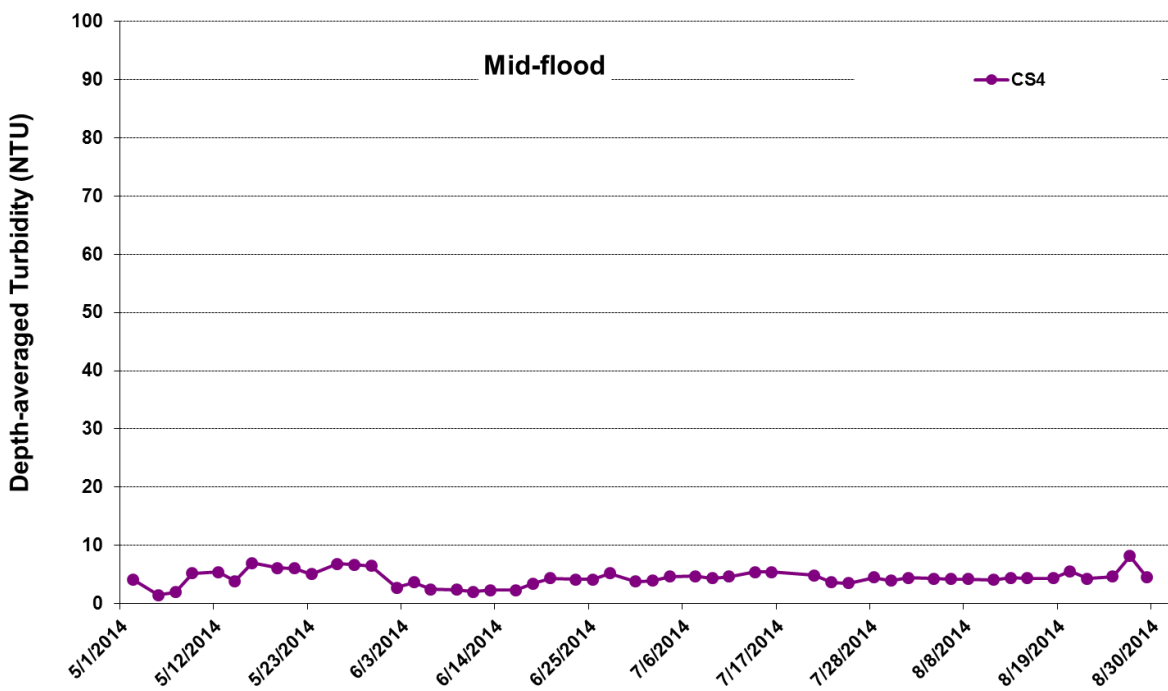
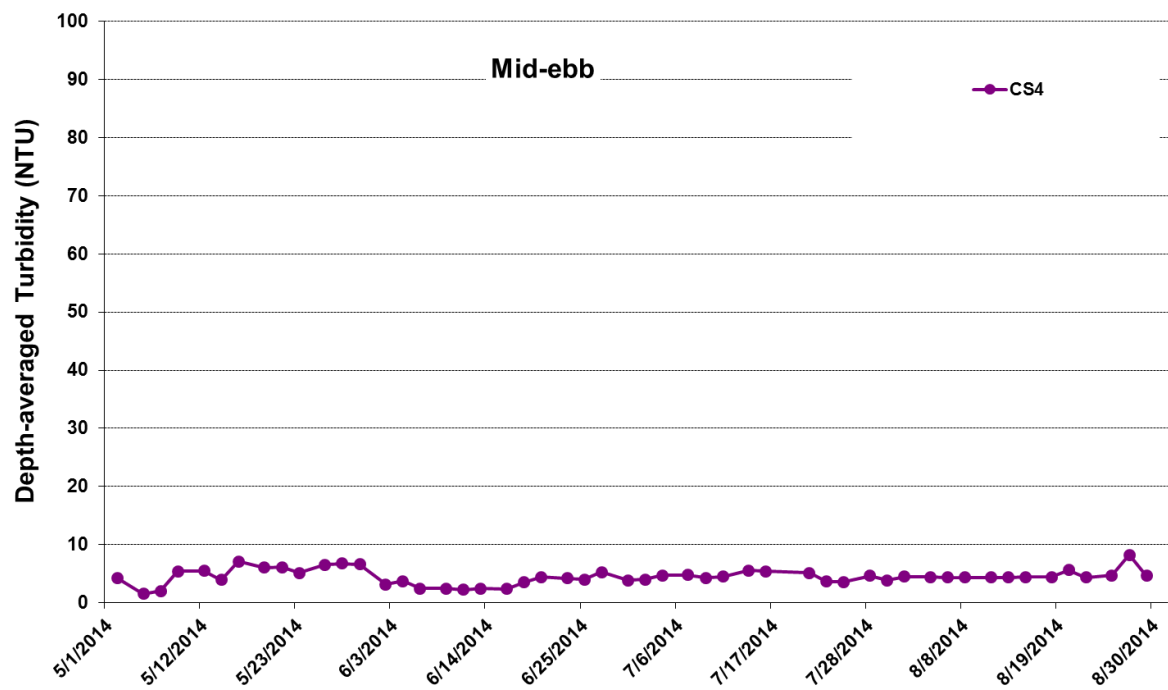


Figure G26 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



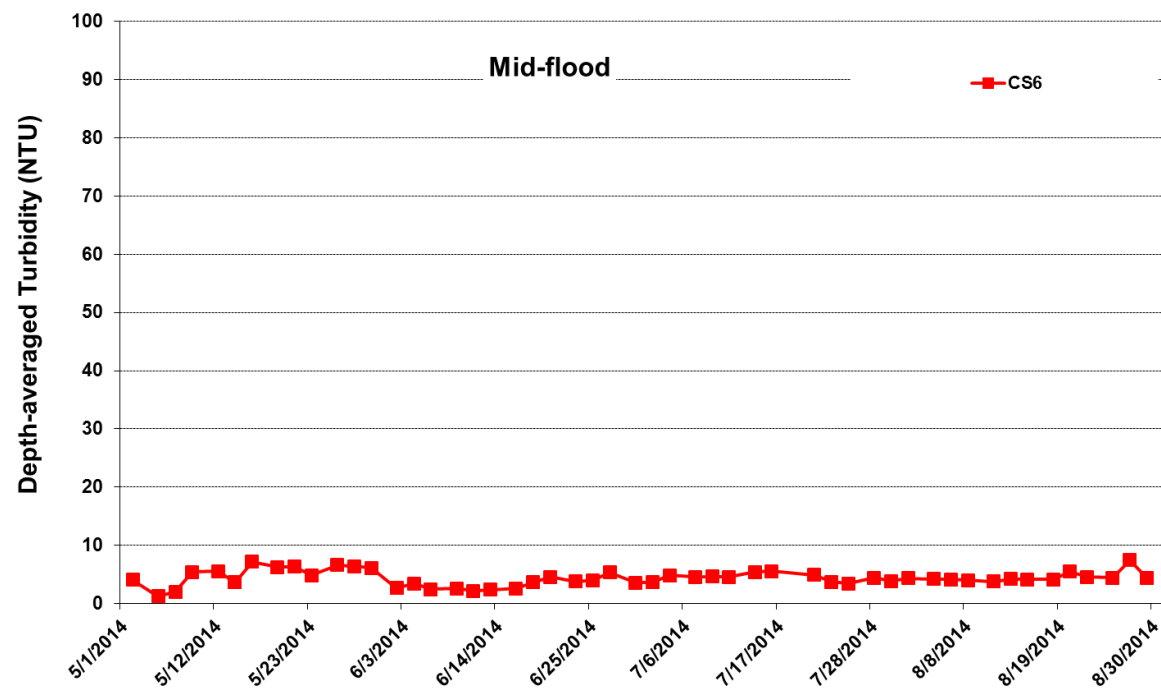
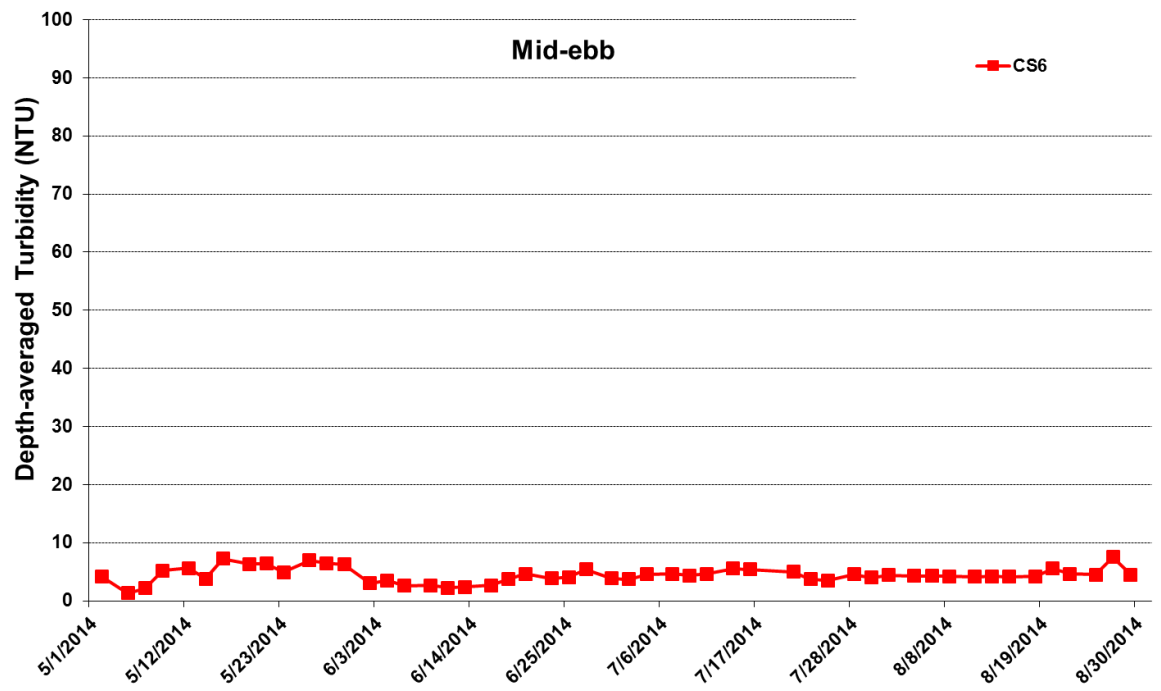


Figure G27 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



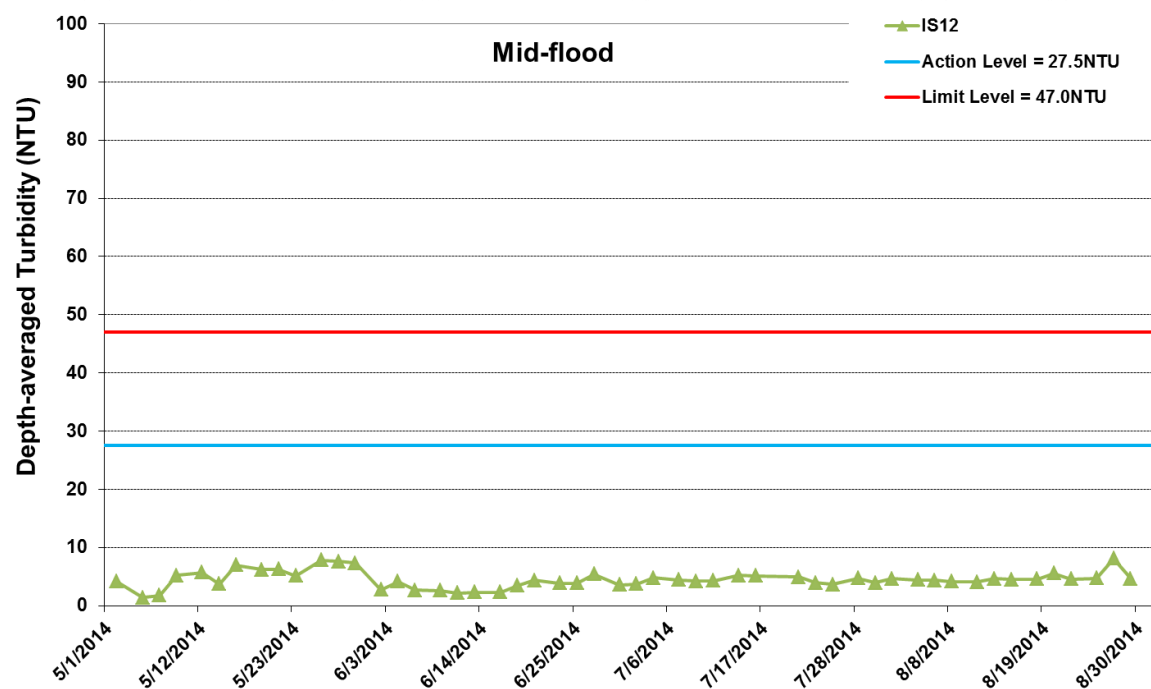
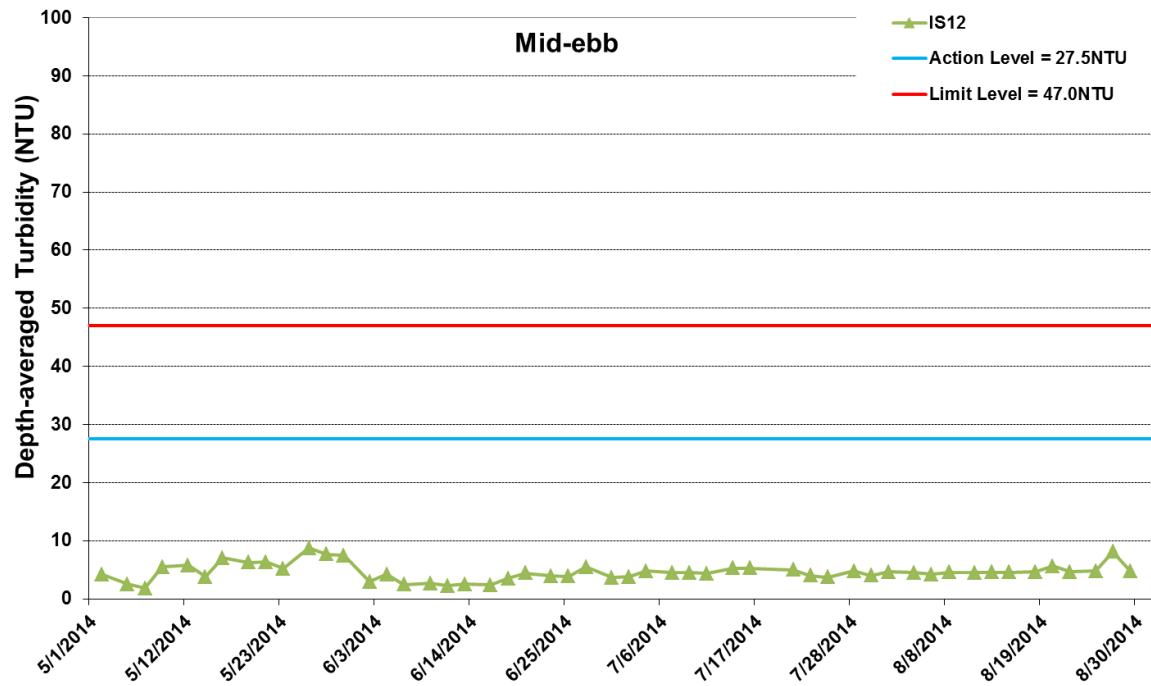


Figure G28 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



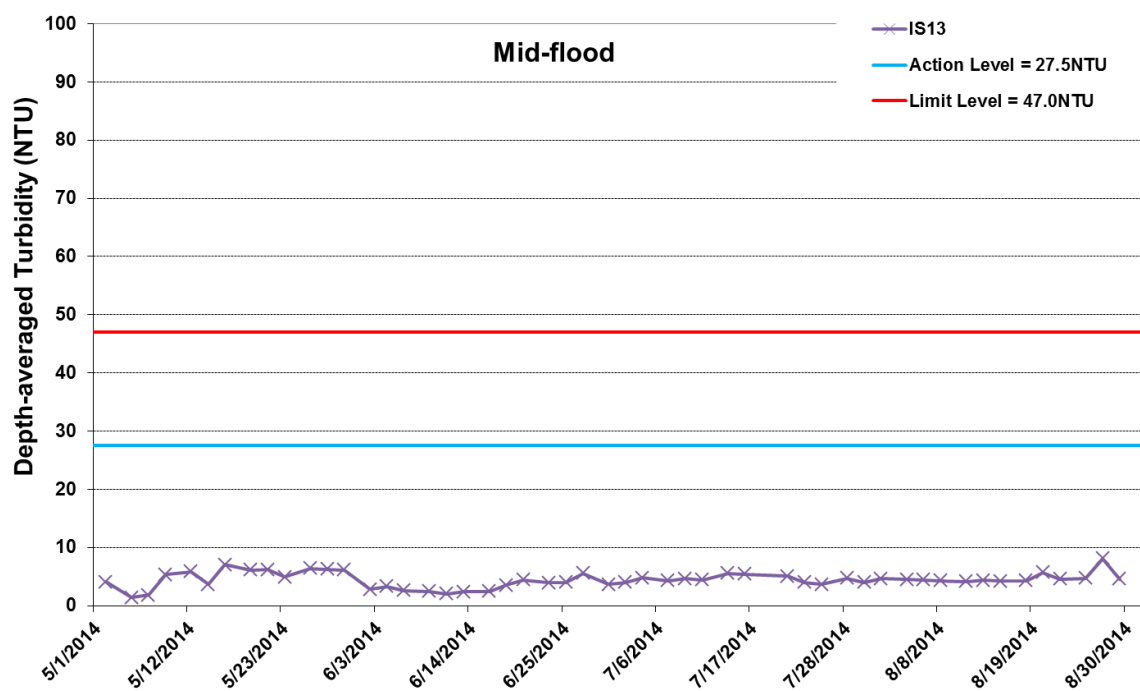
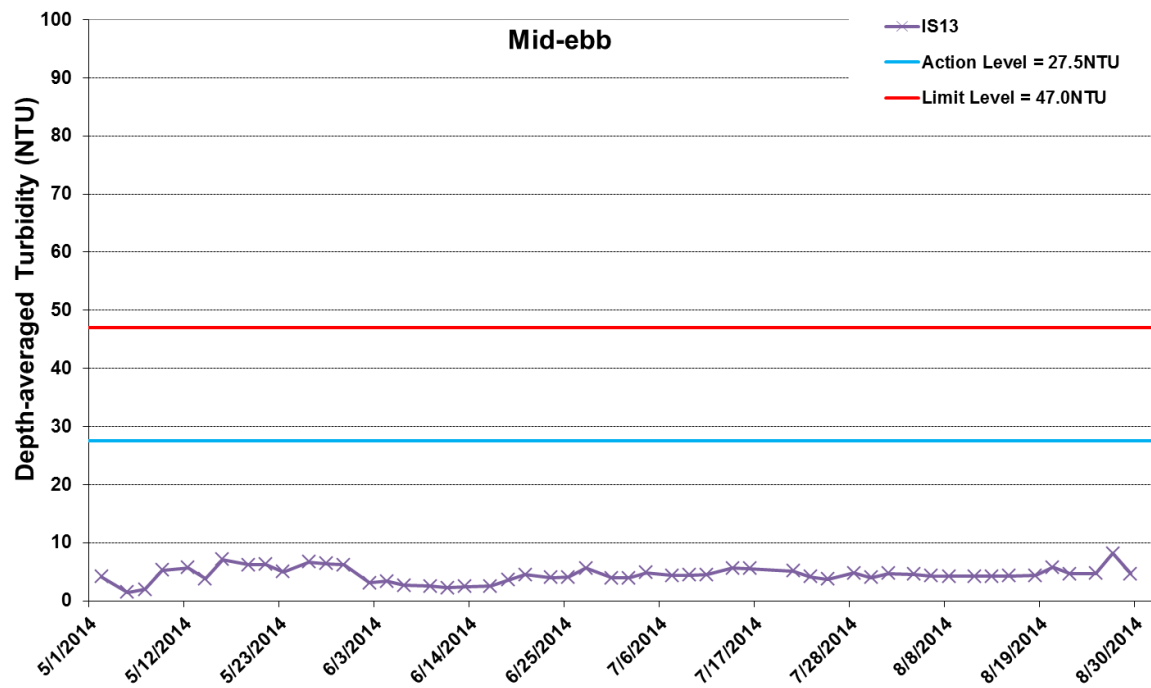


Figure G29 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



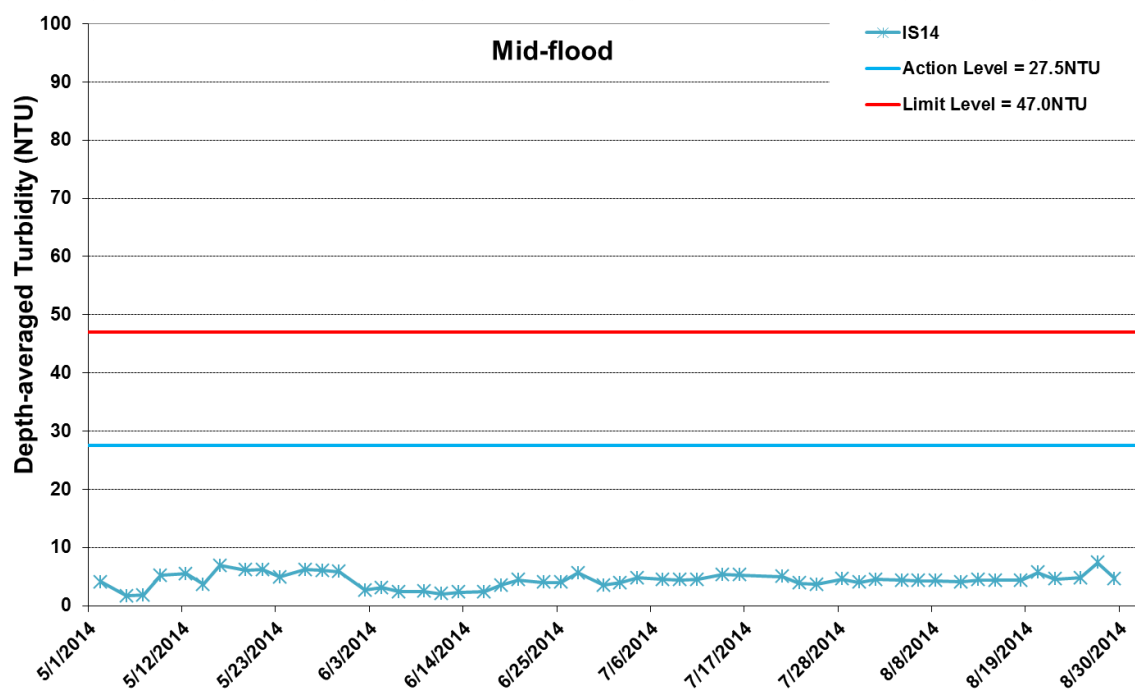
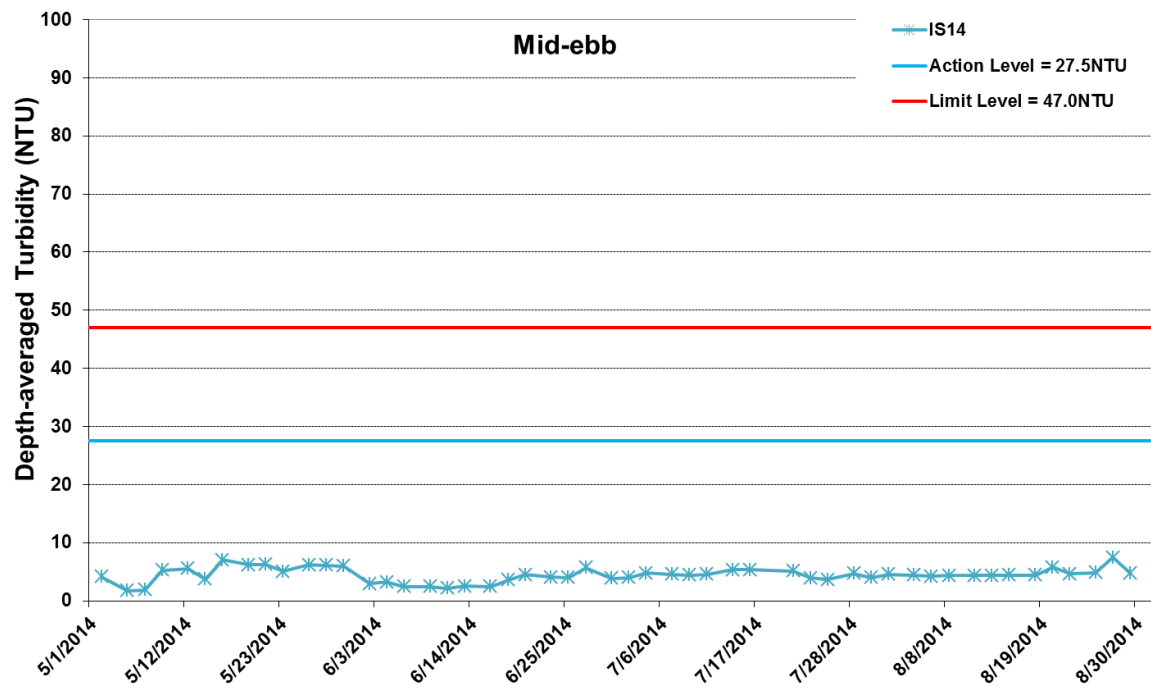


Figure G30 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



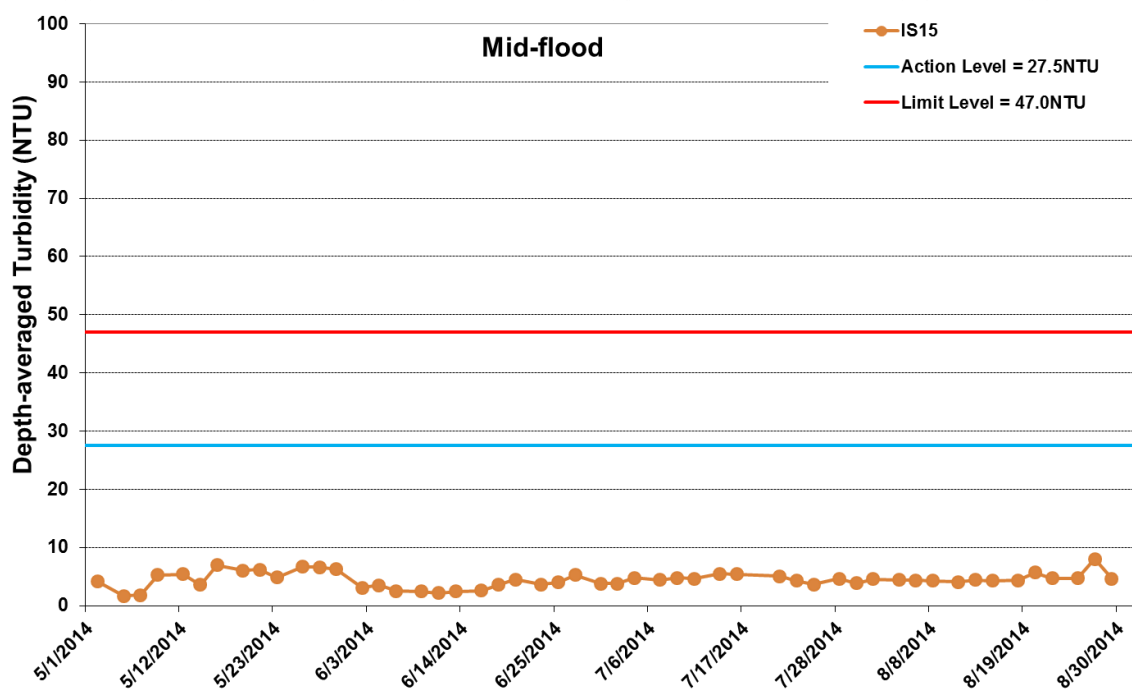
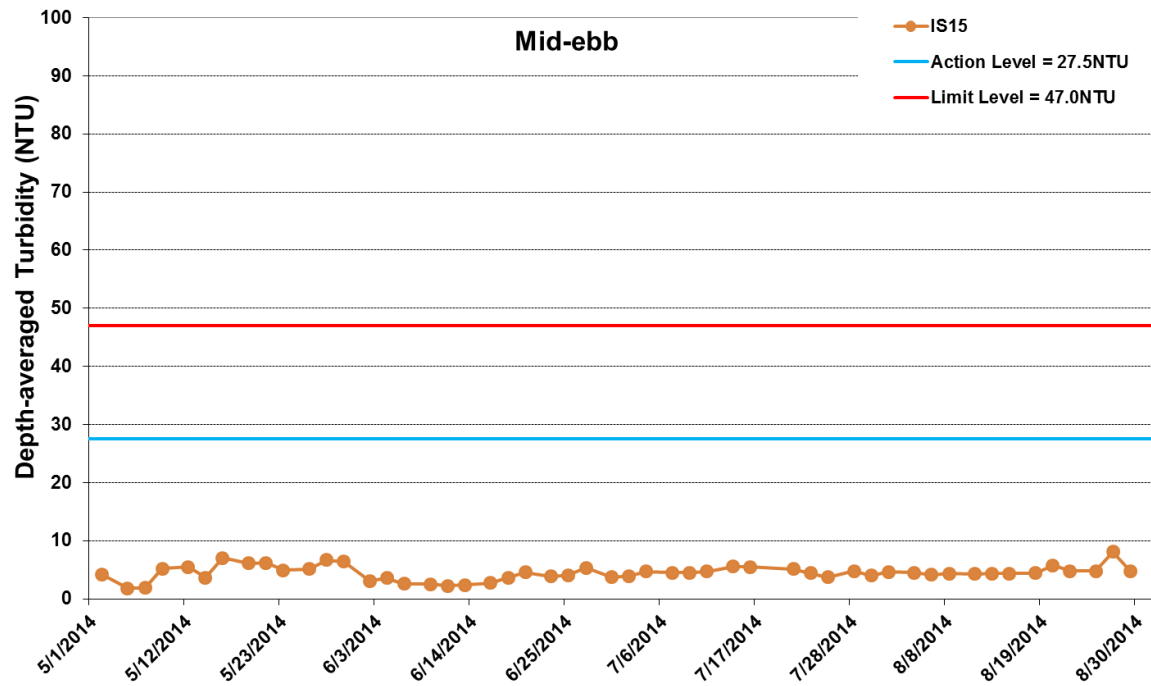


Figure G31 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



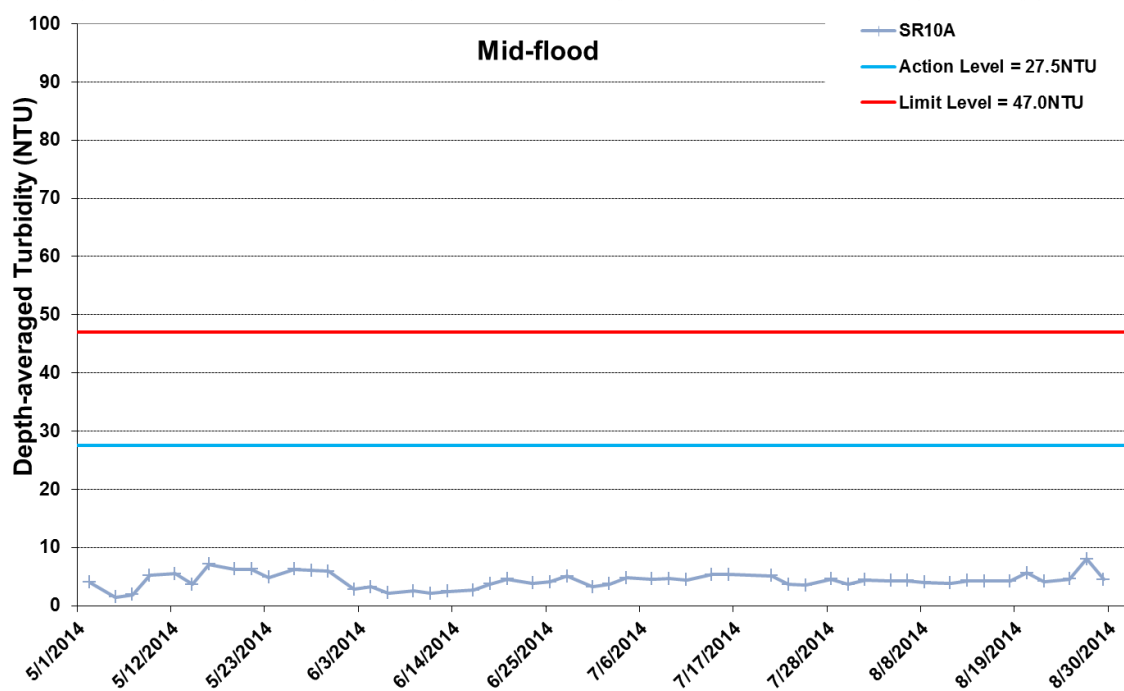
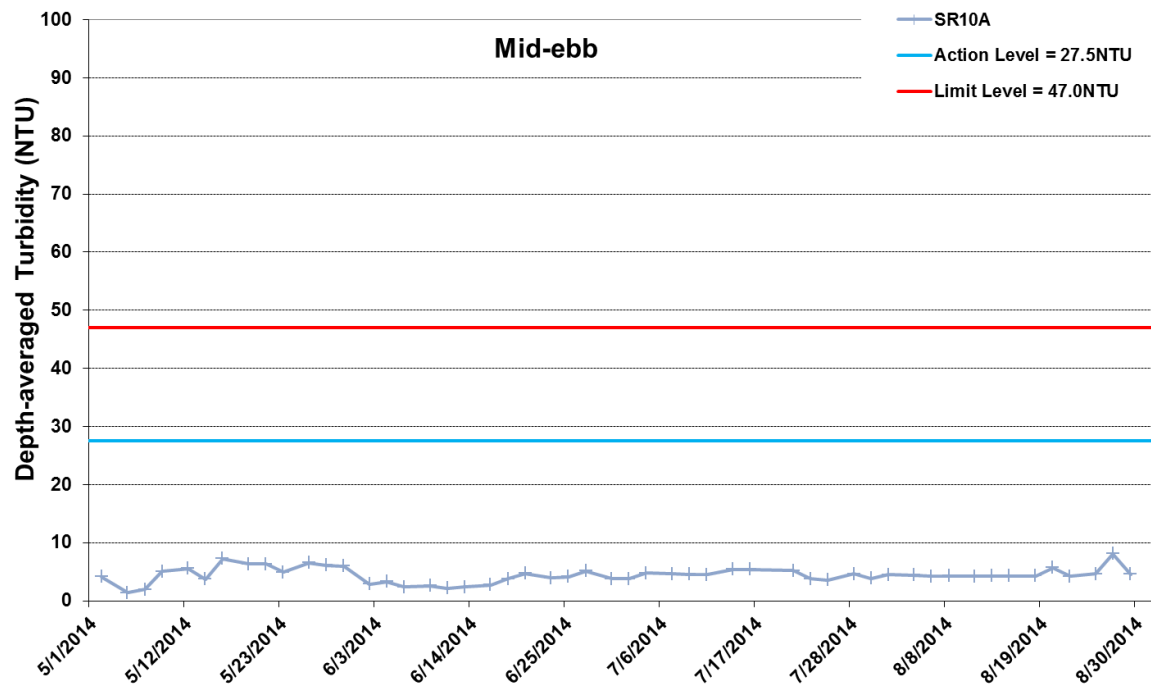


Figure G32 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



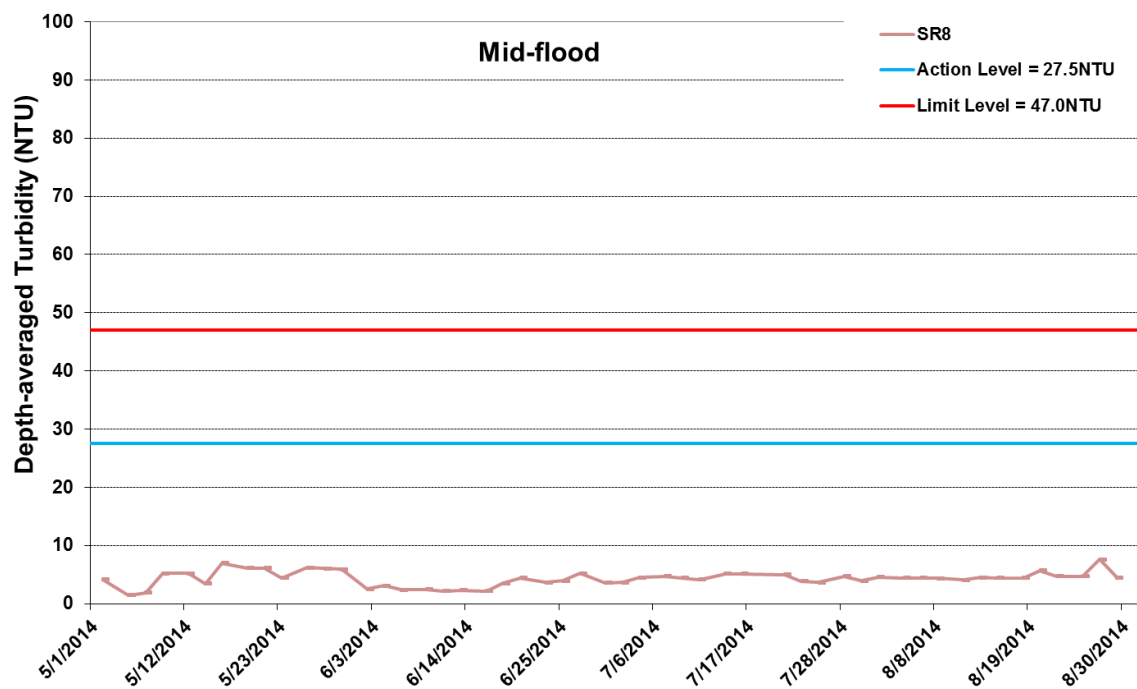
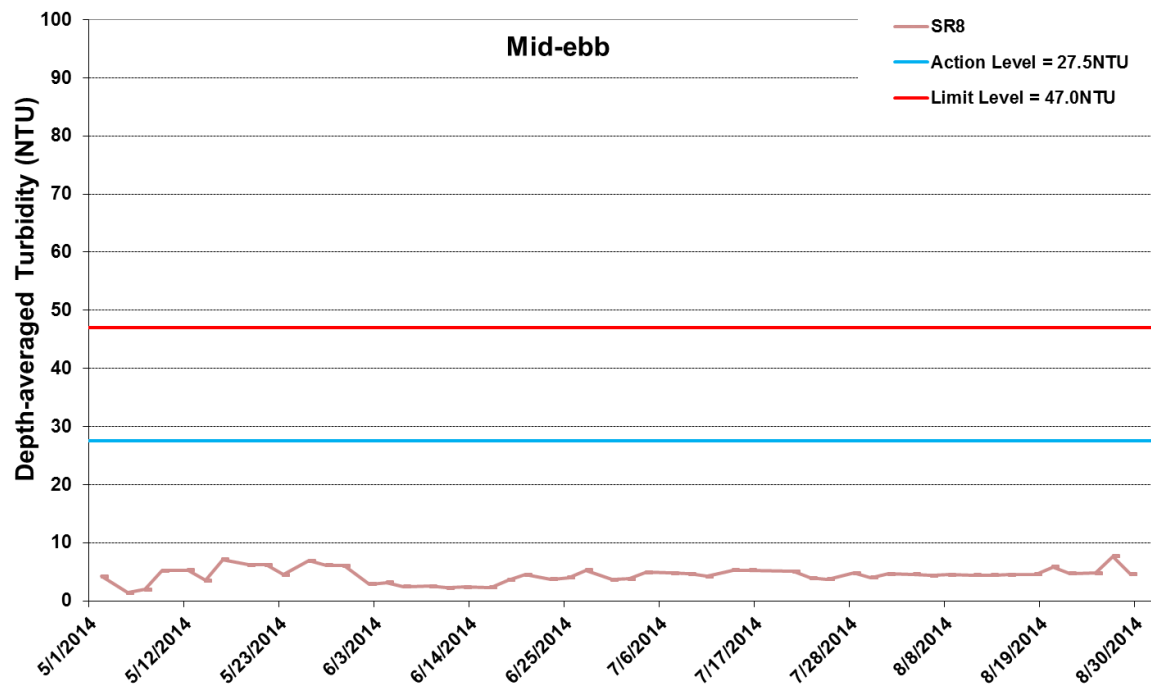


Figure G33 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



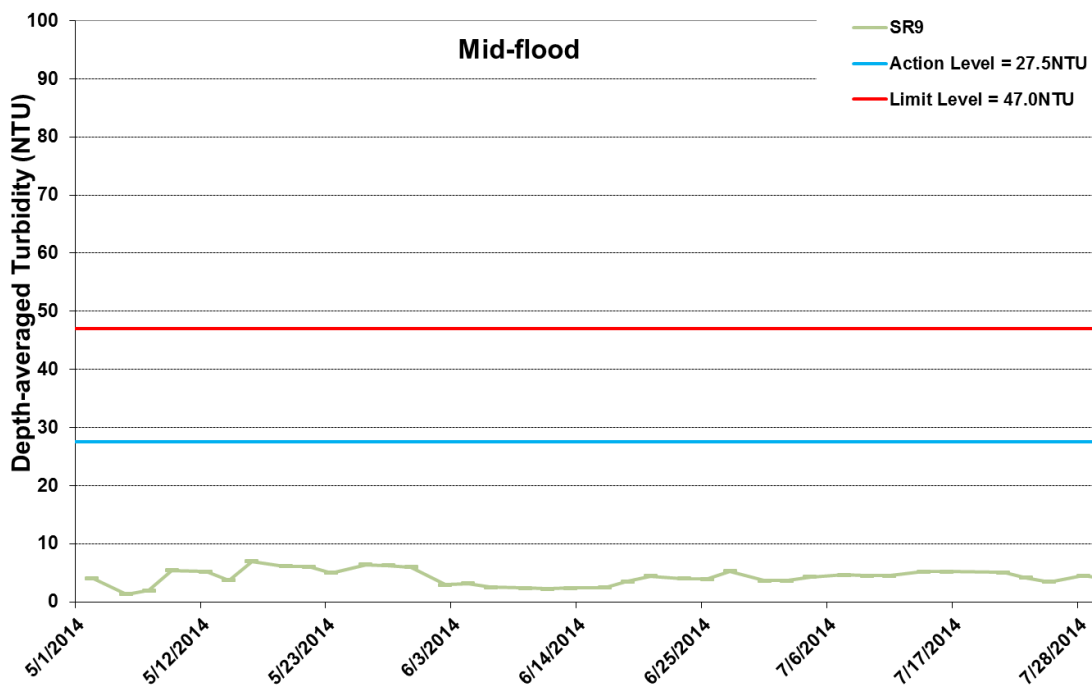
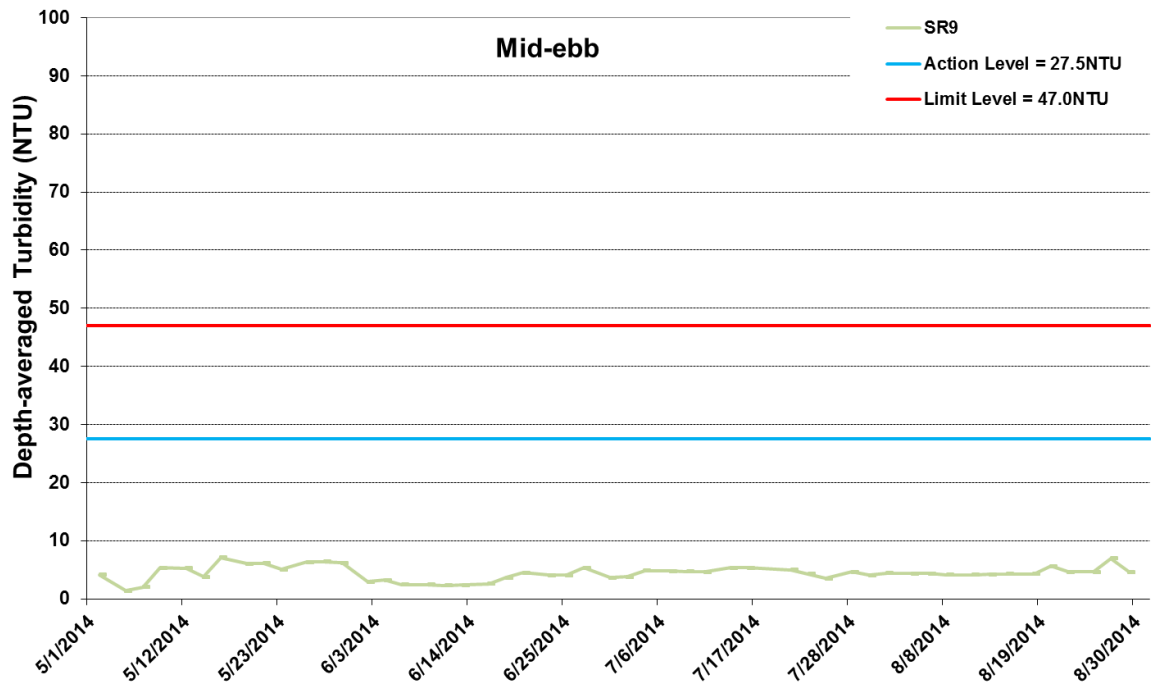


Figure G34 Impact Monitoring - Mean Depth-averaged Level of Turbidity (NTU) between 1 May 2014 and 31 August 2014 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



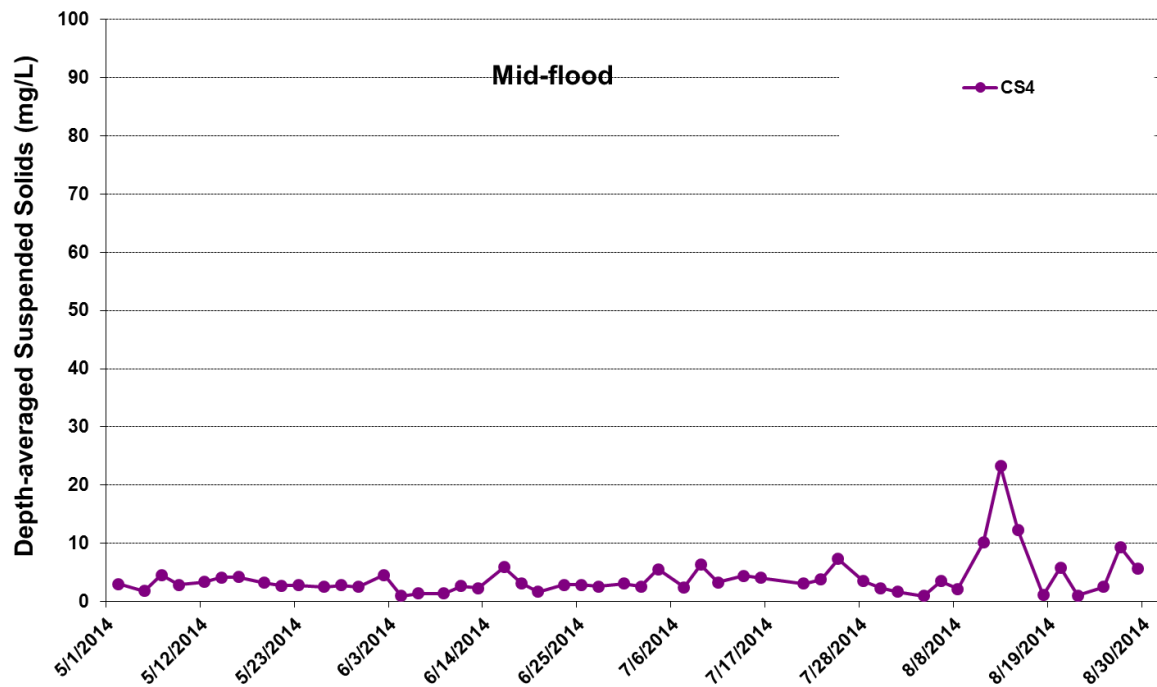
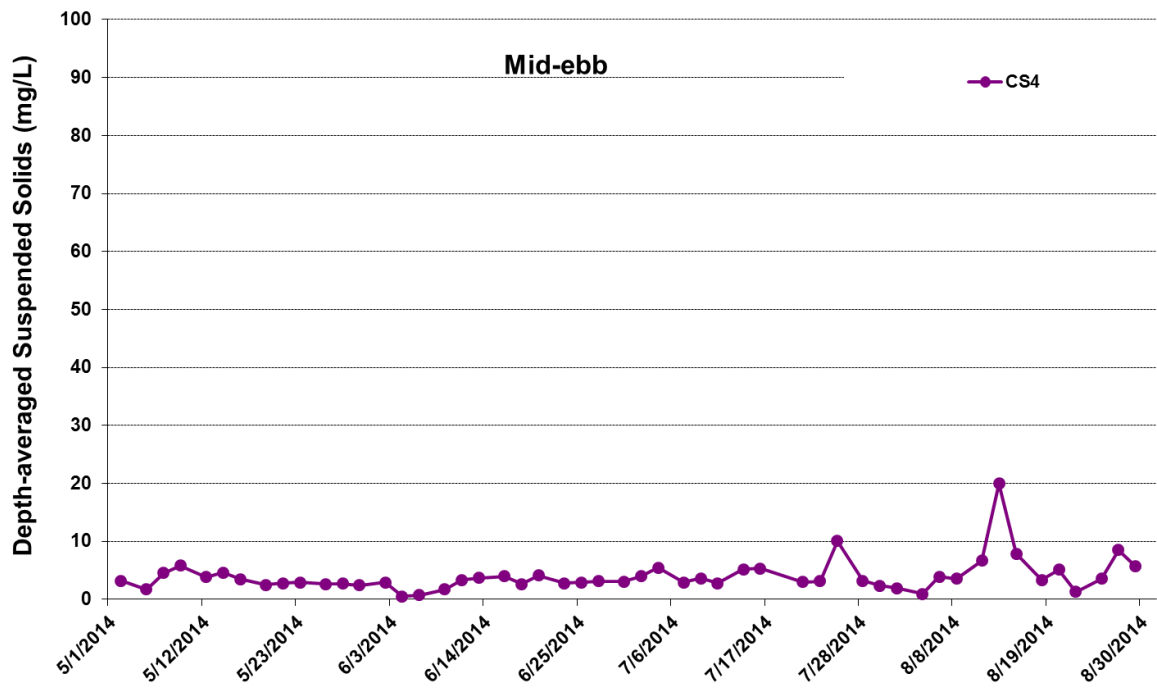


Figure G35 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at CS4. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 – 8/6/2014); Construction of Temporary Seawalls (5/1/2013 – 8/31/2014); Sheet Piling (5/1/2014 – 8/31/2014); Filling (5/1/2014 – 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



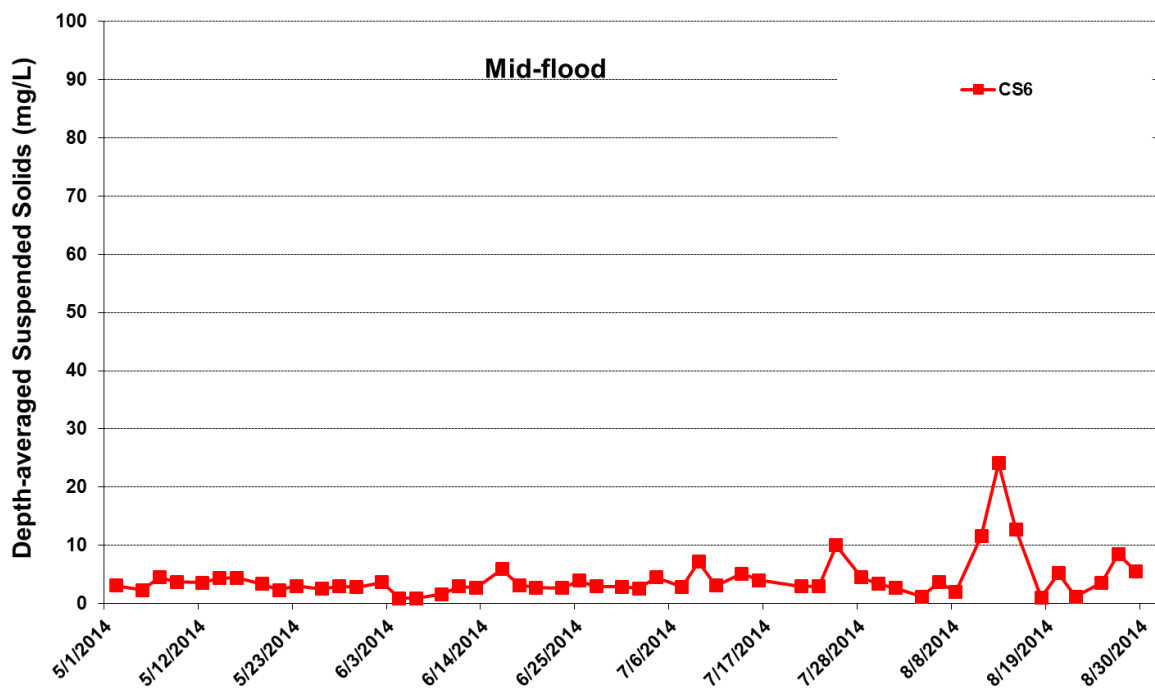
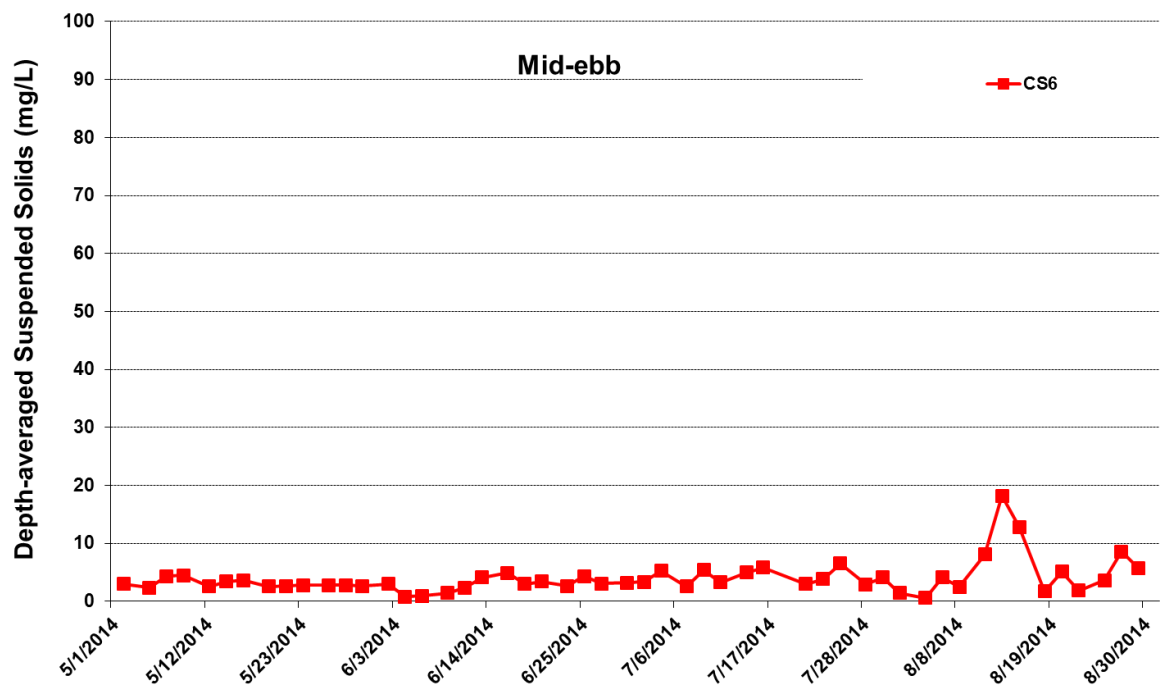


Figure G36 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at CS6. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 – 8/6/2014); Construction of Temporary Seawalls (5/1/2013 – 8/31/2014); Sheet Piling (5/1/2014 – 8/31/2014); Filling (5/1/2014 – 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



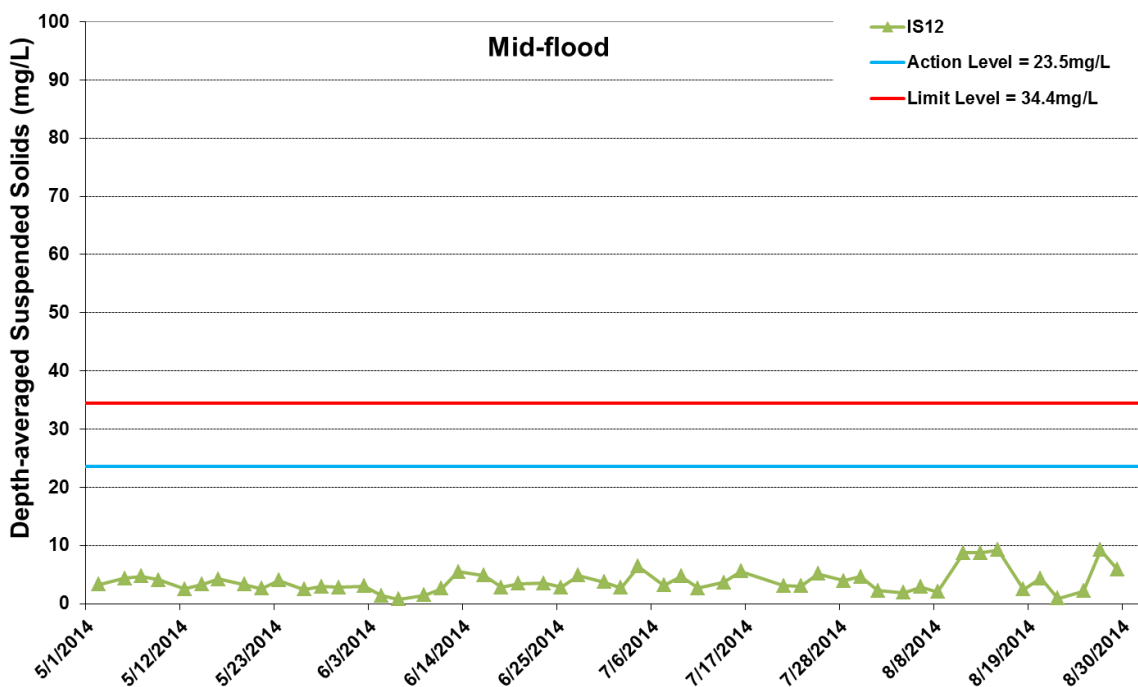
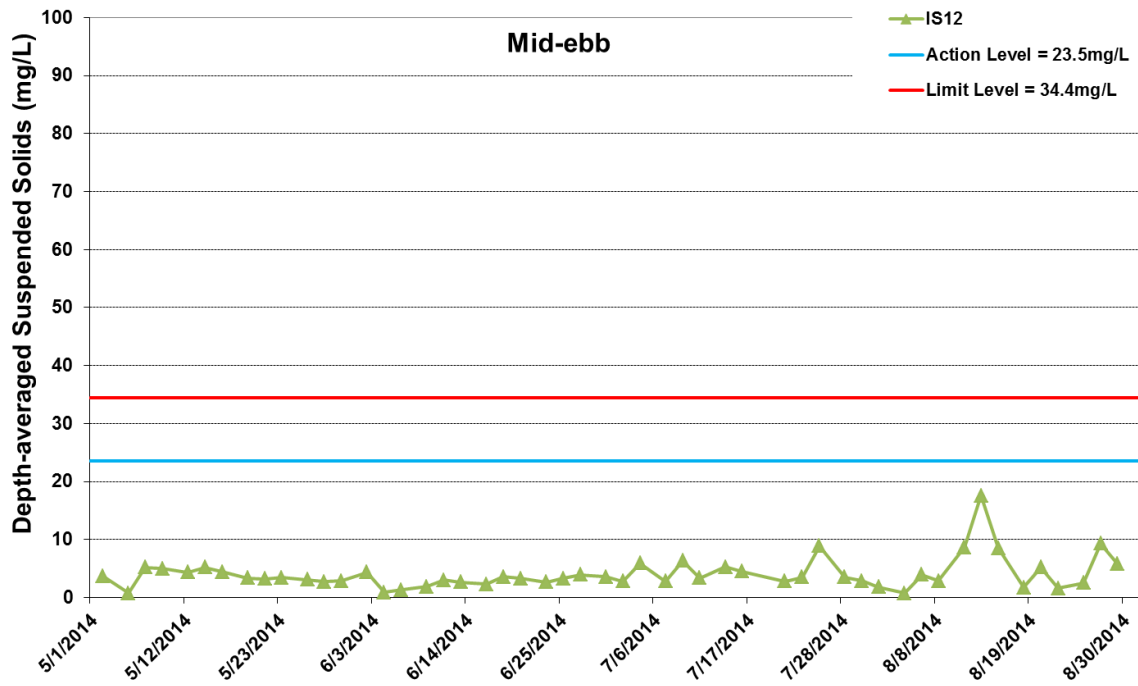


Figure G37 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at IS12. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 – 8/6/2014); Construction of Temporary Seawalls (5/1/2013 – 8/31/2014); Sheet Piling (5/1/2014 – 8/31/2014); Filling (5/1/2014 – 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



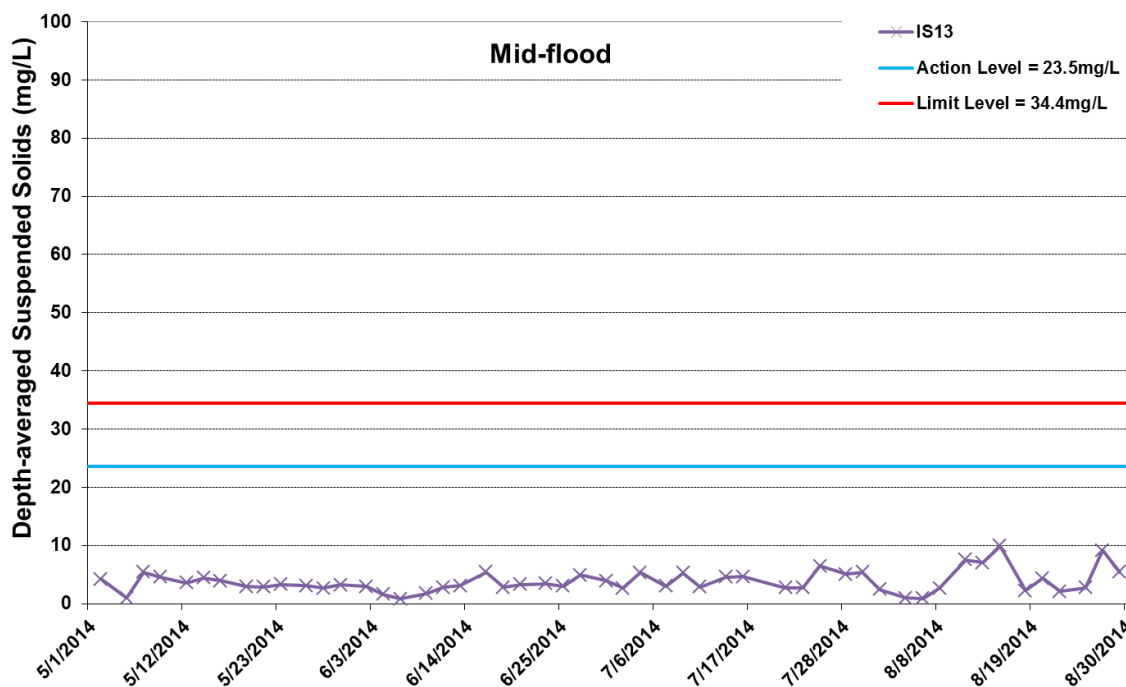
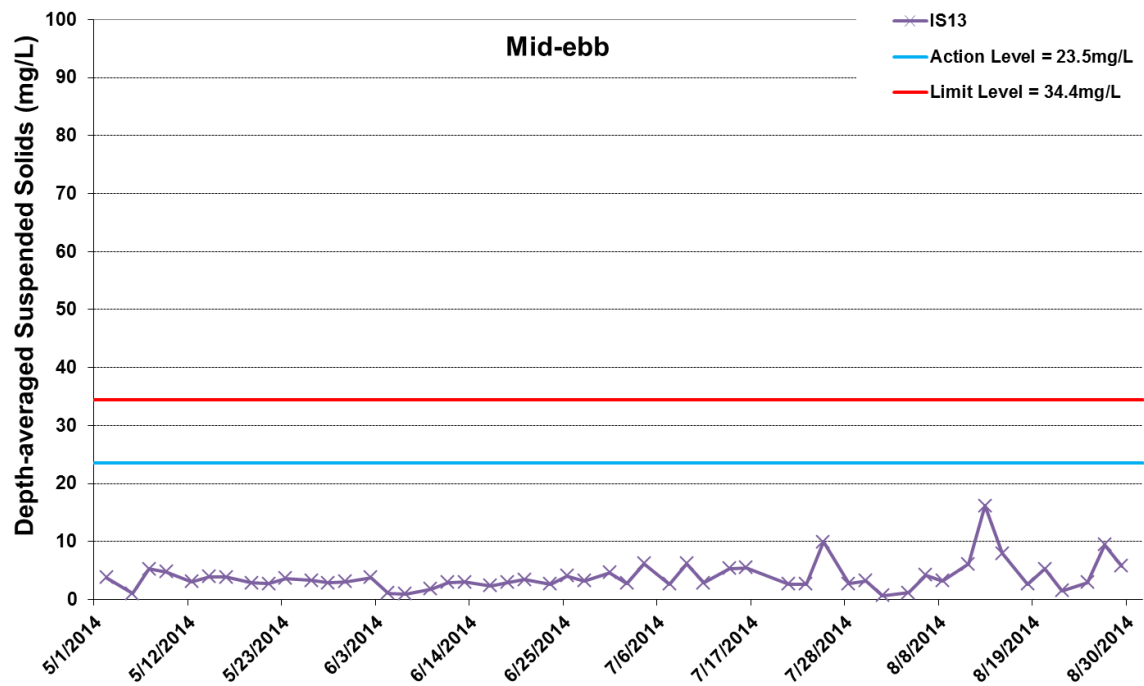


Figure G38 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at IS13. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 – 8/6/2014); Construction of Temporary Seawalls (5/1/2013 – 8/31/2014); Sheet Piling (5/1/2014 – 8/31/2014); Filling (5/1/2014 – 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



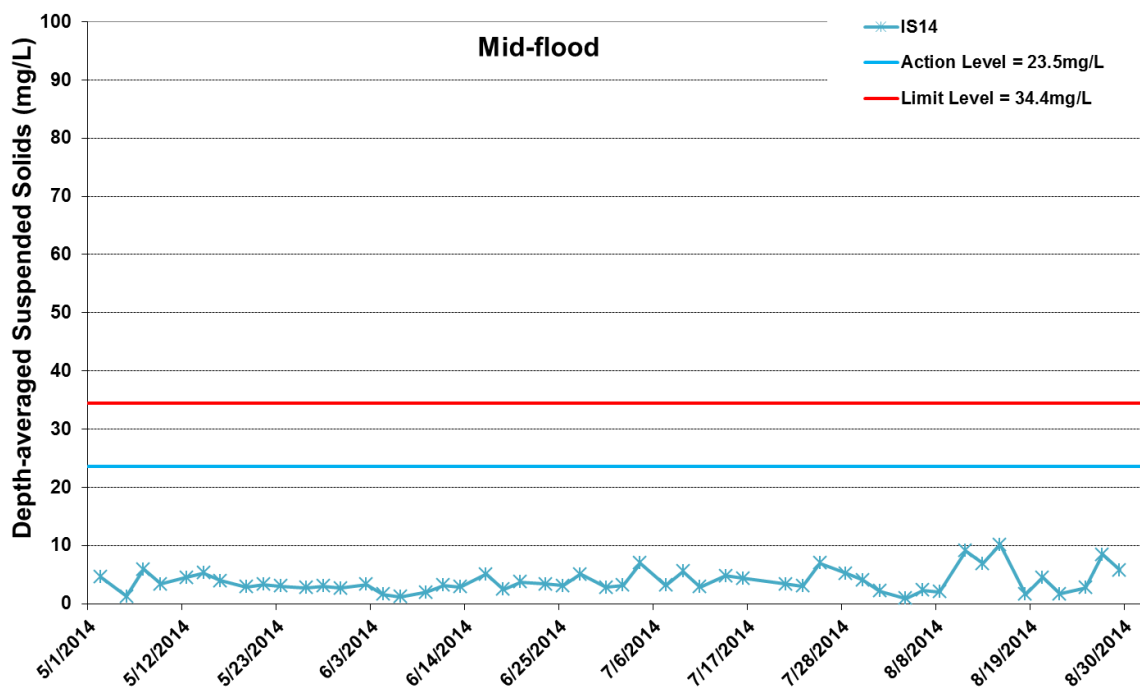
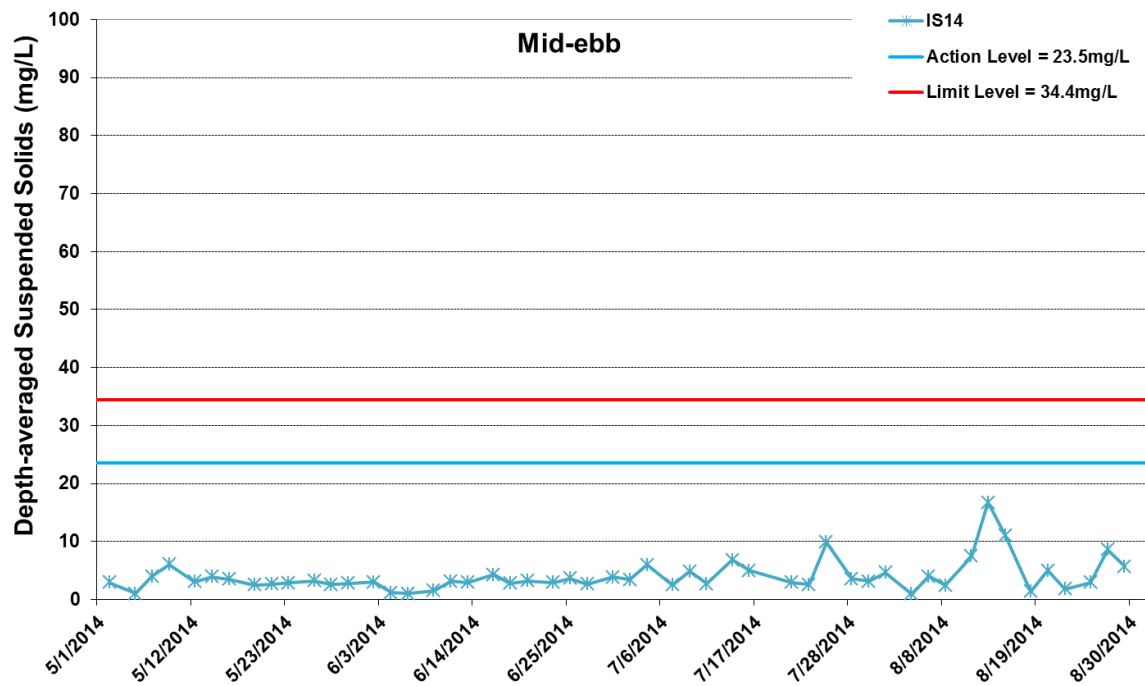


Figure G39 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at IS14. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 – 8/6/2014); Construction of Temporary Seawalls (5/1/2013 – 8/31/2014); Sheet Piling (5/1/2014 – 8/31/2014); Filling (5/1/2014 – 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



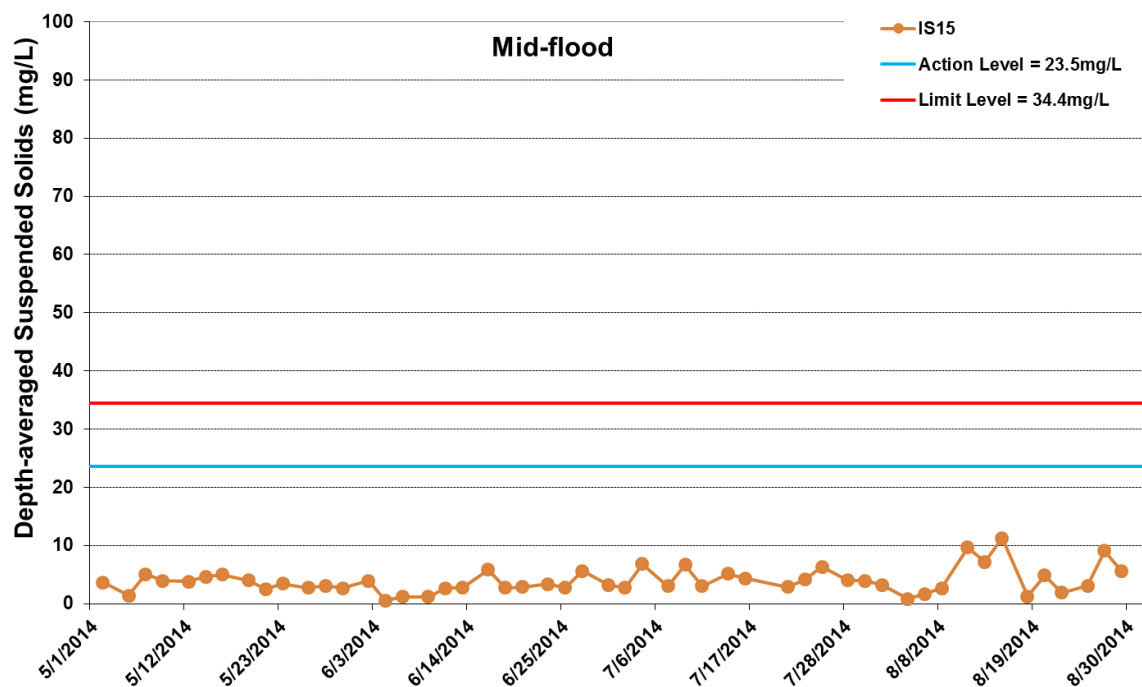
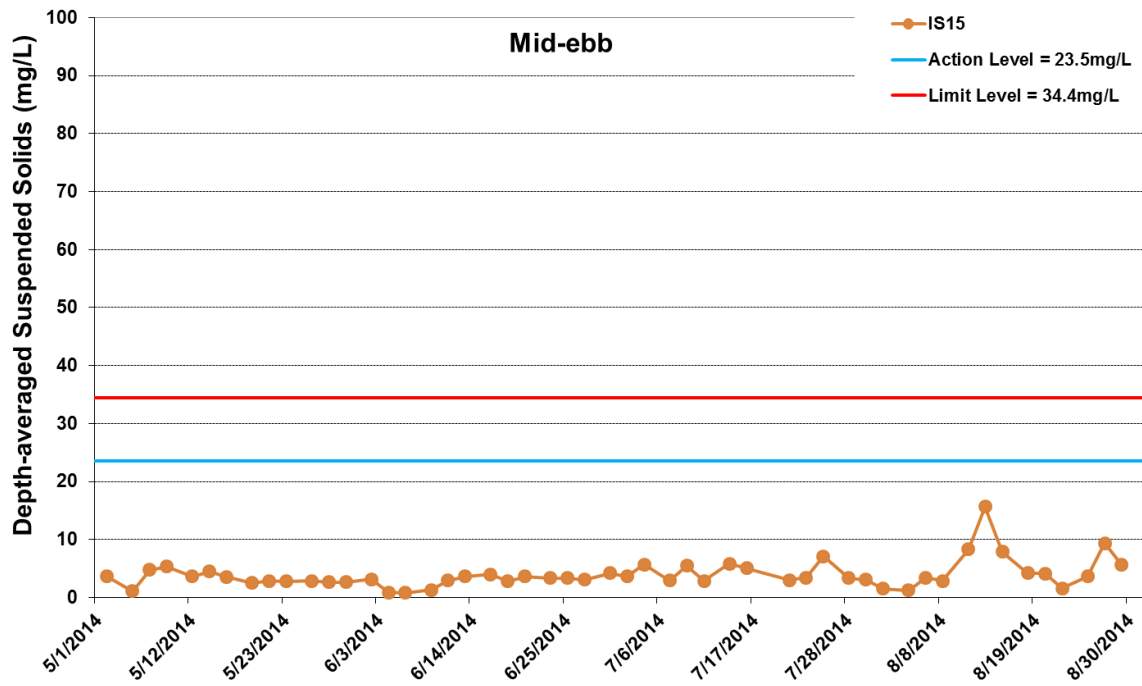


Figure G40 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at IS15. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 – 8/6/2014); Construction of Temporary Seawalls (5/1/2013 – 8/31/2014); Sheet Piling (5/1/2014 – 8/31/2014); Filling (5/1/2014 – 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



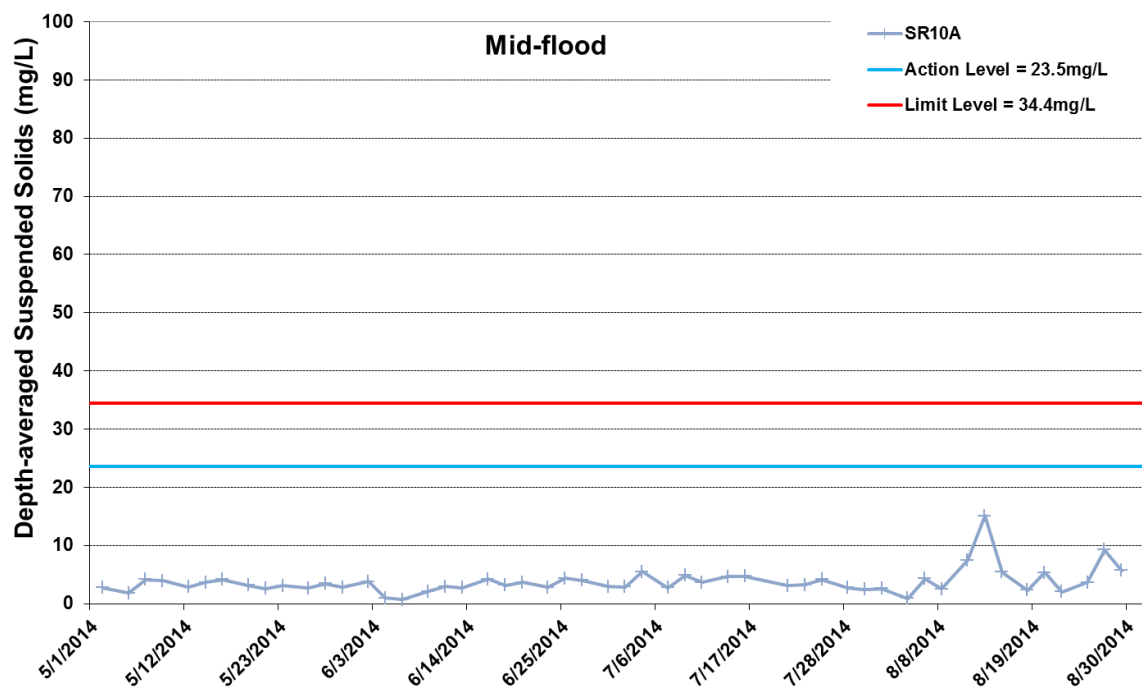
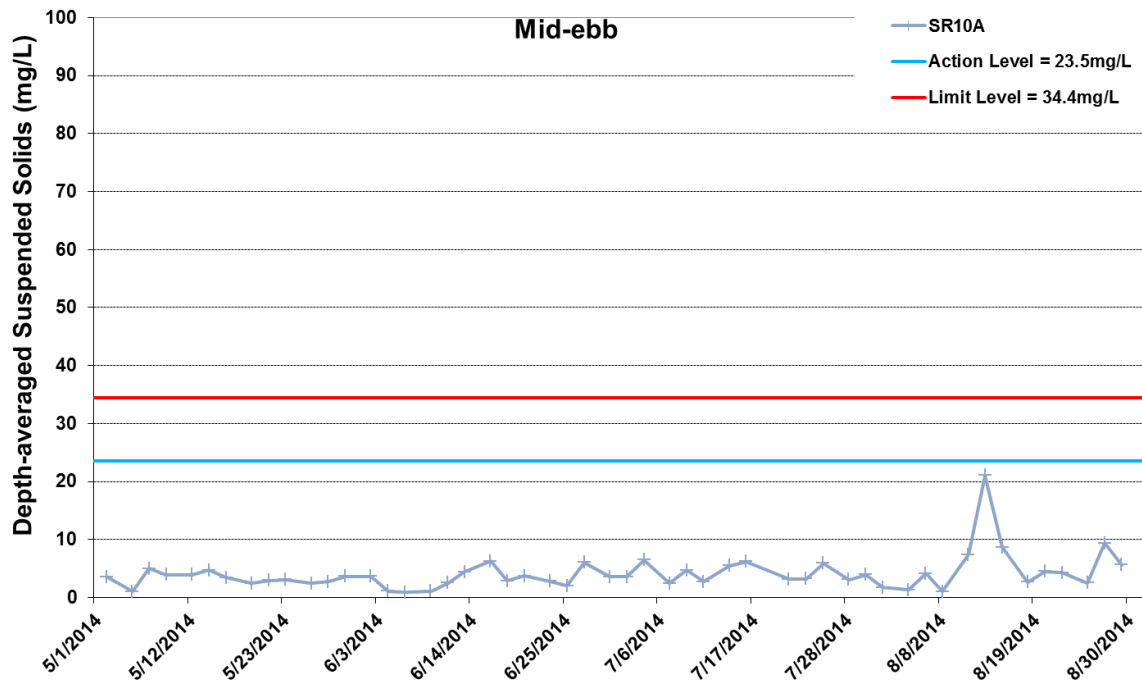


Figure G41 Impact Monitoring – Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at SR10A. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 – 8/6/2014); Construction of Temporary Seawalls (5/1/2013 – 8/31/2014); Sheet Piling (5/1/2014 – 8/31/2014); Filling (5/1/2014 – 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



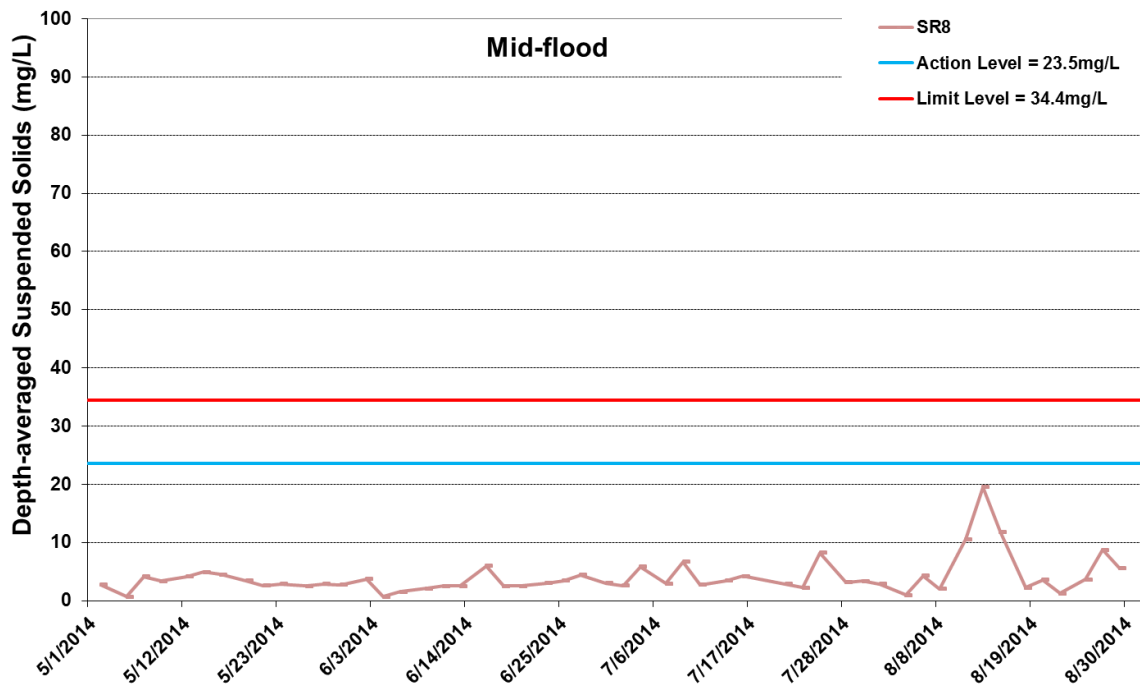
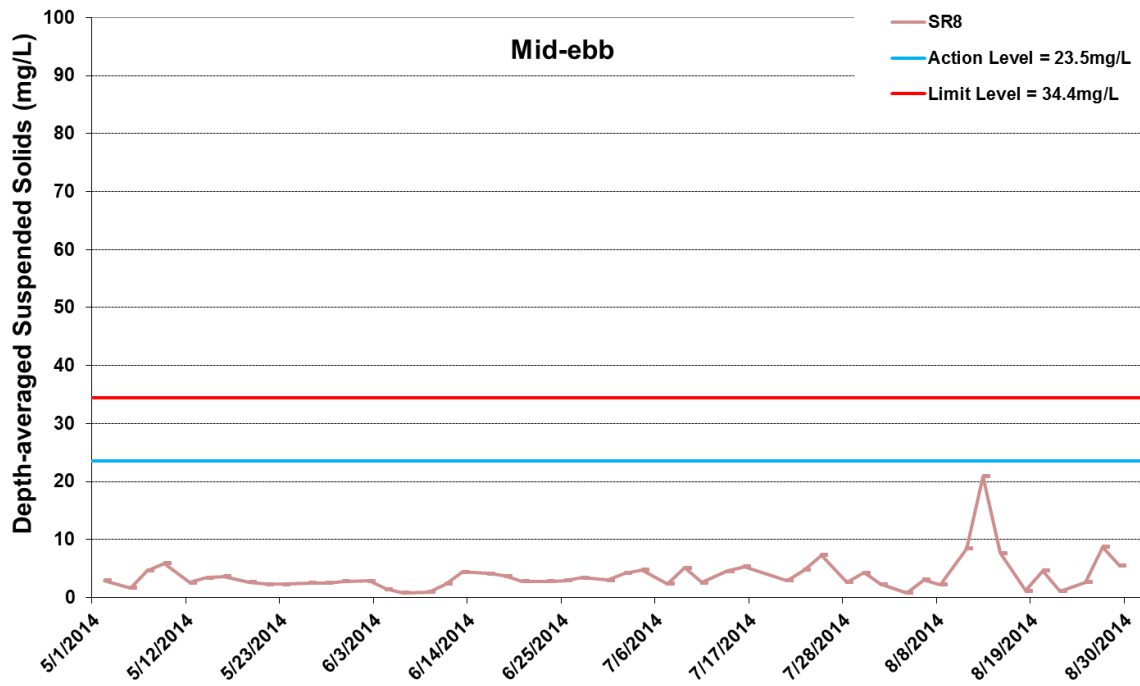


Figure G42 Impact Monitoring - Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at SR8. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



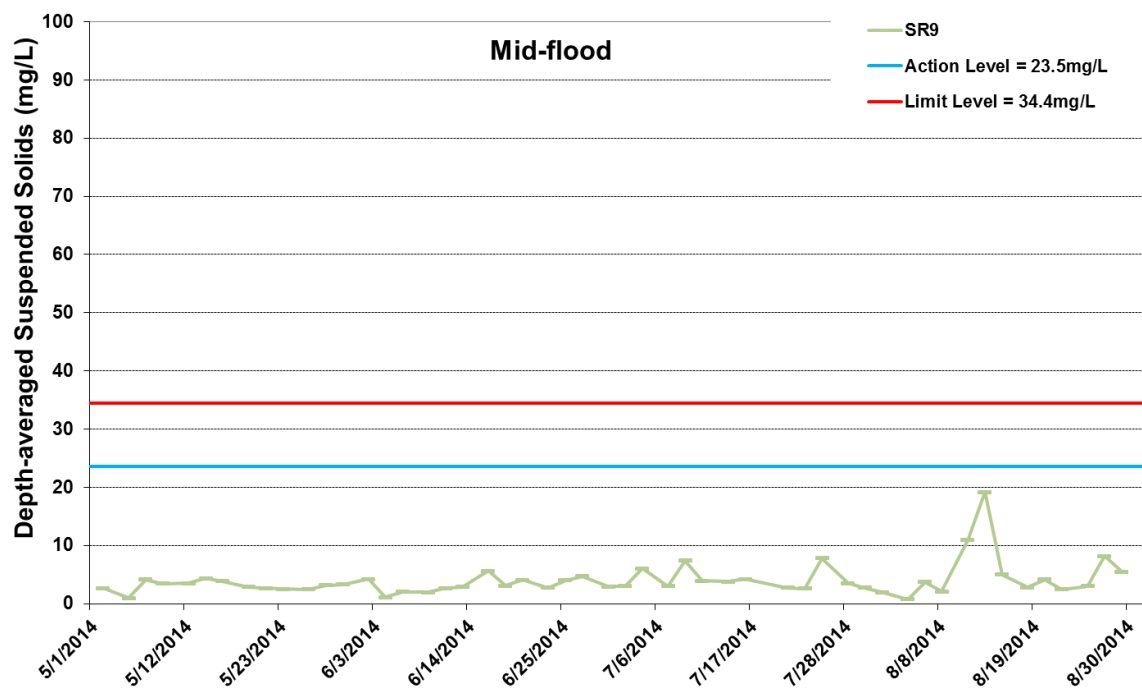
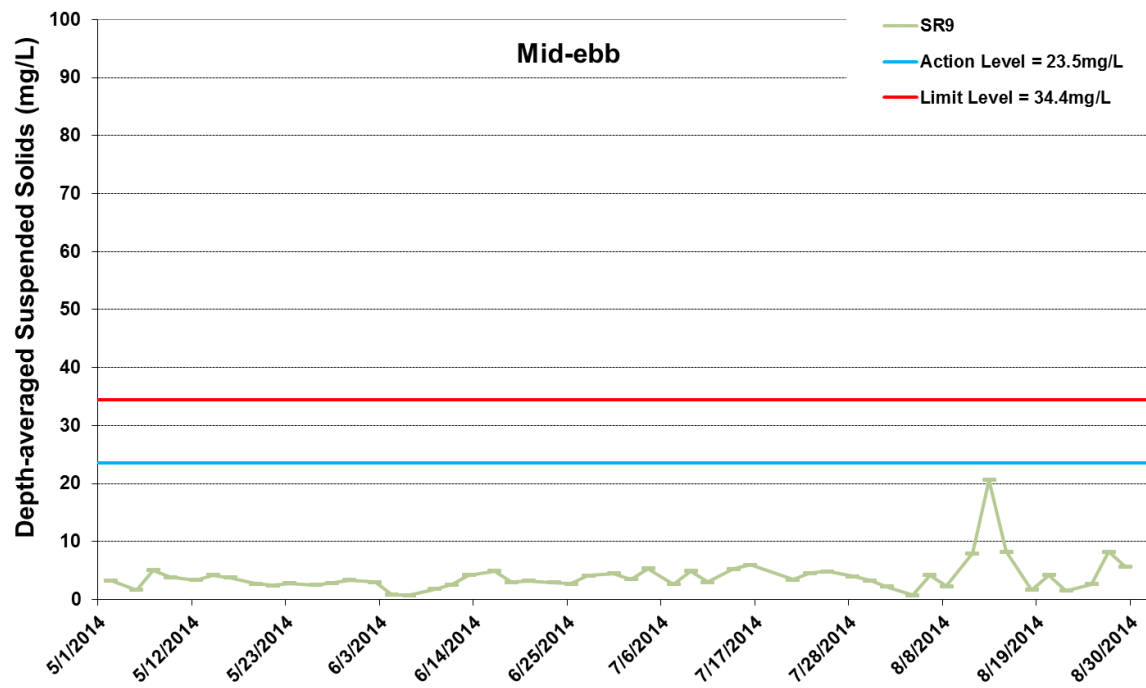


Figure G43 Impact Monitoring - Mean Depth-averaged Level of Suspended Solids (mg/L) between 1 May 2014 and 31 August 2014 at SR9. The weather conditions during the monitoring period varied mostly from sunny to cloudy. Major marine construction activities included: Dredging (5/1/2014 - 8/6/2014); Construction of Temporary Seawalls (5/1/2013 - 8/31/2014); Sheet Piling (5/1/2014 - 8/31/2014); Filling (5/1/2014 - 8/31/2014). No monitoring was conducted on 18 July 2014 due to adverse weather condition.



Appendix H

Impact Dolphin Monitoring Survey

CONTRACT NO. HY/2012/08

**Hong Kong-Zhuhai-Macao Bridge Tuen Mun – Chek Lap Kok Link
(Northern Connection Sub-sea Tunnel Section)
Dolphin Quarterly Monitoring**

*3rd Quarterly Progress Report (June-August 2014)
submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.*

Submitted by
Samuel K.Y. Hung, Ph.D., Hong Kong Cetacean Research Project

27 October 2014

1. Introduction

- 1.1. As part of the Hong Kong-Zhuhai-Macao Bridge, the Tuen Mun-Chek Lap Kok Link (TM-CLKL) Northern Connection Sub-sea Tunnel Section (Contract no. HY/2012/08) comprises the sub-sea TBM tunnels (two tubes with cross passages) across the Urmston Road to connect Tuen Area 40 and Hong Kong Boundary Crossing Facilities (HKBCF) of approximately 4 km in length with dual 2-lane carriageway, the tunnels at both the southern landfall and the northern landfall for construction of approach roads to the sub-sea TBM tunnels of approximately 1.5 km in length, as well as the northern landfall reclamation of approximately 16.5 hectares and about 20.km long seawalls. Dragages – Bouygues Joint Venture (hereinafter called the “Contractor”) was awarded as the main contractor for the Northern Connection Sub-sea Tunnel Section, and ERM Hong Kong Limited would serve as the Environmental Team to implement the Environmental Monitoring and Audit (EM&A) programme.
- 1.2. According to the updated EM&A Manual (for TM-CLKL), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the Northwest (NWL) and Northeast Lantau (NEL) survey areas as in AFCD annual marine mammal monitoring programme. However, as such surveys have been undertaken by the HKLR03 and HKBCF projects in the same areas (i.e. NWL and NEL), a combined monitoring approach is recommended by the Highways Department, that the TM-CLKL EM&A project can utilize the monitoring data collected by HKLR03 or HKBCF project to avoid any redundancy in monitoring effort. Such exemption for the dolphin monitoring will end upon the completion of the dolphin monitoring carried out by HKLR03 contract.
- 1.3. In November 2013, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by ERM Hong Kong Limited as the dolphin specialist for the TM-CLKL Northern Connection Sub-sea Tunnel Section EM&A project. He is responsible for the dolphin monitoring study, including the data collection on Chinese White

Dolphins during the construction phase (i.e. impact period) of the TM-CLKL project in Northwest Lantau (NWL) and Northeast Lantau (NEL) survey areas.

- 1.4. During the construction period of HKLR, the dolphin specialist would be in charge of reviewing and collating information collected by HKLR03 dolphin monitoring programme to examine any potential impacts of TM-CLKL construction works on the dolphins.
- 1.5. From the monitoring results, any changes in dolphin occurrence within the study area will be examined for possible causes, and appropriate actions and additional mitigation measures will be recommended as necessary.
- 1.6. This report is the second quarterly progress report under the TM-CLKL construction phase dolphin monitoring programme submitted to the Contractor, summarizing the results of the surveys findings during the period of June to August 2014 utilizing the survey data collected by HKLR03 project.

2. Monitoring Methodology

2.1. Vessel-based Line-transect Survey

- 2.1.1. According to the requirement of the updated EM&A manual, dolphin monitoring programme should cover all transect lines in NEL and NWL survey areas (see Figure 1) twice per month throughout the entire construction period. The co-ordinates of all transect lines conducted during the HKLR03 dolphin monitoring surveys are shown in Table 1.

Table 1 Co-ordinates of transect lines conducted by HKLR03 project

Line No.	Easting	Northing		Line No.	Easting	Northing	
1	Start Point	804671	814577	13	Start Point	816506	819480
1	End Point	804671	831404	13	End Point	816506	824859
2	Start Point	805475	815457	14	Start Point	817537	820220
2	End Point	805477	826654	14	End Point	817537	824613
3	Start Point	806464	819435	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	819771	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	820220	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	820466	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761
7	Start Point	810499	820690	19	Start Point	822513	823268
7	End Point	810499	824613	19	End Point	822513	824321

8	Start Point	811508	820847		20	Start Point	823477	823402
8	End Point	811508	824254		20	End Point	823477	824613
9	Start Point	812516	820892		21	Start Point	805476	827081
9	End Point	812516	824254		21	End Point	805476	830562
10	Start Point	813525	820872		22	Start Point	806464	824033
10	End Point	813525	824657		22	End Point	806464	829598
11	Start Point	814556	818449		23	Start Point	814559	821739
11	End Point	814556	820992		23	End Point	814559	824768
12	Start Point	815542	818807					
12	End Point	815542	824882					

- 2.1.2. The HKLR03 survey team used standard line-transect methods (Buckland et al. 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 16 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2013, 2014). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.
- 2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.
- 2.1.4. During on-effort survey periods, the survey team recorded effort data including time, positions (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend*).
- 2.1.5. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.
- 2.1.6. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.

2.1.7. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as “primary” survey effort, while the survey effort conducted along the connecting lines between parallel lines was labeled as “secondary” survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, both primary and secondary survey effort were presented as on-effort survey effort in this report.

2.2. Photo-identification Work

- 2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the HKLR03 survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.
- 2.2.2. A professional digital camera (*Canon EOS 7D* or *60D* model), equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.
- 2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.
- 2.2.4. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000).
- 2.2.5. All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

2.3. Data Analysis

- 2.3.1. Distribution Analysis – The line-transect survey data was integrated with the Geographic Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin distribution using sighting positions. Location data of dolphin groups were plotted on map layers of Hong Kong using a desktop GIS (ArcView[®] 3.1) to examine their distribution patterns in details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, young calves and activities.

2.3.2. Encounter rate analysis – Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort, and total number of dolphins sighted on-effort per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collect under Beaufort 3 or below condition would be used for the encounter rate analyses. Dolphin encounter rates were calculated in two ways for comparisons with the HZMB baseline monitoring results as well as to AFCD long-term marine mammal monitoring results.

Firstly, for the comparison with the HZMB baseline monitoring results, the encounter rates were calculated using primary survey effort alone. The average encounter rate of sightings (STG) and average encounter rate of dolphins (ANI) were deduced based on the encounter rates from six events during the present quarter (i.e. six sets of line-transect surveys in North Lantau), which was also compared with the one deduced from the six events during the baseline period (i.e. six sets of line-transect surveys in North Lantau).

Secondly, the encounter rates were calculated using both primary and secondary survey effort collected under Beaufort 3 or below condition as in AFCD long-term monitoring study. The encounter rate of sightings and dolphins were deduced by dividing the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the quarterly period of June to August 2014.

2.3.3. Quantitative grid analysis on habitat use – To conduct quantitative grid analysis of habitat use, positions of on-effort sightings of Chinese White Dolphins collected during the quarterly impact phase monitoring period were plotted onto 1-km² grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km²) and dolphin densities (total number of dolphins from on-effort sightings per km²) were then calculated for each 1 km by 1 km grid with the aid of GIS. Sighting density grids and dolphin density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin density of each grid were then normalized (i.e. divided by the unit of survey effort).

The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort sightings per 100 units of survey effort. In addition, the derived unit for actual dolphin density was termed DPSE, representing the number of dolphins per 100 units of survey effort. Among the 1-km² grids that were partially covered by land, the percentage of sea area was calculated using GIS tools, and their SPSE and DPSE values were adjusted accordingly. The following formulae were used to estimate SPSE and DPSE in each 1-km² grid within the study area:

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

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

where S = total number of on-effort sightings
D = total number of dolphins from on-effort sightings
E = total number of units of survey effort
SA% = percentage of sea area

- 2.3.4. Behavioural analysis – When dolphins were sighted during vessel surveys, their behaviour was observed. Different activities were categorized (i.e. feeding, socializing, traveling, and milling/resting) and recorded on sighting datasheets. This data was then input into a separate database with sighting information, which can be used to determine the distribution of behavioural data with a desktop GIS. Distribution of sightings of dolphins engaged in different activities and behaviours would then be plotted on GIS and carefully examined to identify important areas for different activities of the dolphins.
- 2.3.5. Ranging pattern analysis – Location data of individual dolphins that occurred during the 3-month impact phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, was loaded as an extension with ArcView[®] 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level.

3. Monitoring Results

3.1. Summary of survey effort and dolphin sightings

- 3.1.1. During the period of June to August 2014, six sets of systematic line-transect vessel surveys were conducted under the HKLR03 monitoring works to cover all transect lines in NWL and NEL survey areas twice per month.
- 3.1.2. From these HKLR03 surveys, a total of 894.40 km of survey effort was collected, with 93.6% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility). Among the two areas, 343.21 km and 551.19 km of survey effort were conducted in NEL and NWL survey areas respectively.
- 3.1.3. The total survey effort conducted on primary lines was 647.96 km, while the effort on secondary lines was 246.44 km. Both survey effort conducted on primary and secondary lines were considered as on-effort survey data. Summary table of the survey effort is shown in Appendix I.
- 3.1.4. During the six sets of HKLR03 monitoring surveys from June to August 2014, a total of 28 groups of 96 Chinese White Dolphins were sighted. All except two dolphin sightings were made during on-effort search. Twenty on-effort sightings were made on primary

lines, while another six on-effort sightings were made on secondary lines. In this quarterly period, almost all dolphin groups were sighted in NWL, with the exception of one group of four dolphins being sighted in NEL. Summary table of the dolphin sightings is shown in Appendix II.

3.2. *Distribution*

- 3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys in June to August 2014 is shown in Figure 1. The majority of dolphin sightings were made in the western end of the North Lantau region, with higher concentration within and adjacent to the Sha Chau and Lung Kwu Chau Marine Park (Figure 1). Other dolphin sightings were scattered to the west and northeast of airport platform. The lone sighting made in NEL was located to the north of Yam O at the eastern end of the survey area (Figure 1).
- 3.2.2. Notably, none of the dolphin groups were sighted in the vicinity of TMCLKL northern landfall or southern viaduct section, and the HKLR03/HKBCF reclamation site (Figure 1).
- 3.2.3. Sighting distribution of the present impact phase monitoring period (June to August 2014) was compared to the one during the baseline monitoring period (September to November 2011). In the present quarter, dolphins have mostly avoided the NEL region, which was in stark contrast to their frequent occurrence around the Brothers Islands and in the vicinity of HKBCF reclamation site during the baseline period (Figure 1). The nearly abandonment of NEL region by the dolphins have been consistently recorded in the past six quarters.
- 3.2.4. Dolphin occurrence in the northwestern portion of North Lantau region was somewhat different between the baseline and impact phase quarters. During the present impact monitoring period, there appeared to be much fewer dolphins occurred in the middle portion of North Lantau region than during the baseline period, where dolphins supposedly moved between their core areas around Lung Kwu Chau and the Brothers Islands (Figure 1). Moreover, more dolphins were sighted between Black Point and Lung Kwu Chau during the baseline period than during the present impact monitoring period (Figure 1). A number of dolphin sightings were made to the west of Chek Lap Kok airport (especially near the HKLR09 alignment) during the baseline period, but only two sightings were made there during the present impact phase period.
- 3.2.5. As the baseline monitoring period was in the autumn season while the present monitoring period was in the summer season, a direct comparison in dolphin distribution between the two quarterly periods of summer months in 2013 and 2014 was also made to avoid the potential bias contributed by seasonal variation in distribution (Figure 2).
- 3.2.6. Among the two summer periods, only one dolphin sighting was made in NEL in the summer of 2014, while there were five sightings made there in the summer of 2013. Moreover, a lot more dolphin sightings were made in the middle and western portions of North Lantau waters (especially near Black Point, Pillar Point, to the north of airport platform and near the HKLR09 alignment) in the summer of 2013 than in the summer of 2014.

3.3. Encounter rate

3.3.1. During the present quarterly period, the encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data from the primary transect lines under favourable conditions (Beaufort 3 or below) for each set of the HKLR03 surveys in NEL and NWL are shown in Table 2. The average encounter rates deduced from the six sets of HKLR03 surveys were also compared with the ones deduced from the baseline monitoring period (September – November 2011) (Table 3).

Table 2. Dolphin encounter rates (sightings per 100 km of survey effort) during June – August 2014 deduced from HKLR03 monitoring surveys

SURVEY AREA	HKLR03 DOLPHIN MONITORING DATES	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)
		Primary Lines Only	Primary Lines Only
Northeast Lantau	Set 1 (3 & 5 Jun 2014)	0.00	0.00
	Set 2 (10 & 16 Jun 2014)	0.00	0.00
	Set 3 (3, 9 & 10 Jul 2014)	2.54	10.16
	Set 4 (14 & 21 Jul 2014)	0.00	0.00
	Set 5 (5 & 6 Aug 2014)	0.00	0.00
	Set 6 (15 & 19 Aug 2014)	0.00	0.00
Northwest Lantau	Set 1 (3 & 5 Jun 2014)	1.67	5.00
	Set 2 (10 & 16 Jun 2014)	0.00	0.00
	Set 3 (3, 9 & 10 Jul 2014)	3.03	10.61
	Set 4 (14 & 21 Jul 2014)	8.40	26.60
	Set 5 (5 & 6 Aug 2014)	5.63	22.52
	Set 6 (15 & 19 Aug 2014)	9.70	40.40

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (June – August 2014) and baseline monitoring period (September – November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	June - August 2014	September - November 2011	June - August 2014	September - November 2011
Northeast Lantau	0.42 ± 1.04	6.00 ± 5.05	1.69 ± 4.15	22.19 ± 26.81
Northwest Lantau	4.74 ± 3.84	9.85 ± 5.85	17.52 ± 15.12	44.66 ± 29.85

3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter

rates were also calculated for the present quarter using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 5.04 sightings and 17.54 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were 0.29 sightings and 1.17 dolphins per 100 km of survey effort respectively.

- 3.3.3. In NEL, the average dolphin encounter rates (both STG and ANI) in the present three-month impact monitoring period was only a small fraction of the baseline value (i.e. less than 10%), and such low occurrence of dolphins in NEL have been consistently recorded in the past six quarters (Table 4).

Table 4. Comparison of average dolphin encounter rates in Northeast Lantau survey area from all quarters of impact monitoring period and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)
September-November 2011 (Baseline)	6.00 ± 5.05	22.19 ± 26.81
December 2012-February 2013 (Impact)	3.14 ± 3.21	6.33 ± 8.64
March-May 2013 (Impact)	0.42 ± 1.03	0.42 ± 1.03
June-August 2013 (Impact)	0.88 ± 1.36	3.91 ± 8.36
September-November 2013 (Impact)	1.01 ± 1.59	3.77 ± 6.49
December 2013-February 2014 (Impact)	0.45 ± 1.10	1.34 ± 3.29
March-May 2014 (Impact)	0.00	0.00
June-August 2014 (Impact)	0.42 ± 1.04	1.69 ± 4.15

- 3.3.4. It is a serious concern that dolphin occurrence in NEL in the past six quarters (0.0-1.0 for ER(STG) and 0.0-3.9 for ER(ANI)) have been exceptionally low when compared to the baseline period (Table 4). In fact, the present quarter was the seventh consecutive quarters being accessed that have triggered the Action Level under the Event and Action Plan. As discussed recently in Hung (2014), the dramatic decline in dolphin usage of NEL waters in 2012 and 2013 (including the declines in abundance, encounter rate and habitat use in NEL, as well as shifts of individual core areas and ranges away from NEL waters) was possibly related to the HZMB construction works that were commenced in 2012.
- 3.3.5. Moreover, the average dolphin encounter rates (STG and ANI) in NWL during the present impact phase monitoring period were also much lower (reductions of 52% and 61% respectively) than the ones recorded in the 3-month baseline period, indicating a noticeable decline in dolphin usage of this survey area during the present construction period. In fact, both dolphin encounter rates in summer 2014 have dropped to the lowest since the commencement of the HKLR03 dolphin monitoring (Table 5).

Table 5. Comparison of average dolphin encounter rates in Northwest Lantau survey area from all quarters of impact monitoring period and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)	Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)
September-November 2011 (Baseline)	9.85 ± 5.85	44.66 ± 29.85
December 2012-February 2013 (Impact)	8.36 ± 5.03	35.90 ± 23.10
March-May 2013 (Impact)	7.75 ± 3.96	24.23 ± 18.05
June-August 2013 (Impact)	6.56 ± 3.68	27.00 ± 18.71
September-November 2013 (Impact)	8.04 ± 1.10	32.48 ± 26.51
December 2013-February 2014 (Impact)	8.21 ± 2.21	32.58 ± 11.21
March-May 2014 (Impact)	6.51 ± 3.34	19.14 ± 7.19
June-August 2014 (Impact)	4.74 ± 3.84	17.52 ± 15.12

- 3.3.6. A two-way ANOVA with repeated measures and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline and impact monitoring periods. The two variables that were examined included the two periods (baseline and impact phases) and two locations (NEL and NWL).
- 3.3.7. For the comparison between the baseline period and the present quarter (seventh quarter of the impact phase being assessed), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.0199 and 0.0597 respectively. If the alpha value is set at 0.1, significant difference was detected between the baseline and present quarters in both dolphin encounter rates of STG and ANI.
- 3.3.8. For the comparison between the baseline period and the cumulative quarters in impact phase (i.e. first seven quarters of the impact phase being assessed), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.0037 and 0.0013 respectively. Even if the alpha value is set at 0.01, significant differences were detected in both the average dolphin encounter rates of STG and ANI (i.e. between the two periods and the locations).
- 3.4. *Group size*
- 3.4.1. Group size of Chinese White Dolphins ranged from one to eight individuals per group in North Lantau region during June – August 2014. The average dolphin group sizes from these three months were compared with the ones deduced from the baseline period in September to November 2011, as shown in Table 6.

Table 6. Comparison of average dolphin group sizes from impact monitoring period (June – August 2014) and baseline monitoring period (September – November 2011)

	Average Dolphin Group Size	
	June – August 2014	September – November 2011
Overall	3.43 ± 1.95 (n = 28)	3.72 ± 3.13 (n = 66)
Northeast Lantau	4.00 ± 0.00 (n = 1)	3.18 ± 2.16 (n = 17)
Northwest Lantau	3.41 ± 1.99 (n = 27)	3.92 ± 3.40 (n = 49)

- 3.4.2. The average dolphin group sizes in the entire North Lantau region as well as in NWL waters during June – August 2014 were lower than the ones recorded during the three-month baseline period (Table 6). In fact, 17 of the 28 groups were composed of 1-3 individuals only, while no dolphin group was composed of more than 10 individuals.
- 3.4.3. Distribution of dolphins with larger group sizes (five individuals or more per group) during the present quarter is shown in Figure 3, with comparison to the one in baseline period. During the summer of 2014, distribution of all larger dolphin groups were concentrated within and around the Sha Chau and Lung Kwu Chau Marine Park (Figure 3). This distribution pattern was quite different from the baseline period, when the larger dolphin groups were distributed more evenly in NWL waters with a few more sighted in NEL waters (Figure 3).
- 3.5. *Habitat use*
- 3.5.1. From June to August 2014, the most heavily utilized habitats by Chinese White Dolphins mainly concentrated within and around the marine park area (Figures 4a and 4b). Only one grid in NEL recorded the presence of dolphins. Moreover, all grids near TMCLKL and HKLR09 alignments as well as the HKLR03/HKBCF reclamation sites did not record any presence of dolphins during on-effort search in the present quarterly period.
- 3.5.2. However, it should be emphasized that the amount of survey effort collected in each grid during the three-month period was fairly low (6-12 units of survey effort for most grids), and therefore the habitat use pattern derived from the three-month dataset should be treated with caution. A more complete picture of dolphin habitat use pattern will be presented when more survey effort for each grid will be collected throughout the impact phase monitoring programme.
- 3.5.3. When compared with the habitat use patterns during the baseline period, dolphin usage in NEL was dramatically different from the present impact monitoring period (Figure 5). During the baseline period, nine grids between Siu Mo To and Shum Shui Kok recorded moderately high to high dolphin densities, which was in stark contrast to the very rare occurrence of dolphins during the present impact phase period (Figure 5).
- 3.5.4. The density patterns between the baseline and impact phase monitoring periods were also

different in NWL, with higher dolphin usage near Black Point, as well as between Pillar Point and airport platform during the baseline period (Figure 5).

3.6. *Mother-calf pairs*

- 3.6.1. During the three-month study period, only three unspotted juveniles (UJ) were sighted in NWL survey areas. These young calves comprised of 3.1% of all animals sighted, which was much lower than the percentage recorded during the baseline monitoring period (6.8%).
- 3.6.2. The few young calves were found near Lung Kwu Chau, Sha Chau and Shum Wat (Figure 6), which was very different from their distribution pattern during the baseline period when young calves were sighted throughout the NWL survey area as well as a few sighted in NEL waters. None of these young calves were sighted in the vicinity of the HKLR09/TMCLKL alignments and HKBCF/HKLR03 reclamation sites during the present quarter (Figure 6).

3.7. *Activities and associations with fishing boats*

- 3.7.1. A total of four dolphin sightings were associated with socializing and traveling activities during the three-month study period. Notably, no feeding activity of dolphin was observed during the present quarter, which was in contrast to the relatively high percentage of feeding activities recorded during the baseline period (11.6%). On the contrary, the percentage of socializing activities during the present impact phase monitoring period (7.1%) was slightly higher than the one recorded during the baseline period (5.4%).
- 3.7.2. Distribution of dolphins engaged in socializing and traveling activities during the present three-month period is shown in Figure 7. The two sightings associated with socializing activities occurred near Sha Chau, while the two sightings associated with traveling activities were found adjacent to Lung Kwu Chau (Figure 7). Distribution of dolphin sightings associated with these activities during the impact phase was drastically different from the distribution pattern of these activities during the baseline period (Figure 7).
- 3.7.3. During the three-month period, none of the 28 dolphin groups was found to be associated with an operating fishing vessels in North Lantau waters. The rare events of fishing boat association in the present and previous quarters were consistently found, and were likely related to the recent trawl ban being implemented in December 2012 in Hong Kong waters.

3.8. *Summary of photo-identification works*

- 3.8.1. From June to August 2014, over 2,000 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.
- 3.8.2. In total, 32 individuals sighted 44 times altogether were identified (see summary table in Appendix III and photographs of identified individuals in Appendix IV). All except four of these re-sightings were made in NWL. Four individuals (NL123, NL139, NL261 and NL285) were sighted once during the lone sighting made in NEL in the present quarter.

- 3.8.3. Almost all identified individuals were sighted only once or twice during the three-month period, with the exception of one individual (NL272) being sighted thrice.
- 3.8.4. Notably, 11 of these 32 individuals were also sighted in West Lantau waters during the HKLR09 monitoring surveys during the same three-month period, showing their extensive movement between North and West Lantau regions. In particular, two individuals (NL139 and NL261) were sighted in both NEL and WL during the same quarter.
- 3.8.5. Six well-recognized females (NL93, NL104, NL123, NL145, NL202 and WL124) were accompanied with their calves during their re-sightings. Most of these mothers were frequently sighted with their calves throughout the HKLR03 impact phase monitoring period since October 2012.
- 3.9. *Individual range use*
- 3.9.1. Ranging patterns of the 32 individuals identified during the three-month study period were determined by fixed kernel method, and are shown in Appendix V.
- 3.9.2. With the exception of a few individuals, most identified dolphins sighted in this quarter were utilizing their range use in NWL (and some also in WL), but have avoided the NEL waters where many of them have utilized as their core areas in the past (Appendix V). This is in contrary to the extensive movements between NEL and NWL survey areas observed in the earlier impact monitoring quarters as well as during the baseline period.
- 3.9.3. For many individuals that have previously utilized the Brothers Islands as their major core area of activities, they have apparently shifted their range use away from this important habitat (e.g. NL93, NL123, NL136, NL261; Appendix V). Such shifts of range use and core area use were also documented by Hung (2014), as well as in the past monitoring quarters in 2013 and 2014 under the present study.

4. Conclusion

- 4.1. During this quarter of dolphin monitoring, no adverse impact from the activities of the TMCLKL construction project on Chinese White Dolphins was noticeable from general observations.
- 4.2. Although the dolphins infrequently occurred along the alignment of TMCLKL northern connection sub-sea tunnel section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL, and many individuals have shifted away from the important habitat around the Brothers Islands.
- 4.3. It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the HZMB-related works, and whether suitable mitigation measure can be applied to revert the situation.

5. References

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- Hung, S. K. 2013. Monitoring of Marine Mammals in Hong Kong waters: final report (2012-13). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department, 168 pp.
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- Jefferson, T. A. 2000. Population biology of the Indo-Pacific hump-backed dolphin in Hong Kong waters. Wildlife Monographs 144:1-65.

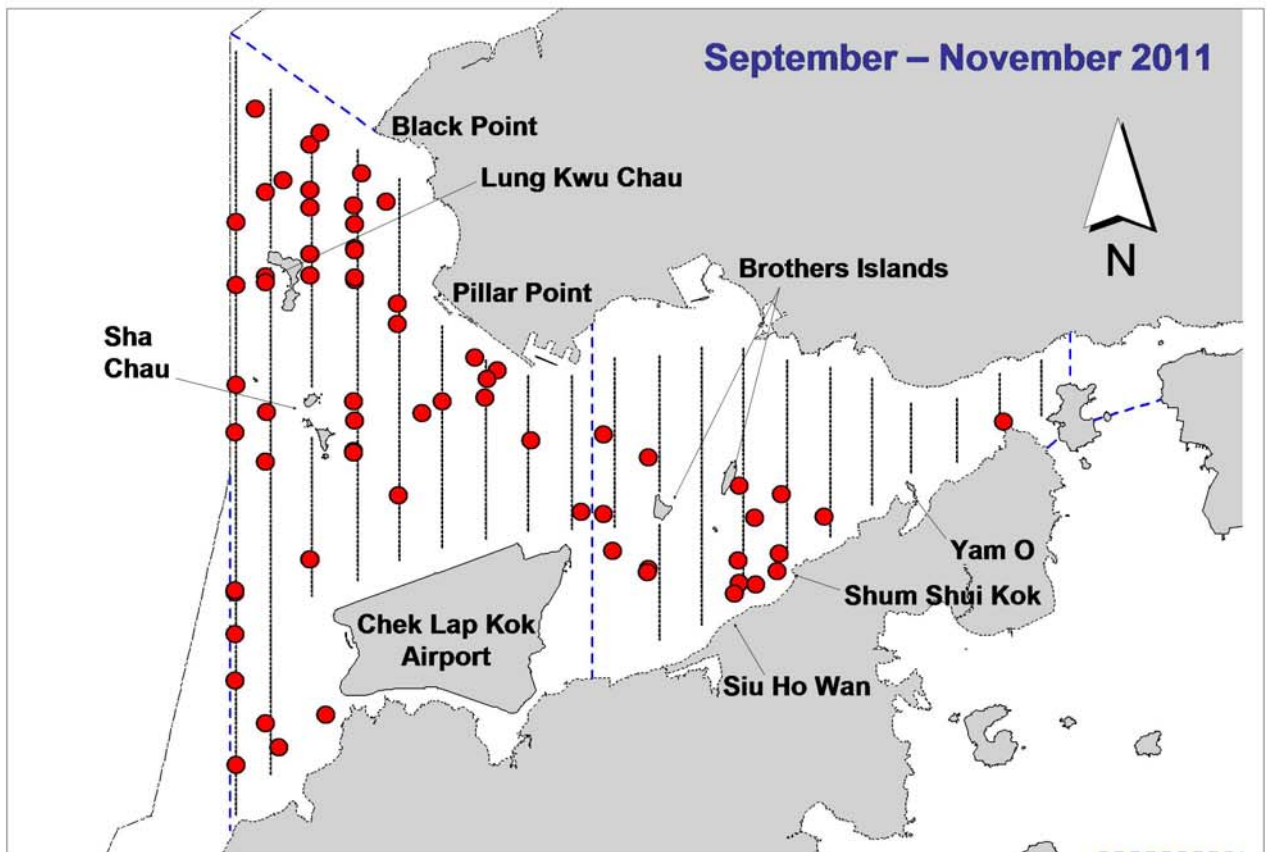
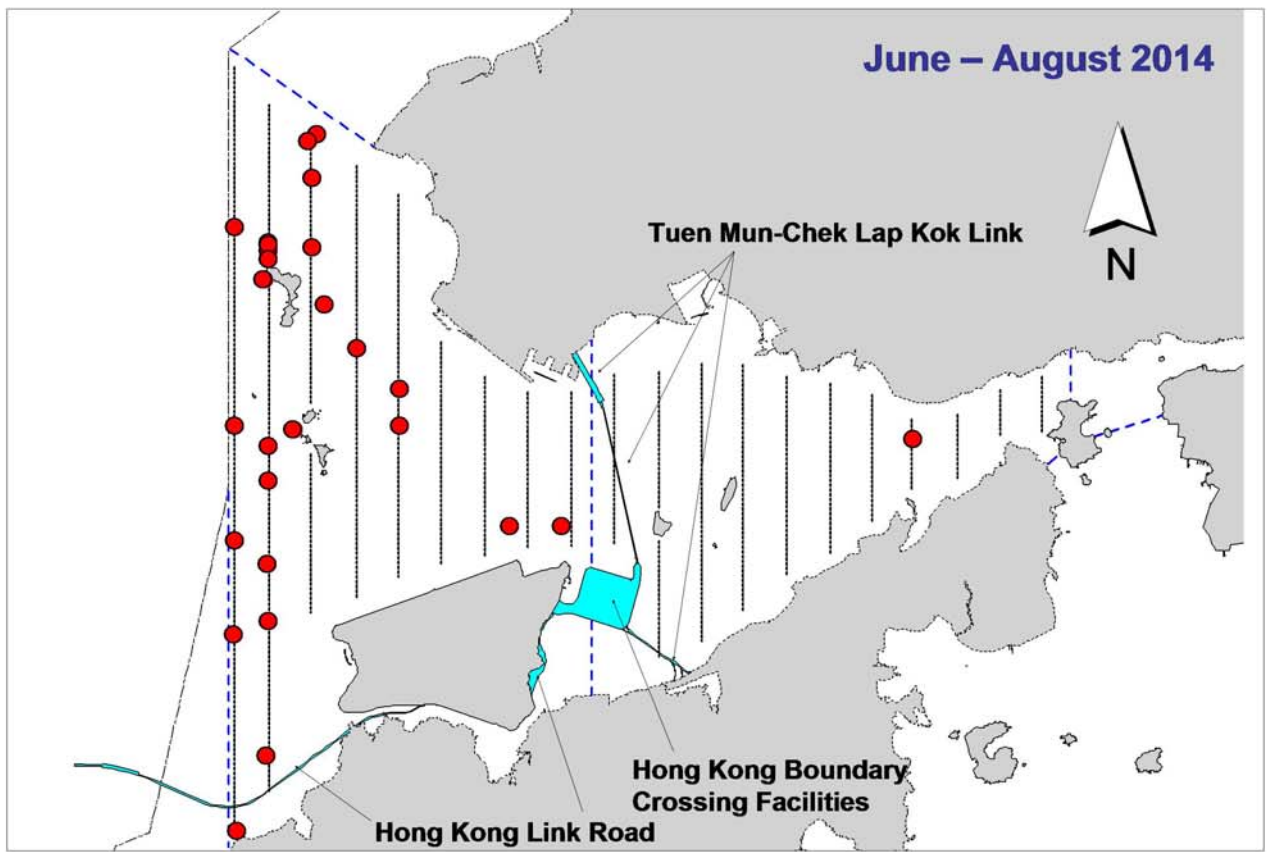


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

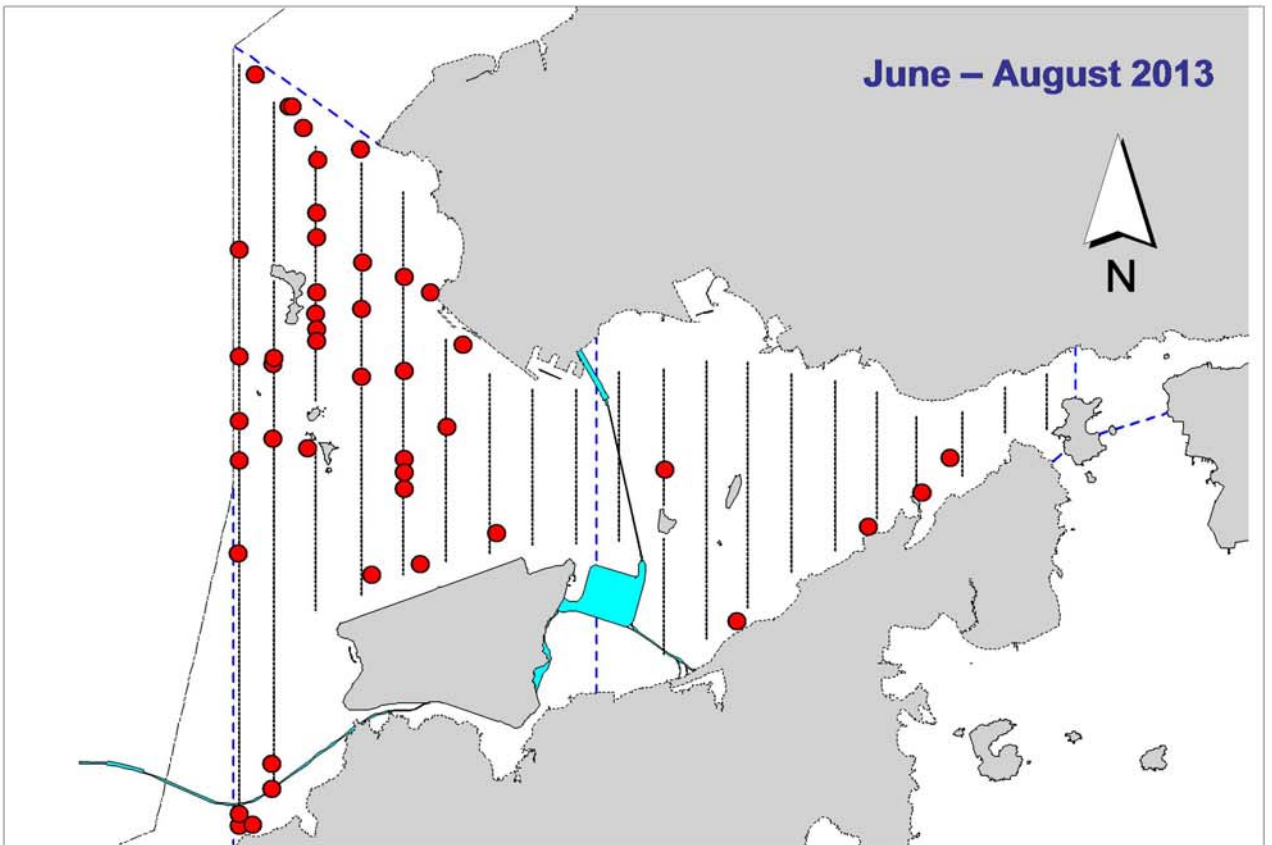
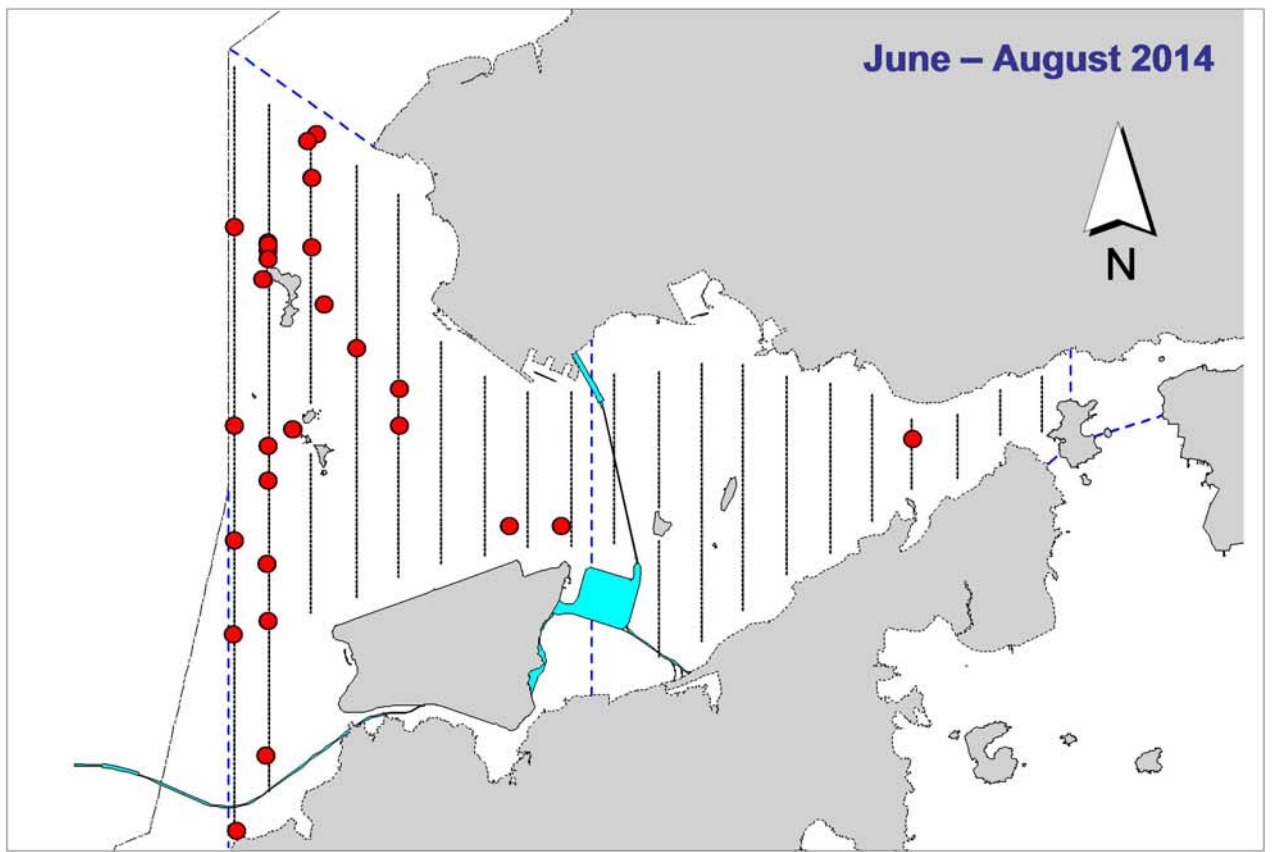


Figure 2. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during the same summer quarters of HKLR03 impact phase in 2014 (top) and 2013 (bottom)

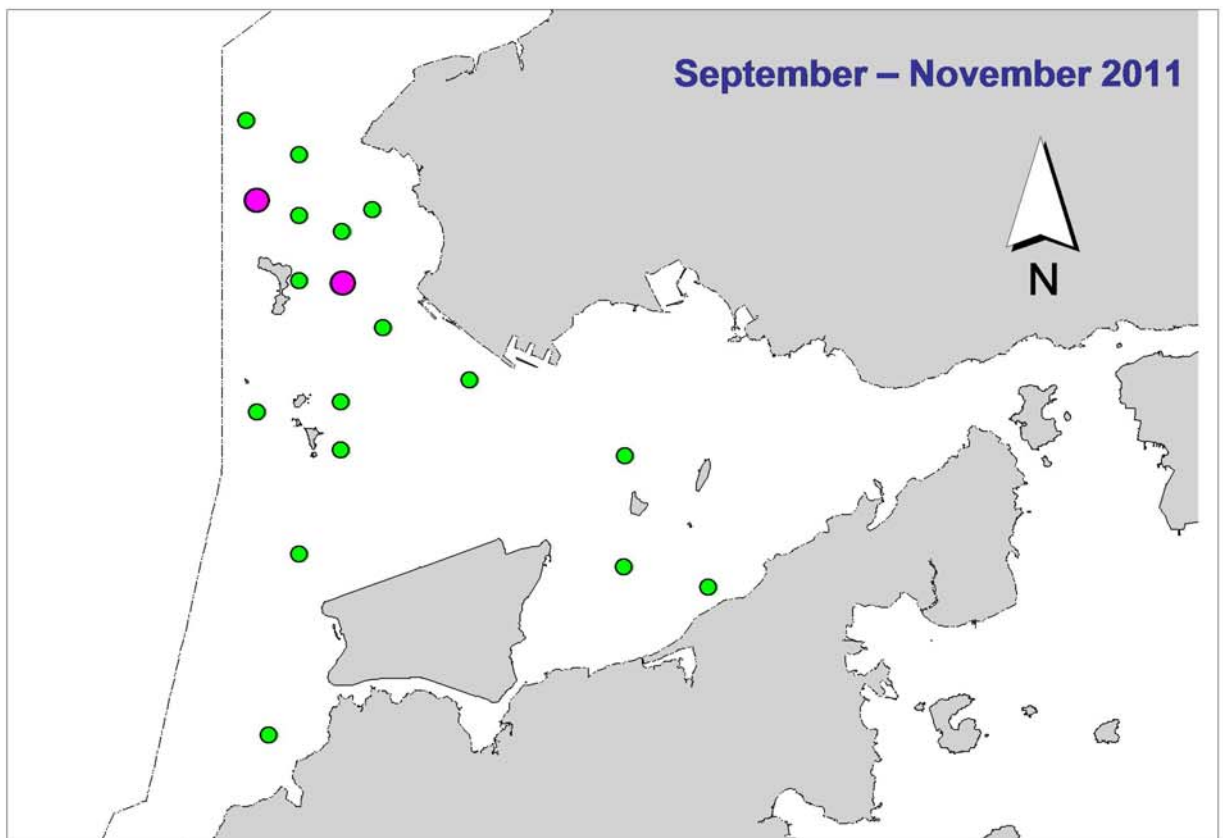
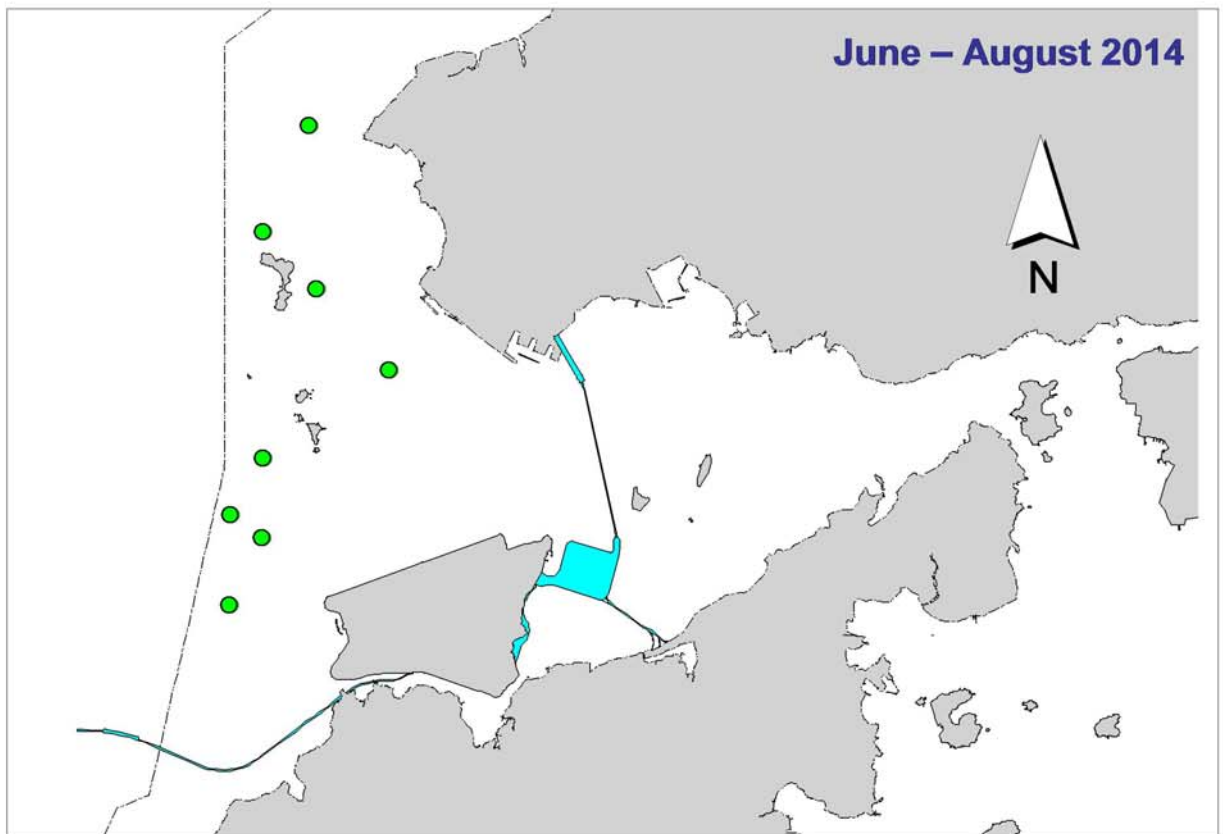


Figure 3. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top) and baseline monitoring surveys (bottom) (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

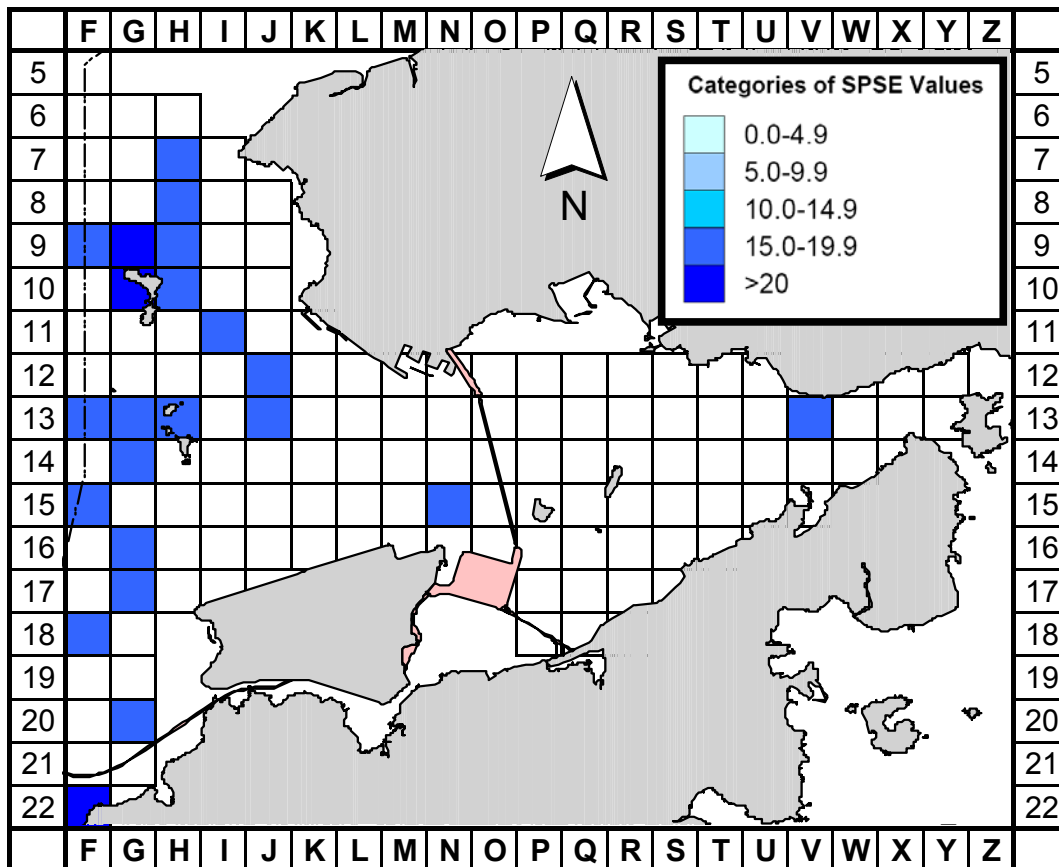


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km² in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Jun-Aug 14) (SPSE = no. of on-effort sightings per 100 units of survey effort)

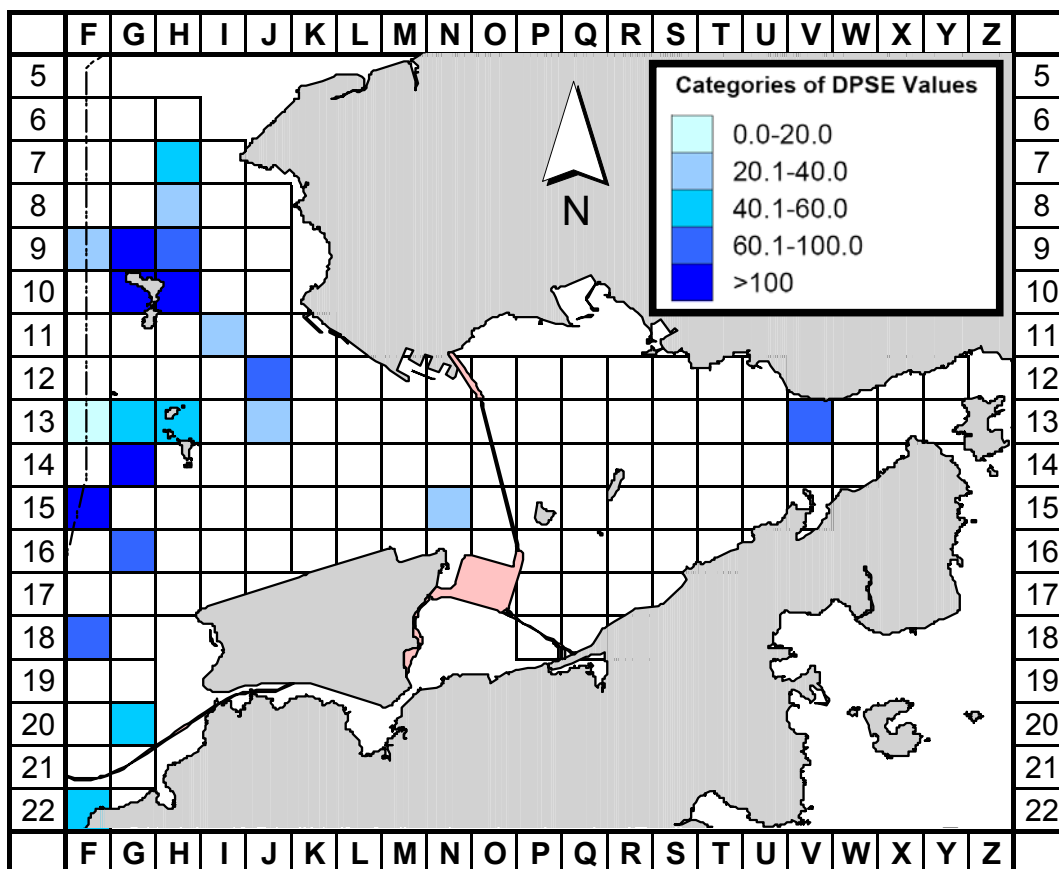


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km² in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Jun-Aug 14) (DPSE = no. of dolphins per 100 units of survey effort)

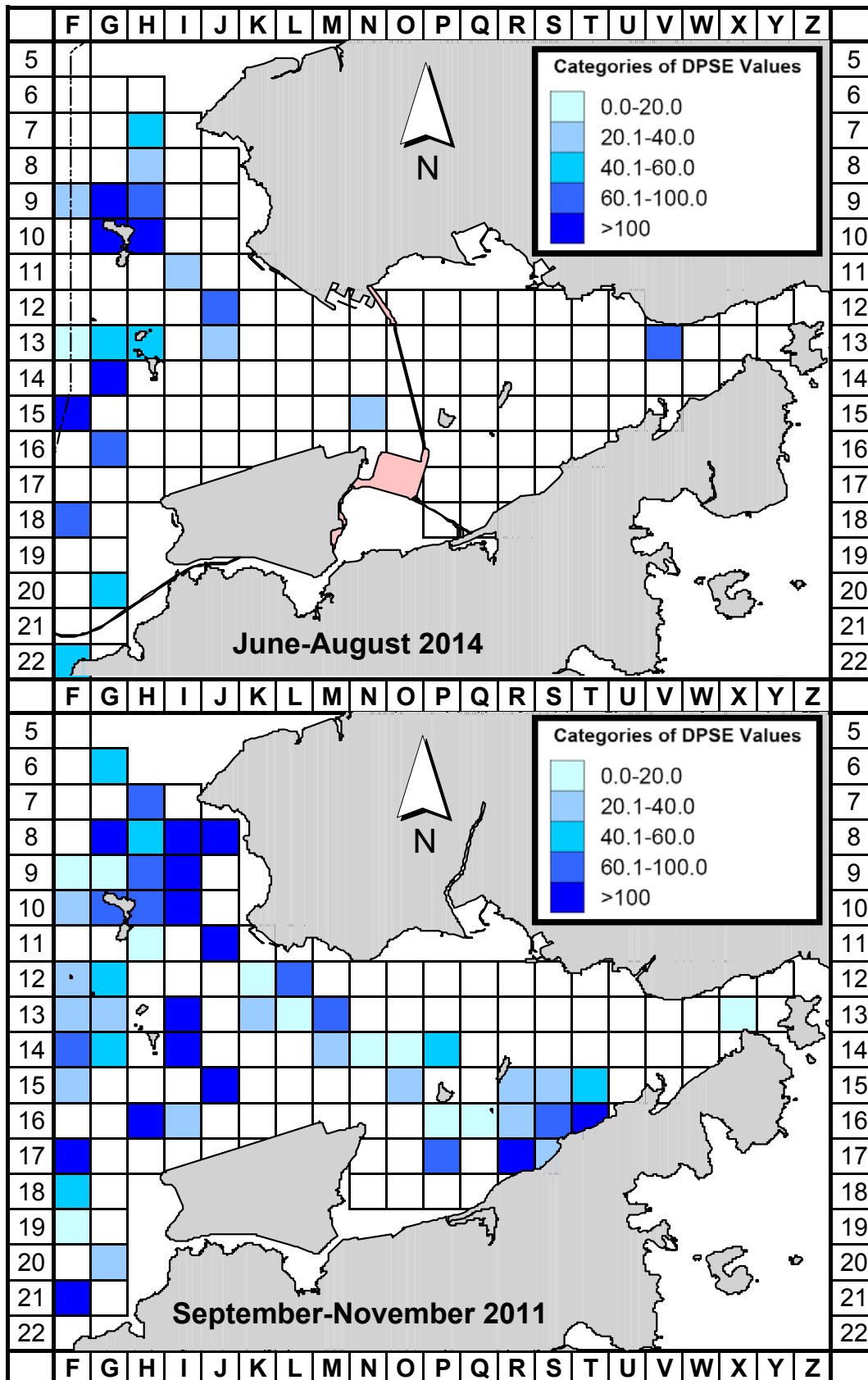


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km² in Northwest and Northeast Lantau survey area between the impact monitoring period (June-August 2014) and baseline monitoring period (September-November 2011) (DPSE = no. of dolphins per 100 units of survey effort)

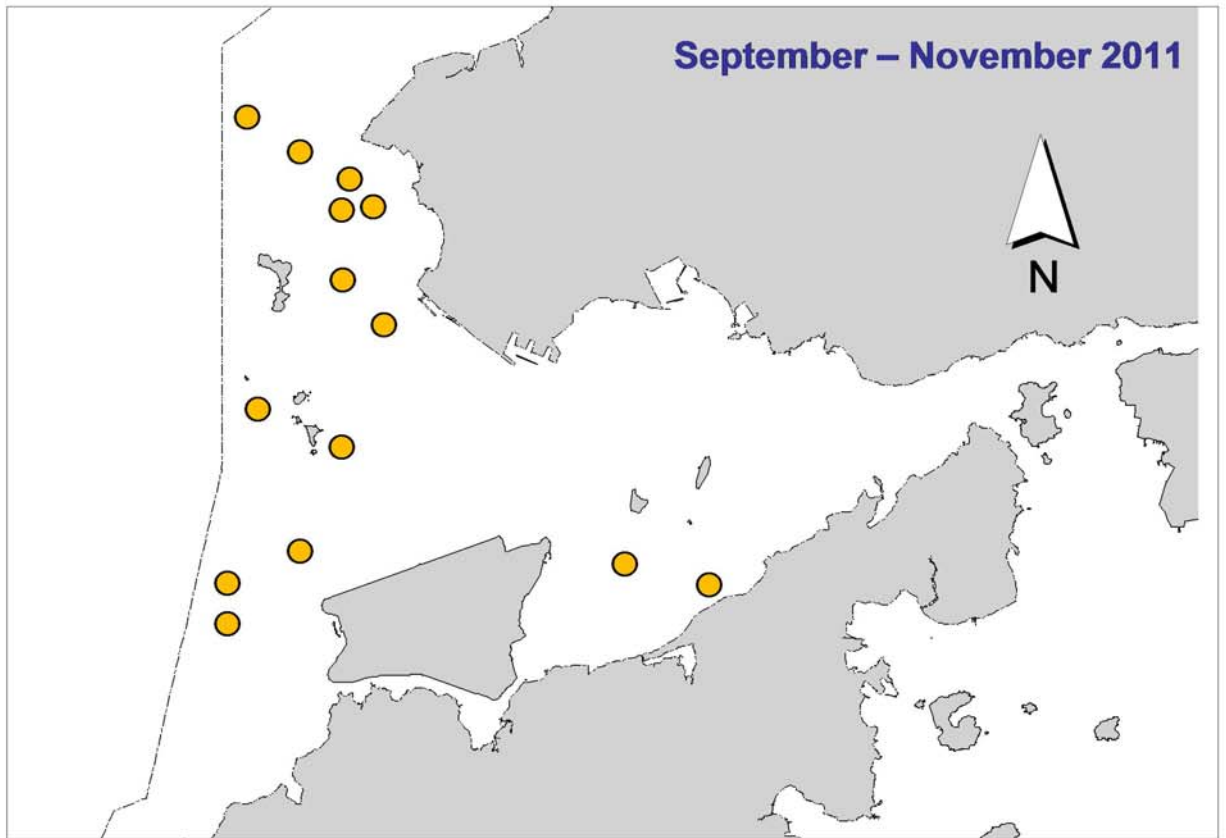
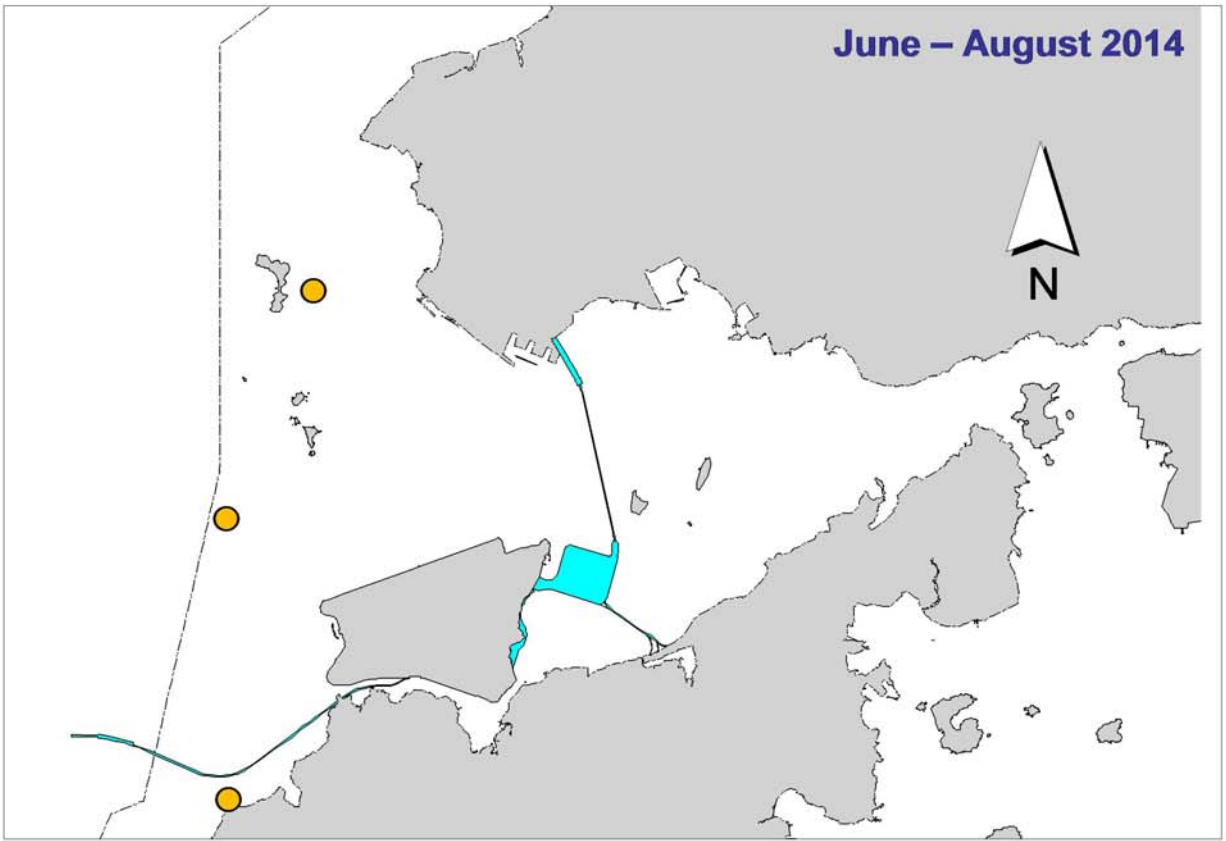


Figure 6. Distribution of young calves of Chinese white dolphins during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

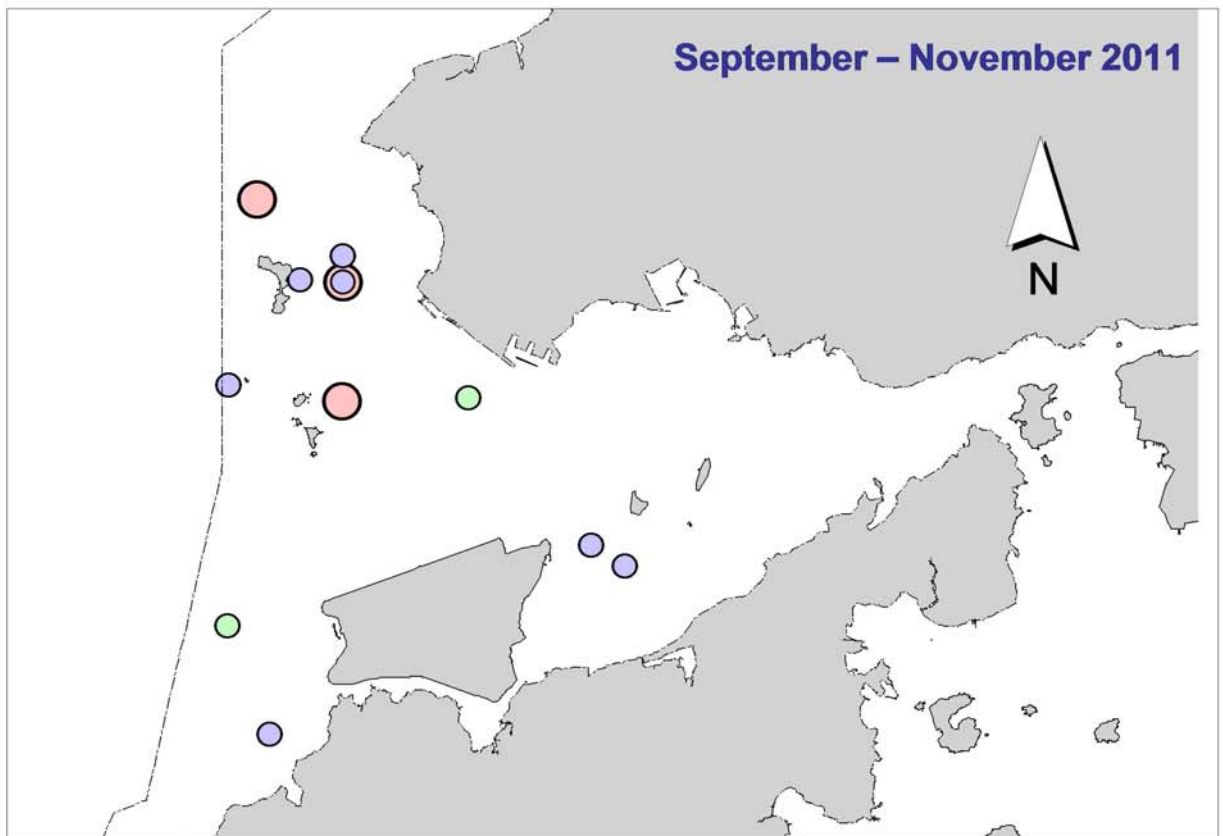
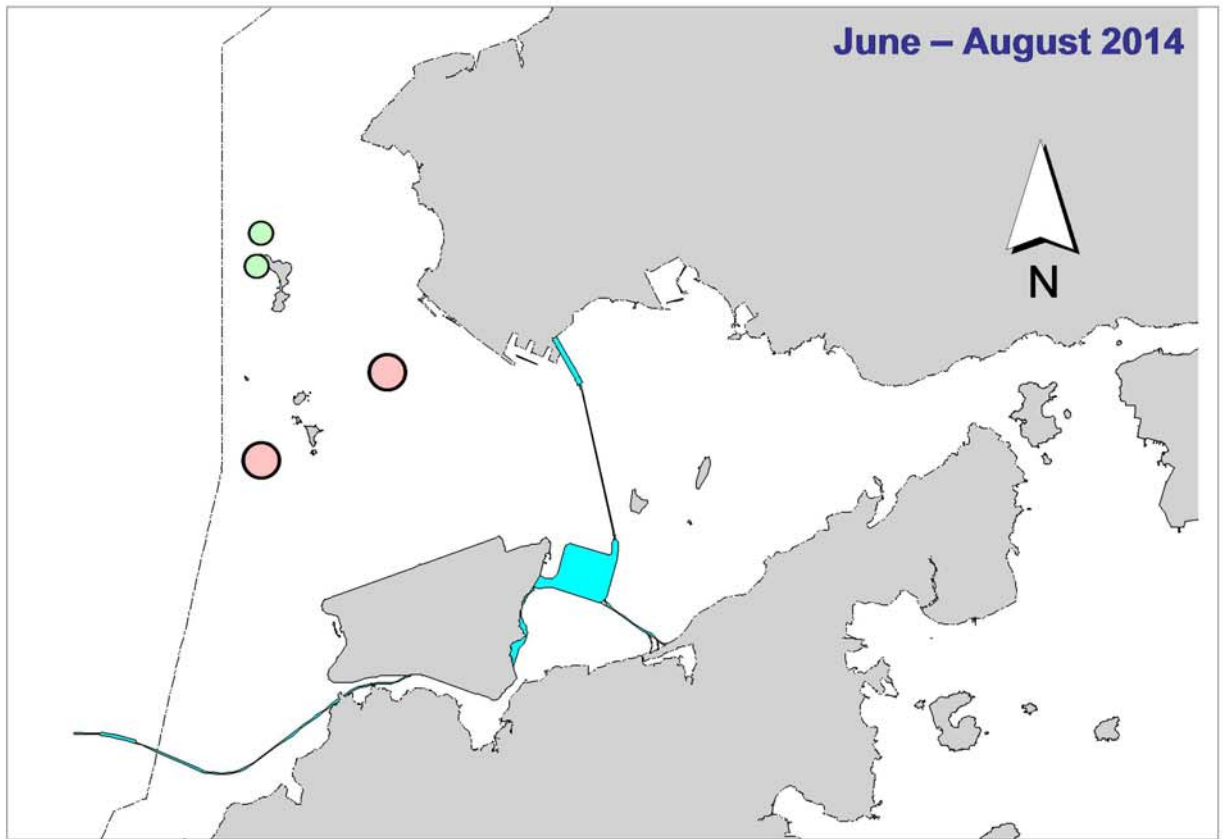


Figure 7. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

Appendix I. HKLR03 Survey Effort Database (June-August 2014)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
3-Jun-14	NE LANTAU	2	14.31	SUMMER	STANDARD31516	HKLR	P
3-Jun-14	NE LANTAU	3	2.60	SUMMER	STANDARD31516	HKLR	P
3-Jun-14	NE LANTAU	2	10.89	SUMMER	STANDARD31516	HKLR	S
3-Jun-14	NW LANTAU	2	6.52	SUMMER	STANDARD31516	HKLR	P
3-Jun-14	NW LANTAU	3	23.00	SUMMER	STANDARD31516	HKLR	P
3-Jun-14	NW LANTAU	4	10.70	SUMMER	STANDARD31516	HKLR	P
3-Jun-14	NW LANTAU	2	3.78	SUMMER	STANDARD31516	HKLR	S
3-Jun-14	NW LANTAU	3	9.70	SUMMER	STANDARD31516	HKLR	S
5-Jun-14	NE LANTAU	1	5.65	SUMMER	STANDARD31516	HKLR	P
5-Jun-14	NE LANTAU	2	10.52	SUMMER	STANDARD31516	HKLR	P
5-Jun-14	NE LANTAU	3	4.20	SUMMER	STANDARD31516	HKLR	P
5-Jun-14	NE LANTAU	1	2.20	SUMMER	STANDARD31516	HKLR	S
5-Jun-14	NE LANTAU	2	6.23	SUMMER	STANDARD31516	HKLR	S
5-Jun-14	NE LANTAU	3	2.10	SUMMER	STANDARD31516	HKLR	S
5-Jun-14	NW LANTAU	2	13.90	SUMMER	STANDARD31516	HKLR	P
5-Jun-14	NW LANTAU	3	16.56	SUMMER	STANDARD31516	HKLR	P
5-Jun-14	NW LANTAU	2	3.70	SUMMER	STANDARD31516	HKLR	S
5-Jun-14	NW LANTAU	3	3.61	SUMMER	STANDARD31516	HKLR	S
10-Jun-14	NW LANTAU	2	6.21	SUMMER	STANDARD31516	HKLR	P
10-Jun-14	NW LANTAU	3	31.70	SUMMER	STANDARD31516	HKLR	P
10-Jun-14	NW LANTAU	4	2.50	SUMMER	STANDARD31516	HKLR	P
10-Jun-14	NW LANTAU	2	9.29	SUMMER	STANDARD31516	HKLR	S
10-Jun-14	NW LANTAU	3	4.10	SUMMER	STANDARD31516	HKLR	S
10-Jun-14	NE LANTAU	2	12.34	SUMMER	STANDARD31516	HKLR	P
10-Jun-14	NE LANTAU	3	3.50	SUMMER	STANDARD31516	HKLR	P
10-Jun-14	NE LANTAU	2	10.53	SUMMER	STANDARD31516	HKLR	S
10-Jun-14	NE LANTAU	3	0.73	SUMMER	STANDARD31516	HKLR	S
16-Jun-14	NW LANTAU	2	3.11	SUMMER	STANDARD31516	HKLR	P
16-Jun-14	NW LANTAU	3	13.98	SUMMER	STANDARD31516	HKLR	P
16-Jun-14	NW LANTAU	4	14.31	SUMMER	STANDARD31516	HKLR	P
16-Jun-14	NW LANTAU	3	4.28	SUMMER	STANDARD31516	HKLR	S
16-Jun-14	NW LANTAU	4	3.43	SUMMER	STANDARD31516	HKLR	S
16-Jun-14	NE LANTAU	1	1.40	SUMMER	STANDARD31516	HKLR	P
16-Jun-14	NE LANTAU	2	18.35	SUMMER	STANDARD31516	HKLR	P
16-Jun-14	NE LANTAU	1	0.30	SUMMER	STANDARD31516	HKLR	S
16-Jun-14	NE LANTAU	2	10.55	SUMMER	STANDARD31516	HKLR	S
3-Jul-14	NE LANTAU	2	1.89	SUMMER	STANDARD31516	HKLR	P
3-Jul-14	NE LANTAU	2	2.14	SUMMER	STANDARD31516	HKLR	S
3-Jul-14	NW LANTAU	2	7.87	SUMMER	STANDARD31516	HKLR	P
3-Jul-14	NW LANTAU	3	23.09	SUMMER	STANDARD31516	HKLR	P
3-Jul-14	NW LANTAU	4	5.90	SUMMER	STANDARD31516	HKLR	P
3-Jul-14	NW LANTAU	2	2.90	SUMMER	STANDARD31516	HKLR	S
3-Jul-14	NW LANTAU	3	7.84	SUMMER	STANDARD31516	HKLR	S
3-Jul-14	NW LANTAU	4	0.60	SUMMER	STANDARD31516	HKLR	S
9-Jul-14	NW LANTAU	1	1.80	SUMMER	STANDARD31516	HKLR	P
9-Jul-14	NW LANTAU	2	9.28	SUMMER	STANDARD31516	HKLR	P
9-Jul-14	NW LANTAU	2	3.22	SUMMER	STANDARD31516	HKLR	S
10-Jul-14	NW LANTAU	1	8.81	SUMMER	STANDARD31516	HKLR	P
10-Jul-14	NW LANTAU	2	12.85	SUMMER	STANDARD31516	HKLR	P
10-Jul-14	NW LANTAU	3	2.29	SUMMER	STANDARD31516	HKLR	P
10-Jul-14	NW LANTAU	1	0.73	SUMMER	STANDARD31516	HKLR	S

Appendix I. (cont'd)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
10-Jul-14	NW LANTAU	2	6.69	SUMMER	STANDARD31516	HKLR	S
10-Jul-14	NE LANTAU	1	14.94	SUMMER	STANDARD31516	HKLR	P
10-Jul-14	NE LANTAU	2	16.33	SUMMER	STANDARD31516	HKLR	P
10-Jul-14	NE LANTAU	3	6.20	SUMMER	STANDARD31516	HKLR	P
10-Jul-14	NE LANTAU	1	3.93	SUMMER	STANDARD31516	HKLR	S
10-Jul-14	NE LANTAU	2	6.90	SUMMER	STANDARD31516	HKLR	S
10-Jul-14	NE LANTAU	3	0.80	SUMMER	STANDARD31516	HKLR	S
14-Jul-14	NW LANTAU	2	19.59	SUMMER	STANDARD31516	HKLR	P
14-Jul-14	NW LANTAU	3	11.09	SUMMER	STANDARD31516	HKLR	P
14-Jul-14	NW LANTAU	2	2.05	SUMMER	STANDARD31516	HKLR	S
14-Jul-14	NW LANTAU	3	3.80	SUMMER	STANDARD31516	HKLR	S
14-Jul-14	NW LANTAU	4	0.93	SUMMER	STANDARD31516	HKLR	S
14-Jul-14	NE LANTAU	1	2.00	SUMMER	STANDARD31516	HKLR	P
14-Jul-14	NE LANTAU	2	14.57	SUMMER	STANDARD31516	HKLR	P
14-Jul-14	NE LANTAU	3	2.40	SUMMER	STANDARD31516	HKLR	P
14-Jul-14	NE LANTAU	4	1.20	SUMMER	STANDARD31516	HKLR	P
14-Jul-14	NE LANTAU	2	10.51	SUMMER	STANDARD31516	HKLR	S
14-Jul-14	NE LANTAU	3	0.30	SUMMER	STANDARD31516	HKLR	S
21-Jul-14	NW LANTAU	1	5.9	SUMMER	STANDARD31516	HKLR	P
21-Jul-14	NW LANTAU	2	31.1	SUMMER	STANDARD31516	HKLR	P
21-Jul-14	NW LANTAU	3	3.7	SUMMER	STANDARD31516	HKLR	P
21-Jul-14	NW LANTAU	2	7.9	SUMMER	STANDARD31516	HKLR	S
21-Jul-14	NW LANTAU	3	4.9	SUMMER	STANDARD31516	HKLR	S
21-Jul-14	NE LANTAU	1	2.8	SUMMER	STANDARD31516	HKLR	P
21-Jul-14	NE LANTAU	2	13.7	SUMMER	STANDARD31516	HKLR	P
21-Jul-14	NE LANTAU	2	10.7	SUMMER	STANDARD31516	HKLR	S
5-Aug-14	NE LANTAU	1	8.40	SUMMER	STANDARD31516	HKLR	P
5-Aug-14	NE LANTAU	2	5.80	SUMMER	STANDARD31516	HKLR	P
5-Aug-14	NE LANTAU	3	2.10	SUMMER	STANDARD31516	HKLR	P
5-Aug-14	NE LANTAU	1	6.20	SUMMER	STANDARD31516	HKLR	S
5-Aug-14	NE LANTAU	2	4.80	SUMMER	STANDARD31516	HKLR	S
5-Aug-14	NW LANTAU	1	8.00	SUMMER	STANDARD31516	HKLR	P
5-Aug-14	NW LANTAU	2	30.30	SUMMER	STANDARD31516	HKLR	P
5-Aug-14	NW LANTAU	3	1.70	SUMMER	STANDARD31516	HKLR	P
5-Aug-14	NW LANTAU	1	1.50	SUMMER	STANDARD31516	HKLR	S
5-Aug-14	NW LANTAU	2	9.90	SUMMER	STANDARD31516	HKLR	S
6-Aug-14	NW LANTAU	1	4.30	SUMMER	STANDARD31516	HKLR	P
6-Aug-14	NW LANTAU	2	21.55	SUMMER	STANDARD31516	HKLR	P
6-Aug-14	NW LANTAU	3	5.21	SUMMER	STANDARD31516	HKLR	P
6-Aug-14	NW LANTAU	1	2.30	SUMMER	STANDARD31516	HKLR	S
6-Aug-14	NW LANTAU	2	4.05	SUMMER	STANDARD31516	HKLR	S
6-Aug-14	NW LANTAU	3	0.30	SUMMER	STANDARD31516	HKLR	S
6-Aug-14	NE LANTAU	1	17.62	SUMMER	STANDARD31516	HKLR	P
6-Aug-14	NE LANTAU	2	2.26	SUMMER	STANDARD31516	HKLR	P
6-Aug-14	NE LANTAU	1	10.52	SUMMER	STANDARD31516	HKLR	S
15-Aug-14	NW LANTAU	2	7.71	SUMMER	STANDARD31516	HKLR	P
15-Aug-14	NW LANTAU	3	29.93	SUMMER	STANDARD31516	HKLR	P
15-Aug-14	NW LANTAU	3	9.92	SUMMER	STANDARD31516	HKLR	S
15-Aug-14	NW LANTAU	4	2.64	SUMMER	STANDARD31516	HKLR	S
15-Aug-14	NE LANTAU	2	17.22	SUMMER	STANDARD31516	HKLR	P
15-Aug-14	NE LANTAU	3	0.58	SUMMER	STANDARD31516	HKLR	P
15-Aug-14	NE LANTAU	2	8.54	SUMMER	STANDARD31516	HKLR	S
15-Aug-14	NE LANTAU	3	1.26	SUMMER	STANDARD31516	HKLR	S

Appendix I. (cont'd)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
19-Aug-14	NE LANTAU	1	1.46	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NE LANTAU	2	11.20	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NE LANTAU	3	5.91	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NE LANTAU	4	0.80	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NE LANTAU	2	4.35	SUMMER	STANDARD31516	HKLR	S
19-Aug-14	NE LANTAU	3	6.48	SUMMER	STANDARD31516	HKLR	S
19-Aug-14	NW LANTAU	2	1.16	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NW LANTAU	3	23.08	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NW LANTAU	4	3.24	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NW LANTAU	5	3.69	SUMMER	STANDARD31516	HKLR	P
19-Aug-14	NW LANTAU	3	4.32	SUMMER	STANDARD31516	HKLR	S
19-Aug-14	NW LANTAU	4	7.12	SUMMER	STANDARD31516	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (June-August 2014)

(Abbreviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Line)

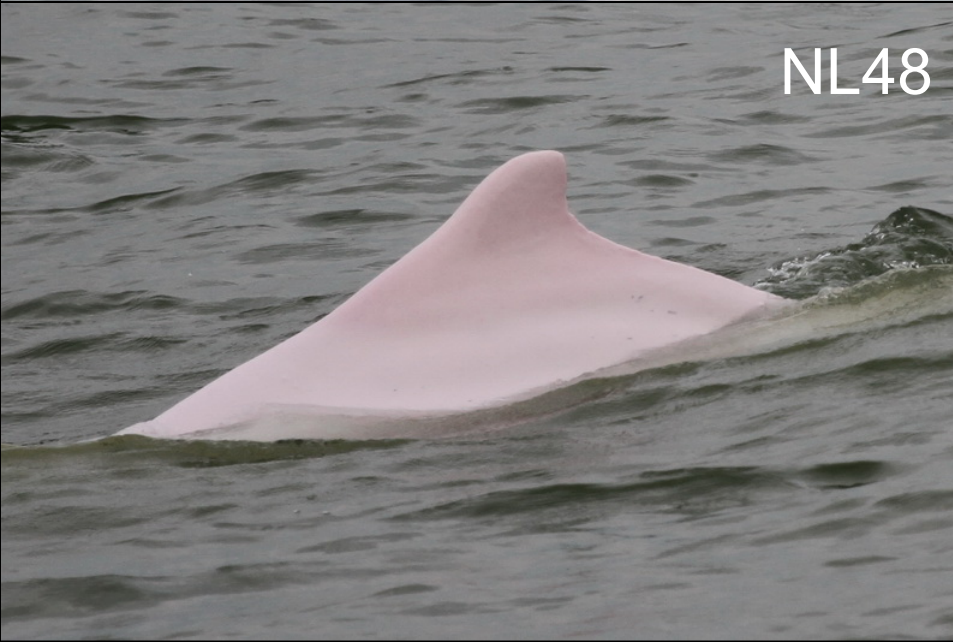
DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
5-Jun-14	1	1400	3	NW LANTAU	3	184	ON	HKLR	827350	805448	SUMMER	NONE	P
5-Jun-14	2	1413	3	NW LANTAU	3	20	ON	HKLR	826719	805344	SUMMER	NONE	S
16-Jun-14	1	1408	1	NW LANTAU	3	ND	OFF	HKLR	827538	805459	SUMMER	NONE	
3-Jul-14	1	958	4	NE LANTAU	2	317	ON	HKLR	823230	820459	SUMMER	NONE	P
3-Jul-14	2	1302	4	NW LANTAU	3	ND	OFF	HKLR	821327	811071	SUMMER	NONE	
3-Jul-14	3	1642	2	NW LANTAU	3	161	ON	HKLR	814628	804722	SUMMER	NONE	P
10-Jul-14	1	1110	5	NW LANTAU	2	588	ON	HKLR	827483	805459	SUMMER	NONE	P
10-Jul-14	2	1150	5	NW LANTAU	2	0	ON	HKLR	829928	806565	SUMMER	NONE	S
14-Jul-14	1	1022	3	NW LANTAU	2	572	ON	HKLR	816276	805395	SUMMER	NONE	P
14-Jul-14	2	1036	1	NW LANTAU	2	866	ON	HKLR	819222	805442	SUMMER	NONE	P
14-Jul-14	3	1044	5	NW LANTAU	2	118	ON	HKLR	820484	805434	SUMMER	NONE	P
14-Jul-14	4	1105	7	NW LANTAU	2	471	ON	HKLR	822311	805448	SUMMER	NONE	P
14-Jul-14	5	1144	2	NW LANTAU	2	819	ON	HKLR	827173	805448	SUMMER	NONE	P
21-Jul-14	1	1113	1	NW LANTAU	2	694	ON	HKLR	823509	804668	SUMMER	NONE	P
21-Jul-14	2	1436	2	NW LANTAU	2	325	ON	HKLR	821325	812267	SUMMER	NONE	S
5-Aug-14	1	1413	8	NW LANTAU	2	428	ON	HKLR	826185	806764	SUMMER	NONE	P
5-Aug-14	2	1435	4	NW LANTAU	2	0	ON	HKLR	827426	806458	SUMMER	NONE	P
5-Aug-14	3	1444	2	NW LANTAU	2	990	ON	HKLR	828943	806461	SUMMER	NONE	P
5-Aug-14	4	1515	2	NW LANTAU	2	452	ON	HKLR	827872	804667	SUMMER	NONE	P
6-Aug-14	1	1110	3	NW LANTAU	3	10	ON	HKLR	826730	805323	SUMMER	NONE	S
6-Aug-14	2	1151	1	NW LANTAU	2	17	ON	HKLR	829773	806359	SUMMER	NONE	S
15-Aug-14	1	1029	5	NW LANTAU	3	393	ON	HKLR	818936	804648	SUMMER	NONE	P
15-Aug-14	2	1041	7	NW LANTAU	3	15	ON	HKLR	821006	804652	SUMMER	NONE	P
15-Aug-14	3	1218	3	NW LANTAU	3	0	ON	HKLR	823429	806027	SUMMER	NONE	S
15-Aug-14	4	1305	2	NW LANTAU	2	749	ON	HKLR	823524	808510	SUMMER	NONE	P
15-Aug-14	5	1310	6	NW LANTAU	3	83	ON	HKLR	824321	808501	SUMMER	NONE	P
19-Aug-14	1	1338	2	NW LANTAU	3	105	ON	HKLR	825220	807514	SUMMER	NONE	P
19-Aug-14	2	1536	3	NW LANTAU	2	113	ON	HKLR	823076	805450	SUMMER	NONE	P

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in June-August 2014

ID#	DATE	STG#	AREA
CH34	10/07/14	1	NW LANTAU
NL46	05/08/14	2	NW LANTAU
NL48	05/08/14	1	NW LANTAU
	19/08/14	1	NW LANTAU
NL80	14/07/14	4	NW LANTAU
NL93	10/07/14	1	NW LANTAU
	05/08/14	1	NW LANTAU
NL104	05/08/14	1	NW LANTAU
NL123	03/07/14	1	NE LANTAU
	15/08/14	5	NW LANTAU
NL136	05/06/14	2	NW LANTAU
NL139	03/07/14	1	NE LANTAU
NL145	14/07/14	3	NW LANTAU
NL182	10/07/14	2	NW LANTAU
NL202	19/08/14	1	NW LANTAU
	19/08/14	2	NW LANTAU
NL210	10/07/14	2	NW LANTAU
NL242	05/08/14	1	NW LANTAU
NL247	14/07/14	4	NW LANTAU
	15/08/14	2	NW LANTAU
NL259	05/08/14	1	NW LANTAU
NL261	03/07/14	1	NE LANTAU
NL272	05/06/14	1	NW LANTAU
	05/06/14	2	NW LANTAU
	15/08/14	5	NW LANTAU
NL278	15/08/14	2	NW LANTAU
NL284	15/08/14	5	NW LANTAU
NL285	03/07/14	1	NE LANTAU
	15/08/14	5	NW LANTAU
NL286	15/08/14	5	NW LANTAU
	19/08/14	2	NW LANTAU

ID#	DATE	STG#	AREA
NL287	14/07/14	3	NW LANTAU
	15/08/14	5	NW LANTAU
NL300	14/07/14	4	NW LANTAU
NL301	14/07/14	4	NW LANTAU
NL307	15/08/14	5	NW LANTAU
WL28	15/08/14	2	NW LANTAU
WL30	10/07/14	1	NW LANTAU
WL46	15/08/14	2	NW LANTAU
WL124	03/07/14	3	NW LANTAU
	15/08/14	2	NW LANTAU
WL188	06/08/14	1	NW LANTAU
	15/08/14	2	NW LANTAU
WL214	15/08/14	2	NW LANTAU

Appendix IV. Thirty-two individual dolphins that were identified during June – August 2014 under HKLR03 impact phase monitoring surveys



Appendix IV. (cont'd)



Appendix IV. (cont'd)

NL139



NL145



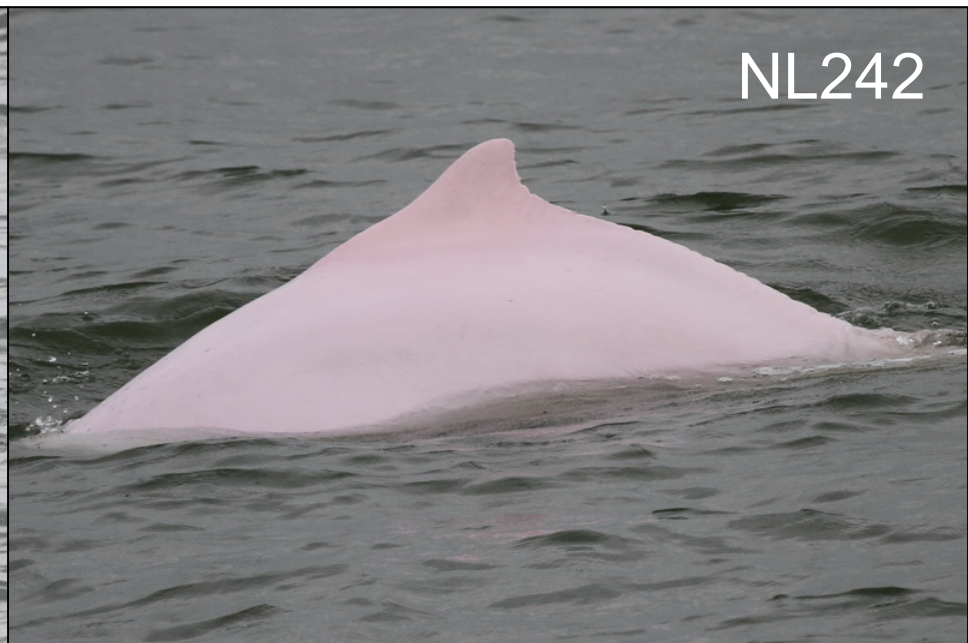
NL182



NL202



Appendix IV. (cont'd)



Appendix IV. (cont'd)



Appendix IV. (cont'd)

NL285



NL286



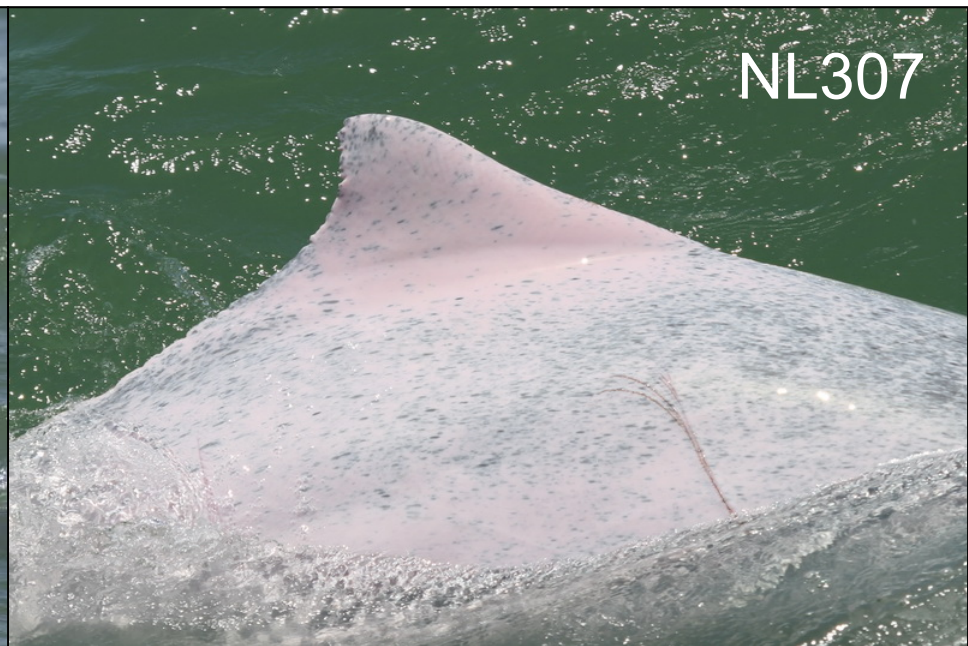
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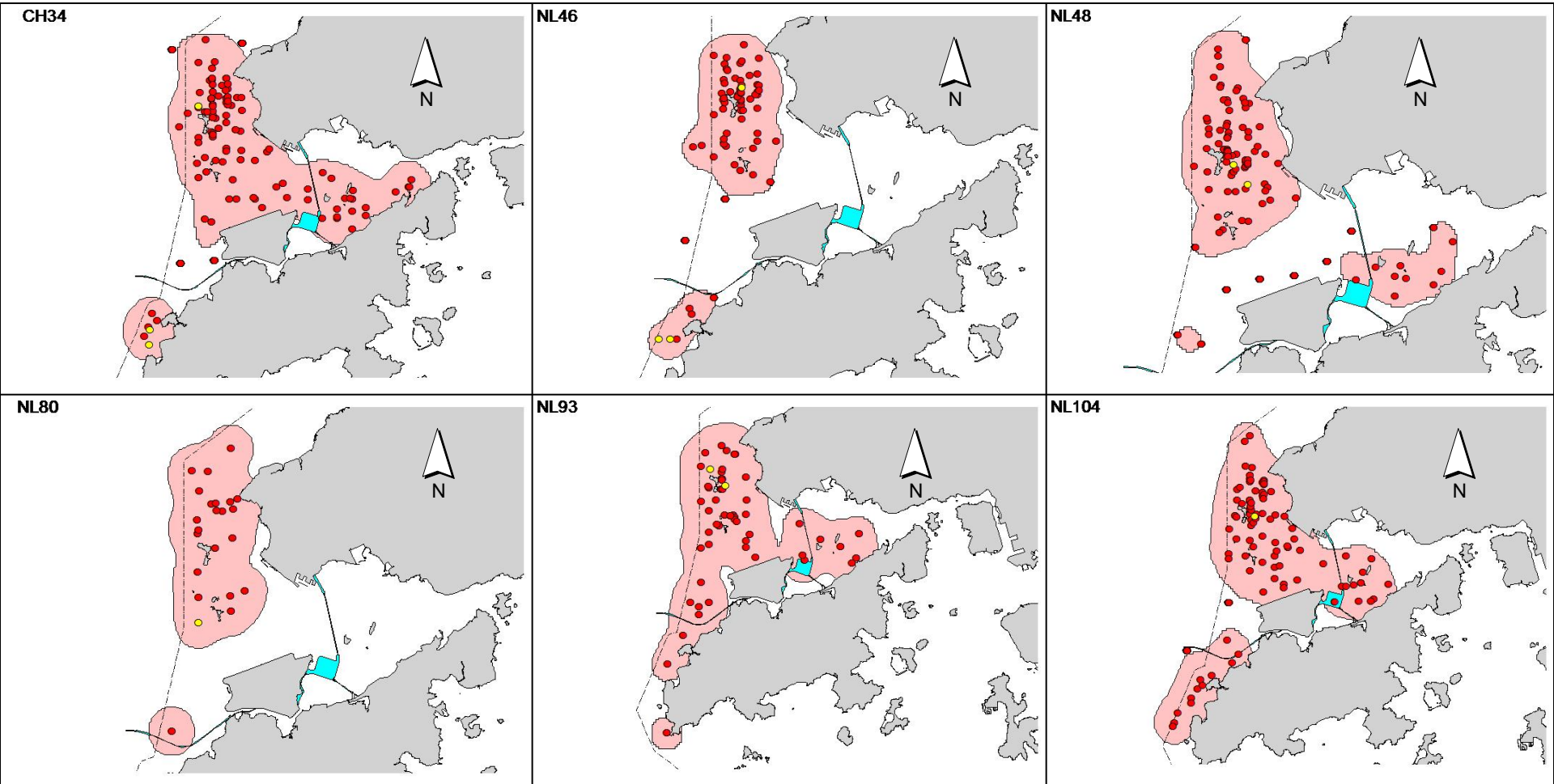
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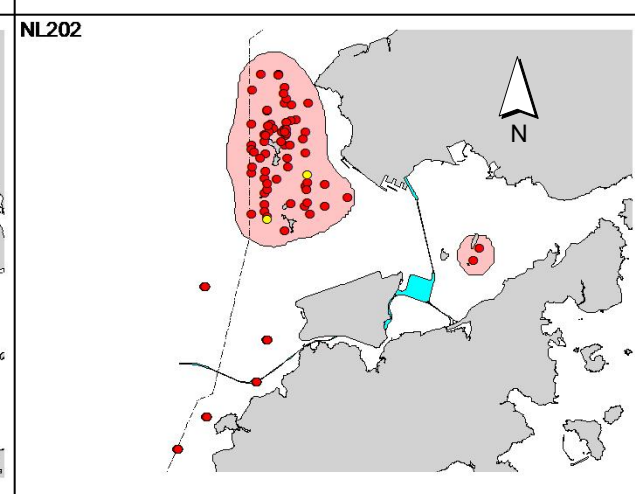
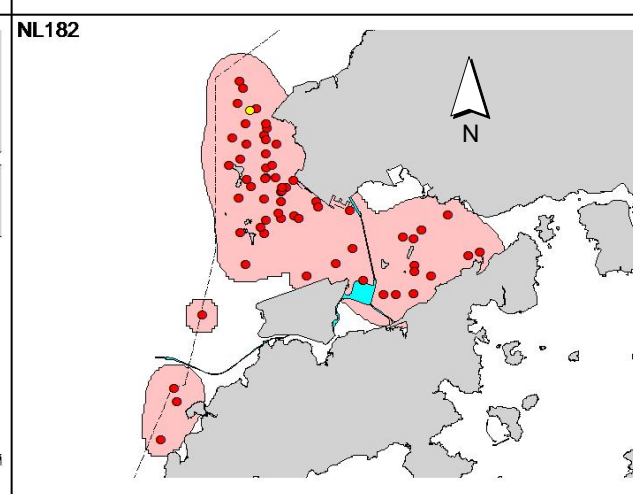
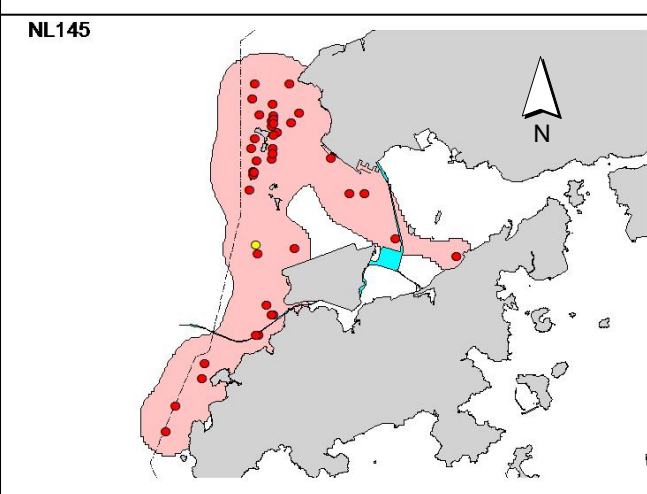
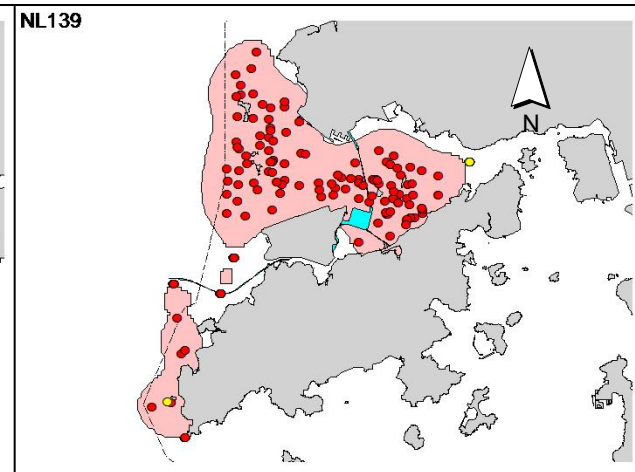
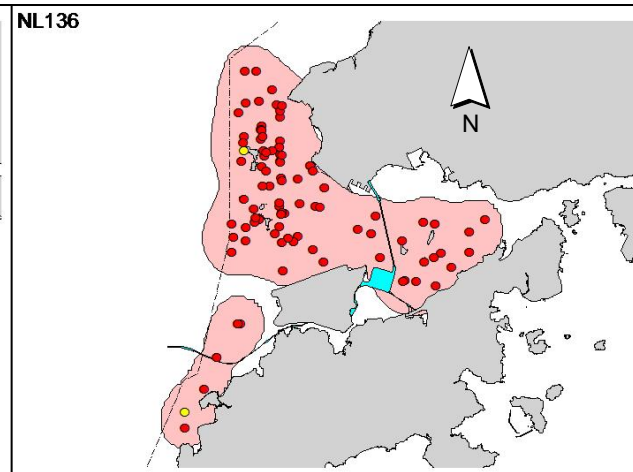
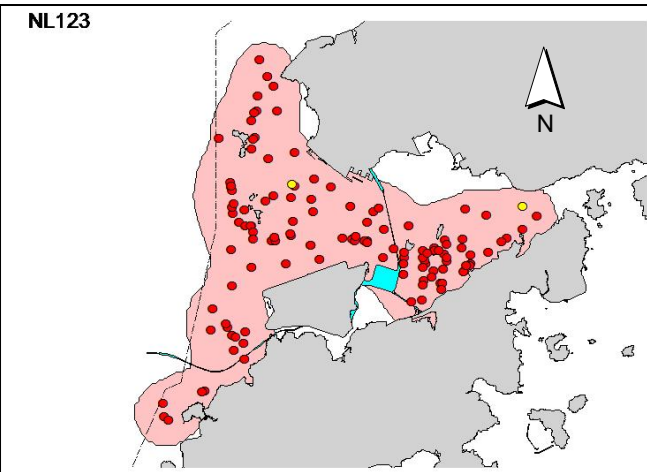
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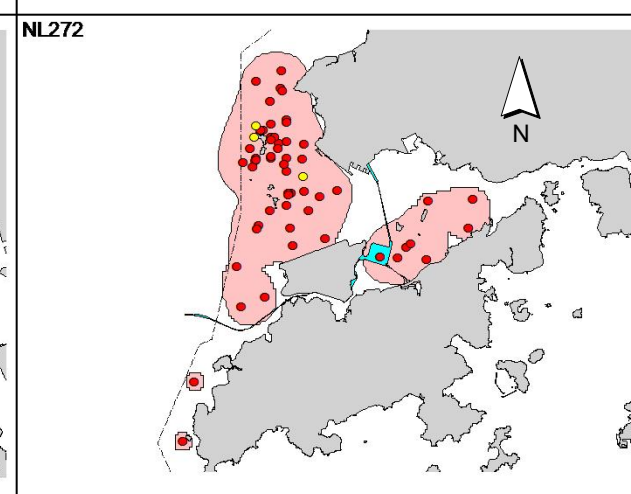
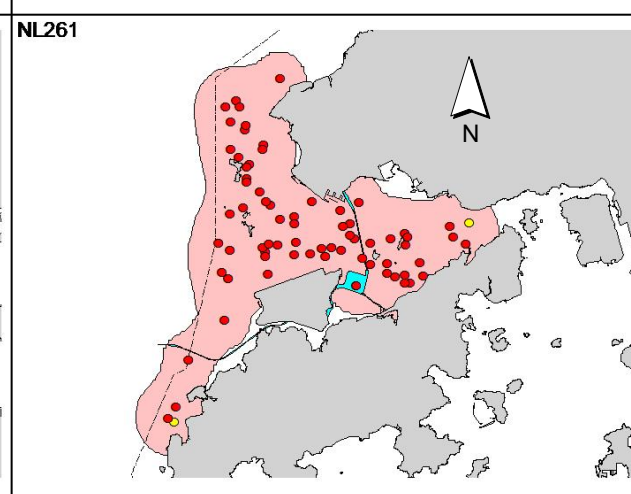
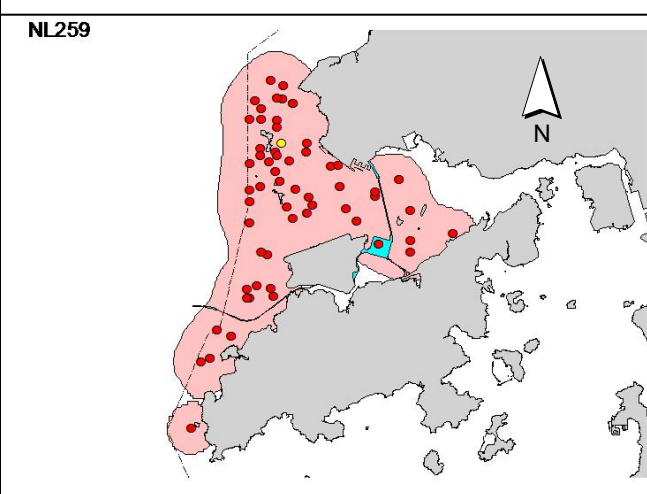
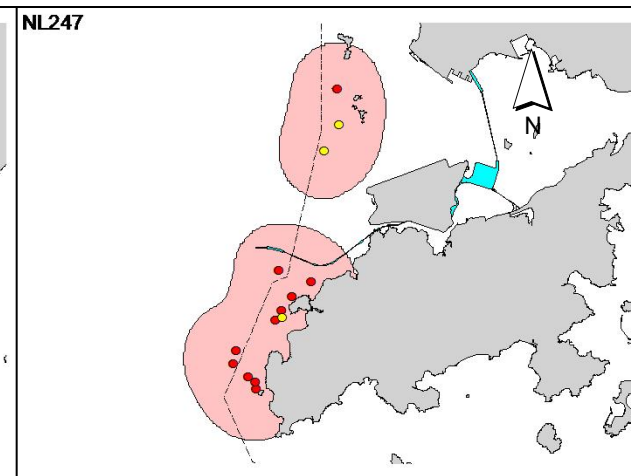
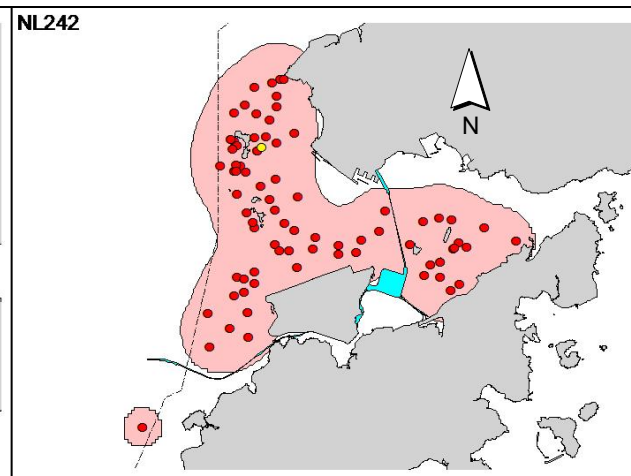
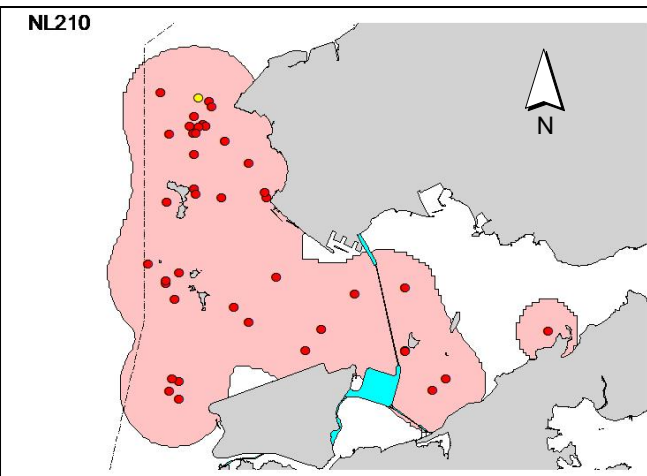
Appendix V. Ranging patterns (95% kernel ranges) of 32 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicates sightings made in June – August 2014)



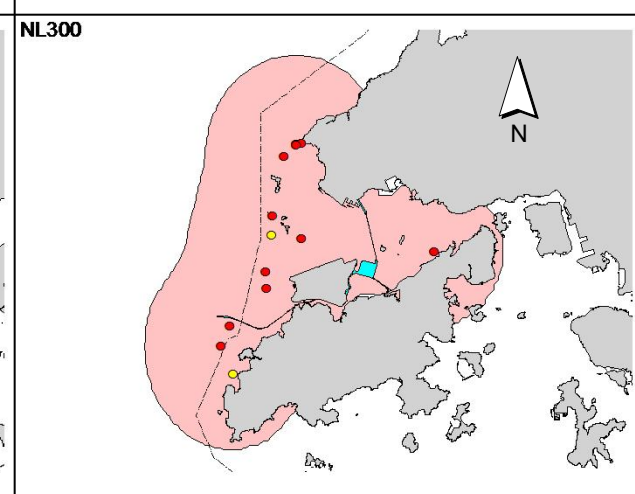
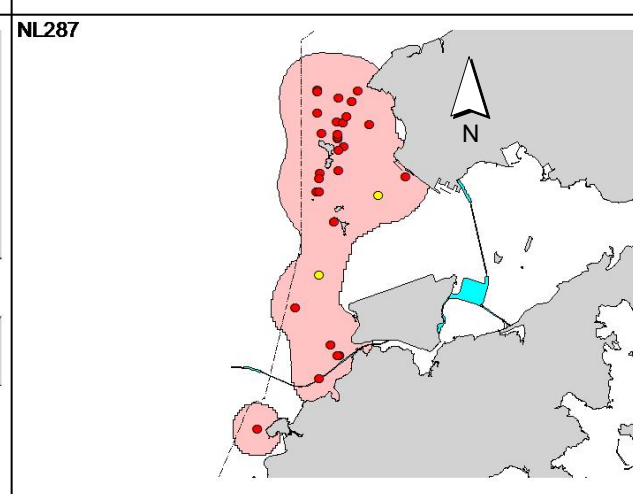
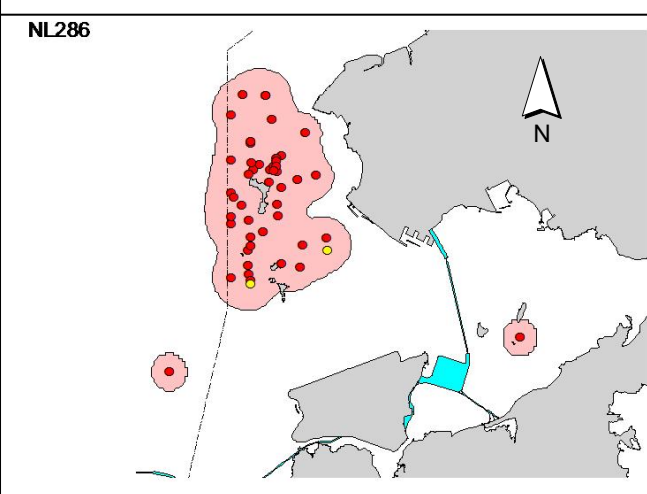
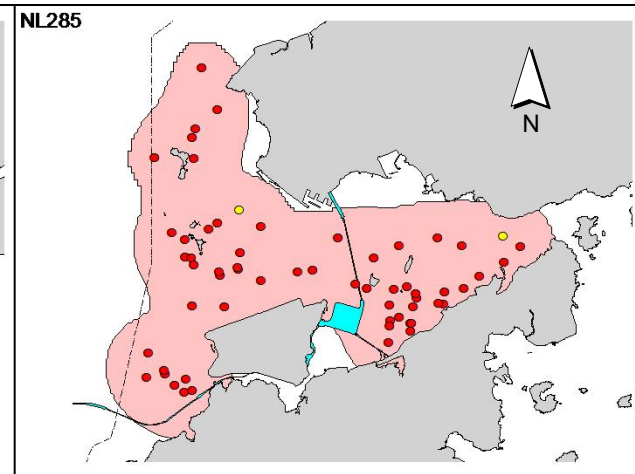
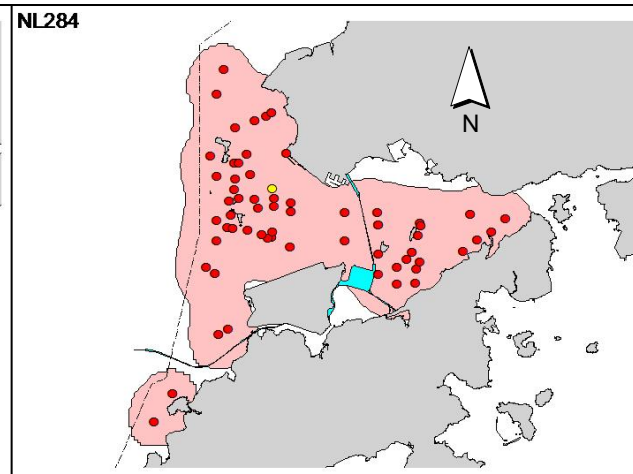
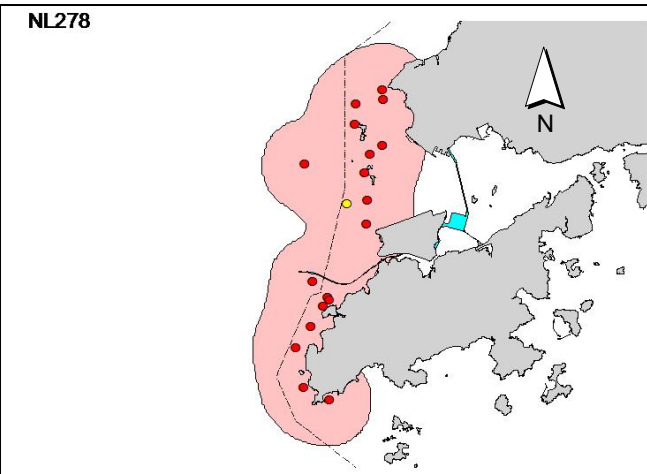
Appendix V. (cont'd)



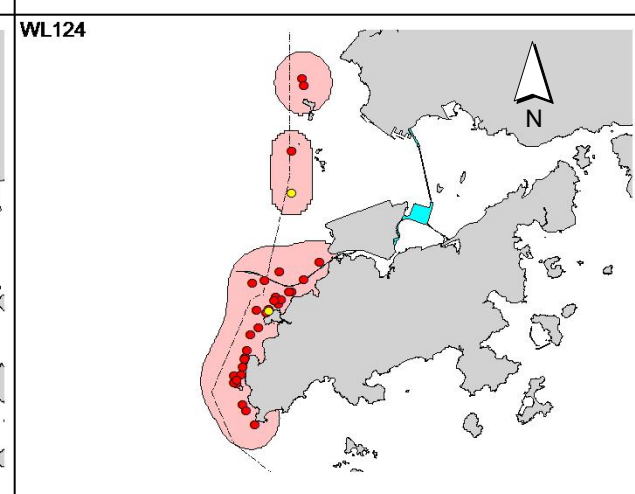
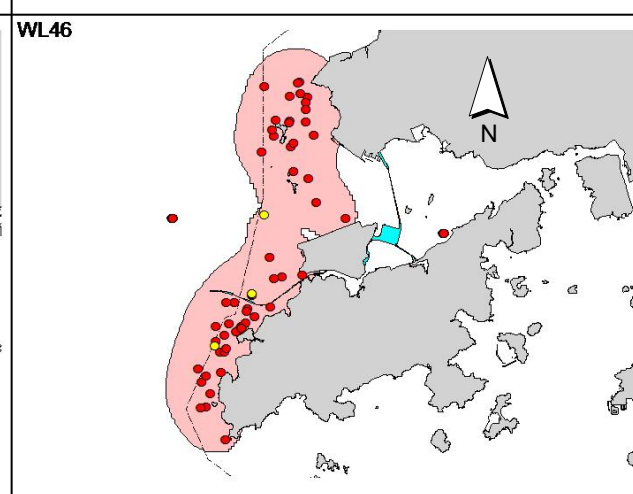
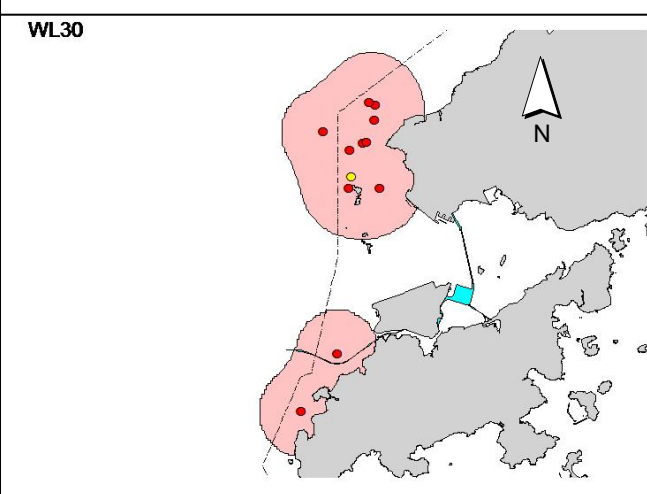
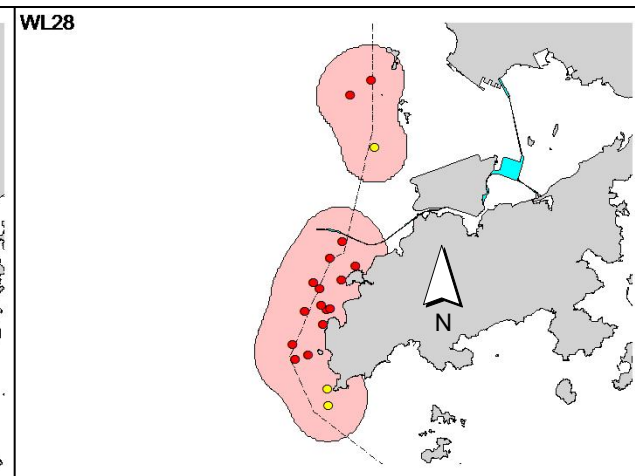
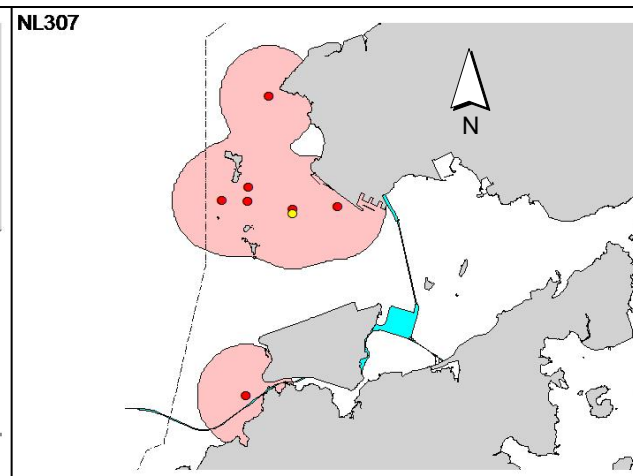
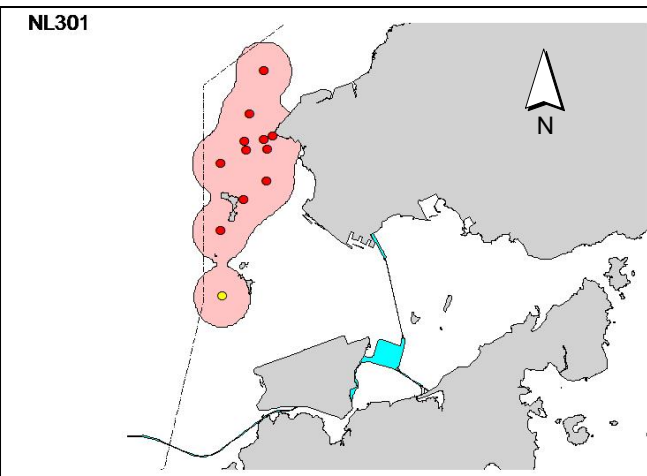
Appendix V. (cont'd)



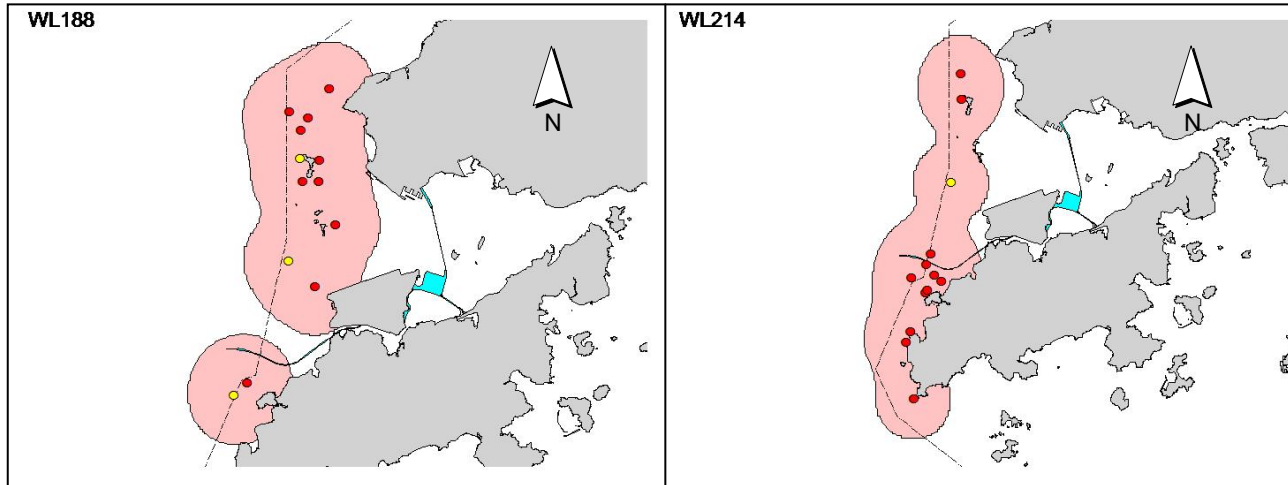
Appendix V. (cont'd)



Appendix V. (cont'd)



Appendix V. (cont'd)



Appendix I

Event and Action Plan

Event and Action Plan for Impact Air Monitoring

Action Level	Action			
	ET (a)	IEC (a)	SOR (a)	Contractor(s)
Exceedance recorded	<ol style="list-style-type: none"> 1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Action Level, the exceedance is then confirmed. 3. Inform the IEC and the SOR. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Discuss with the IEC and the Contractor on remedial actions required. 7. If exceedance continues, arrange meeting with the IEC and the SOR. 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET. 2. Check the Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervisor implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice 2. Amend working methods if appropriate 3. If the exceedance is confirmed to be Project related, submit proposals for remedial actions to IEC within 3 working days of notification 4. Implement the agreed proposals 5. Amend proposal if appropriate

	Action			
	ET (a)	IEC (a)	SOR (a)	Contractor(s)
Limit Level				
Exceedance recorded	<ol style="list-style-type: none"> 1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Limit Level, the exceedance is then confirmed. 3. Inform the IEC, the SOR, the DEP and the Contractor. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented. 7. Arrange meeting with the IEC and the SOR to discuss the remedial actions to be taken. 8. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and the SOR informed of the results. 9. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET. 2. Check Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervisor implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. If the exceedance is confirmed to be Project related after investigation, in consultation with the IEC, agree with the Contractor on the remedial measures to be implemented. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance. 2. If the exceedance is confirmed to be Project related after investigation, submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Amend proposal if appropriate. 5. Stop the relevant activity of works as determined by the SOR until the exceedance is abated.

Note: (a) ET – Environmental Team; IEC – Independent Environmental Checker; SOR – Supervising Officer's Representative

Event & Action Plan for Water Quality

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

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

Note: ET – Environmental Team, IEC – Independent Environmental Checker, SOR – Supervising Officer's Representative

Event / Action Plan for Impact Dolphin Monitoring

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

EVENT	ACTION*			
	ET	IEC	SOR	Contractor
	<ol style="list-style-type: none"> 3. Identify source(s) of impact; 4. Inform the IEC, SOR and Contractor of findings; 5. Check monitoring data; 6. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary. 7. If ET proves that the source of impact is caused by any of the construction activity by the works contract, ET to arrange a meeting to discuss with IEC, 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>Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures.</p> <ol style="list-style-type: none"> 4. Review proposals for additional monitoring and any other mitigation measures submitted by ET and Contractor and advise SOR of the results and findings accordingly. 5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise SOR the results and findings accordingly. 	<p>proposals for additional dolphin monitoring and/or any other mitigation measures submitted by ET and Contractor and verified by IEC, SOR to signify the agreement in writing on such proposals and any other mitigation measures.</p> <ol style="list-style-type: none"> 3. Supervise the implementation of additional monitoring and/or any other mitigation measures. 	<p>potential mitigation measures.</p> <ol style="list-style-type: none"> 3. Jointly submit with ET to IEC a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary. 4. Implement the agreed additional dolphin monitoring and/or any other mitigation measures.

Appendix J

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

Table J1 *Cumulative Statistics on Exceedances*

Monitoring Parameters	Action/Limit Level	Total No. recorded in this reporting quarter	Total No. recorded since project commencement
1-Hr TSP	Action	0	26
	Limit	0	2
24-Hr TSP	Action	0	5
	Limit	0	1
Water Quality	Action	0	6
	Limit	0	1
Impact Dolphin Monitoring	Action	2	5
	Limit	0	0

Table J2 *Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions*

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Successful Prosecutions
This Reporting Period (Jun 2014 to Aug 2014)	0	0	0
Total No. received since project commencement	1	0	0

Email
message

Environmental
Resources
Management

To ENVIRON - Hong Kong, Limited (ENPO)

From ERM- Hong Kong, Limited

Ref/Project number Contract No. HY/2012/08 Tuen Mun-Chek Lap
Kok Link-Northern Connection Sub-sea Tunnel
Section

Subject Notification of Exceedance for Impact Dolphin
Monitoring

Date 6 November 2014

16/F Berkshire House,
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3113
Facsimile: (852) 2723 5660
E-mail: jovy.tam@erm.com



ERM

Dear Sir or Madam,

Please find attached the Notification of Exceedance (NOE) of the following
Log no.:

0212330_Jun2014/Aug2014_dolphin_STG&ANI_NEL
0212330_Jun2014/Aug2014_dolphin_STG&ANI_NWL

A total of two action level exceedances were recorded in the quarterly impact
dolphin monitoring data between June 2014 and August 2014.

Regards,

A handwritten signature in black ink, appearing to be 'Jovy Tam'.

Mr Jovy Tam
Environmental Team Leader

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ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08

TUEN MUN – CHEK LAP KOK LINK –
NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Impact Dolphin Monitoring
Notification of Exceedance

Log No.	0212330_Jun2014/Aug2014_dolphin_STG&ANI_NEL 0212330_Jun2014/Aug2014_dolphin_STG&ANI_NWL [Total No. of Exceedances = 2]	
Date	June 2014 to August 2014 (monitored) 27 October 2014 (results received by ERM)	
Monitoring Area	Northeast Lantau (NEL) and Northwest Lantau (NWL)	
Parameter(s) with Exceedance(s)	Quarterly encounter rate of dolphin sightings (STG) Quarterly encounter rate of total number of dolphins (ANI)	
Action Levels	North Lantau Social cluster	NEL: STG < 4.2 & ANI < 15.5 or NWL: STG < 6.9 & ANI < 31.3
Limit Levels		NEL: STG < 2.4 & ANI < 8.9 and NWL: STG < 3.9 & ANI < 17.9
Recorded Levels	NEL	STG = 0.4 & ANI = 1.7
	NWL	STG = 4.7 & ANI = 17.5
	Two Action Level Exceedances are recorded in the quarterly impact dolphin monitoring at NEL and NWL between June 2014 and August 2014. The exceedances were reported in the approved <i>Tenth Monthly EM&A Report</i> dated 11 September 2014.	
Statistical Analyses	<p>Further to the review of the available and relevant dolphin monitoring data in the EM&A under this Contract, statistical analyses were conducted as follows:</p> <ul style="list-style-type: none"> A two-way ANOVA with repeated measures and unequal sample size was conducted using Period (2 levels: baseline vs impact – present quarter, June to August 2014) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the averages encounter rates between the baseline and present impact monitoring quarter. By setting $\alpha = 0.1$ as the significance level in the statistical tests, significant difference in STG ($p = 0.0199$) and in ANI ($p = 0.0597$) between Period were detected. A two-way ANOVA with repeated measures and unequal sample size was conducted using Cumulative Period (2 levels: baseline vs impact – cumulative quarters*, December 2012 to August 2014) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the averages encounter rates between the baseline and cumulative impact monitoring quarters. By setting $\alpha = 0.1$ as the significance level in the statistical tests, significant difference in STG ($p = 0.0037$) and in ANI ($p = 0.0013$) between Cumulative Period and Location were detected. <p>*Note: The commencement date under <i>Contract No. HY/2012/08</i> is 1 November 2013.</p>	
Works Undertaken (in the monitoring quarter)	<p>In the quarter between June 2014 and August 2014, the major marine works under <i>Contract No. HY/2012/08</i> included:</p> <ul style="list-style-type: none"> Dredging works at Portion N-C Vertical seawall and sloping seawall constructions at Portions N-B and N-C Reclamation Filling at Portions N-A and N-B Marine sheet piling for box culvert extension at Portion N-A 	

Possible Reason for Action or Limit Level Exceedance(s)	<p>The exceedances are considered not caused by the Project, in view of the following:</p> <ul style="list-style-type: none"> • The <i>Monitoring of Marine Mammals in Hong Kong Waters (2013 – 14)</i> ⁽¹⁾ reported that dolphin usage and traveling activities to the northern side of the airport (dolphin traveling corridor) are affected by frequent high-speed ferry traffic from Sky Pier (not related to this project), which is likely a contributing factor for the decrease in dolphin abundances in NEL. • As per the findings from the EIA report (Section 8.11.9), the major influences on the CWD are marine traffics, dredging works and reclamation/filling works. The Contractor has implemented the marine traffic control as per the requirements in the EP-354/2009/B and the updated EM&A Manual. Likewise, dredging works were undertaken within the working rate described in the EP and the approved EIA Report by a closed grab dredger with silt curtains being deployed throughout the dredging period. Filling works were undertaken within 200m leading seawall throughout the filling period and the working rate described in the EP and the approved EIA Report were strictly followed. After reviewing of the dredging and filling records, the dredging and filling rates in this quarter are below the maximum working rate described in the EP. During this quarter of dolphin monitoring, no adverse impact on CWD due to the activities under this Contract was observed. • According to the findings of the approved EIA report (Section 8.11.9), dredging and filling works are expected to increase the level of suspended solids (SS) in the vicinity waters of the project, which would lead to indirect loss of prey availability and increase in level of bioaccumulative contaminants in CWD. According to the findings in the quarterly water monitoring results between June and August 2014, the impact mean level of SS (Mid-ebb: 4.2 mg/L; Mid-flood: 4.1 mg/L) in this quarter is well below of the baseline mean level of SS (Mid-ebb: 10.0 mg/L; Mid-flood: 10.3 mg/L). This would imply that no unacceptable impact on SS levels was associated with the marine works under this Contract, and thus no indirect impacts on marine habitat quality due to change in water quality is observed in this Contract. • Seasonal variation in individual ranging pattern which has been well documented in the literatures ^{(2) (3)}.
Actions Taken/ To Be Taken	<p>With reference to the site inspection records in this quarter, the respective marine ecological mitigation measures (including 250 m dolphin exclusion zone, passive acoustic monitoring, underwater acoustic decoupling plan and marine traffic control) have been implemented properly by the Contractor throughout the marine works period. No immediate additional action is considered necessary. The ET will monitor for future trends in exceedance(s).</p>
Remarks	<p>The results of impact water quality and impact dolphin monitoring, the status of implemented marine ecological mitigation measures are documented in the approved <i>Eighth to Tenth EM&A Monthly Reports</i>.</p>

(1) Hung SKY (2014). Prepared for AFCD. Available from:

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

(2) Jefferson & Hung (2010) A review of the status of the Indo-Pacific Humpback Dolphin (*Sousa chinensis*) in Chinese Waters. *Aquatic Mammals* (30): 149 – 158.

(3) Chen et al., (2010) Distribution, abundance, and individual movements of Indo-Pacific humpback dolphins (*Sousa chinensis*) in the Pearl River Estuary, China. *Mammalia* (74): 117 – 125.

Appendix K

Waste Flow Table

Name of Department: HyD

Contract No. / Works Order No.: HY/2012/08

Monthly Summary Waste Flow Table for August 2014 [to be submitted not later than the 15th day of each month following reporting month]

(All quantities shall be rounded off to 3 decimal places.)

Month	Actual Quantities of <u>Inert</u> Construction Waste Generated Monthly				
	(a)=(b)+(c)+(d)+(e) Total Quantity Generated	(b) Hard Rock and Large Broken Concrete	(c) Reused in the Contract	(d) Reused in other Projects	(e) Disposed of as Public Fill
	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)
2013 Sub-total	3.718	0.000	0.000	0.000	3.718
Jan	9.012	0.000	0.000	0.000	9.012
Feb	0.000	0.000	0.000	0.000	0.000
Mar	0.105	0.000	0.000	0.000	0.105
Apr	0.022	0.000	0.000	0.000	0.022
May	1.016	0.000	0.000	0.000	1.016
Jun	4.393	0.000	0.000	0.000	4.393
Sub-total	14.548	0.000	0.000	0.000	14.548
Jul	14.405	0.000	0.000	0.000	14.405
Aug	12.728	0.000	0.000	0.000	12.728
Sep					
Oct					
Nov					
Dec					
2014 Total	45.399	0.000	0.000	0.000	45.399

Month	Actual Quantities of <u>Inert</u> Construction Waste Generated Monthly							
	Imported Fill to WA 23 & Reclamation Area (Rockfill 400)	Imported Fill to WA 23 & Reclamation Area (Rockfill 200)	Imported Fill to WA 23 & Reclamation Area (Rockfill Type A)	Imported Fill to Reclamation Area (Public Fill) (by Barge)	Imported Fill to Reclamation Area (Public Fill) (by Truck)	Imported Fill to Barging Point	Marine Disposal (Cat. L)	Marine Disposal (Cat. M _P & M _F)
	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 m ³)	(in '000 m ³)
2013 Sub-total	211.541	2.508	19.460	0.000	0.000	45.472	61.600	18.200
Jan	177.300	4.050	8.544	0.000	0.000	124.412	34.000	12.500
Feb	143.891	27.825	5.371	0.000	0.000	81.296	18.500	24.500
Mar	257.304	53.388	27.958	113.789	0.000	63.961	37.300	40.450
Apr	198.245	10.186	41.702	191.094	0.000	26.640	28.600	15.400
May	236.816	4.612	65.308	150.749	43.718	15.165	18.700	29.150
Jun	233.430	2.856	37.103	108.667	25.433	0.000	40.700	7.700
Sub-total	1246.986	102.917	185.986	564.299	69.151	311.474	177.800	129.700
Jul	177.859	0.000	65.758	161.817	22.958	0.000	37.950	7.150
Aug	174.710	23.110	33.127	351.703	40.379	0.000	12.100	0.000
Sep								
Oct								
Nov								
Dec								
2014 Total	1811.096	128.535	304.331	1077.819	132.488	356.946	289.450	155.050

Month	Actual Quantities of <u>Non-inert</u> Construction Waste Generated Monthly								
	Metals		Paper/ cardboard packaging		Plastics (see Note 3)		Chemical Waste		Others, e.g. General Refuse disposed at Landfill
	(in '000kg)		(in '000kg)		(in '000kg)		(in '000kg)		(in '000ton)
	generated	recycled	generated	recycled	generated	recycled	generated	recycled	generated
2013 Sub-total	0.000	0.000	0.380	0.380	0.000	0.000	0.000	0.000	0.172
Jan	0.000	0.000	0.130	0.130	0.000	0.000	0.000	0.000	0.045
Feb	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.020	0.028
Mar	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.036
Apr	0.000	0.000	0.160	0.160	0.000	0.000	0.000	0.000	0.026
May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.042
Jun	0.000	0.000	0.000	0.000	0.000	0.000	0.030	0.030	0.030
Sub-total	0.000	0.000	0.290	0.290	0.000	0.000	0.050	0.050	0.207
Jul	0.000	0.000	0.300	0.300	0.000	0.000	0.000	0.000	0.033
Aug	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022
Sep									
Oct									
Nov									
Dec									
2014 Total	0.000	0.000	0.970	0.970	0.000	0.000	0.050	0.050	0.434

Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract*							
Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed of as Public Fill	Imported Fill	Marine Disposal (Cat. L)	Marine Disposal (Cat. M)
(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 m ³)	(in '000 m ³)
5.000	0.000	0.000	0.000	5.000	180.000	5.000	40.000

Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract*				
Metals	Paper/ cardboard packaging	Plastics (see Note 3)	Chemical Waste	General Refuse disposed of at Landfill
(in '000kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m ³)
0.000	0.050	0.000	0.000	0.100

- Notes:
- (1) The performance targets are given in the **ER Appendix 8J Clause 14** and the EM & A Manual(s).
 - (2) The waste flow table shall also include C&D materials to be imported for use at the Site.
 - (3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
 - (4) The Contractor shall also submit the latest forecast of the total amount of C&D materials expected to be generated from the Works, together with a breakdown of the nature where the amount of C&D materials expected to be generated from the Works is equal to or exceeding 50,000 m³. (**ER Part 8 Clause 8.8.5 (d) (ii)** refers).