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## ***HKPFH Joint Venture***

**Contract No.: CV/2013/06  
Handling of Surplus Public Fill  
(2014-2016)**

**TSEUNG KWAN O AREA 137 FILL BANK  
QUARTERLY EM&A SUMMARY REPORT  
NO.1  
(FROM 21 JANUARY TO 31 MARCH 2014)**

Prepared by:

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Senior Environmental Officer

Checked by:

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Environmental Team Leader

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25 April 2014

By E-mail and Fax No.: 2695 3944

ETS-Testconsult Limited  
8/F, Block B  
Veristrong Industrial Centre  
34-36 Au Pui Wan Street  
Fo Tan, Hong Kong

Attention: Mr. C L Lau

Dear Mr. Lau,

**Re: Contract No. CV/2013/06  
Handling of Surplus Public Fill (2014 – 2016)  
Quarterly EM&A Summary Report No. 1 (from 21 January 2014 to 31 March 2014)  
for the Tseung Kwan O Area 137 Fill Bank**

Reference is made to your submission of the revised draft Quarterly EM&A Summary Report (from 21 January 2014 to 31 March 2014 for the TKO Area 137 Fill Bank received by E-mail on 24 April 2014.

We are pleased to inform you that we have no further comment on the captioned report.

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

Yours sincerely,



Tony Cheng  
Independent Environmental Checker

c.c. CEDD Attn: Mr. Jason Wong / Mr. Terry Chock / Mr. N C Chan  
HKPFHJV Attn: Mr. Jerry Siu / Mr. Eric Wan

Fax No.: 2714 0113  
Fax No.: 2744 6937

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## **EXECUTIVE SUMMARY**

This is the first Quarterly Environmental Monitoring and Audit (EM&A) Summary Report prepared by ETS-Testconsult Ltd (ET) for the "Contract No: CV/2013/06 –Handling of Surplus Public Fill (2014-2016) – Tseung Kwan O (TKO) Area 137 Fill Bank" (The Project).

This report documents the findings of EM&A Works conducted during the operation phase of Fill Bank at Tseung Kwan O Area 137 from 21 January to 31 March 2014.

### **Site Activities**

As informed by the Contractor, the site activities in this reporting quarter were as below:

- |                       |  |
|-----------------------|--|
| 21 to 31 January 2014 | <ul style="list-style-type: none"><li>• Construction of Contractor's and Engineer's site office;</li><li>• Transferring filling material to barge; and</li><li>• Operation of derrick barge for unloading filling material.</li></ul>  |
| February 2014         | <ul style="list-style-type: none"><li>• Unloading fill material at tipping hall;</li><li>• Transferring fill material to stockpile area and BCF'</li><li>• Construction of Contractor's and Engineer's site office; and</li><li>• Unloading fill material from derrick barge with mechanical claw.</li></ul> |
| March 2014            | <ul style="list-style-type: none"><li>• Internal public fill transferring and stockpiling;</li><li>• Loading of public fill by excavator and unload into vessels;</li><li>• Erection of Engineer Principal Site Office; and</li><li>• Erection of new CCTV tower.</li></ul>                                  |

Dump truck traffic and hauling activities at Barge Handling Area (BHA) were the major dust sources. Barge delivery of fill material was also undertaken in the reporting quarter. Besides the Fill Bank operation, the other dust sources near TKO Area 137 also included operation of C&DMSF at PBR2 Project and dumping activities at the SENT Landfill.

The desilting facilities were in proper operation to avoid silty discharge and the silt curtains were properly installed. There was no sediment plume observed during the monitoring events.

The major noise sources during the reporting quarter were the dump truck traffic and construction activities near the site egress. Noise impact on the sensitive receivers was insignificant in the reporting quarter according to the results of noise monitoring and site inspections.

### **Environmental Monitoring Works**

#### **Noise Monitoring**

No exceedance of Action and Limit levels for noise monitoring was recorded in the reporting quarter.

#### **Air Monitoring**

No exceedance of Action and Limit levels was recorded for 1-hr and 24-hr TSP monitoring in this quarter.

#### **Marine Water Quality Monitoring**

According to the summary of marine water monitoring results, no exceedance of Action and Limit Levels was recorded in this quarter.

### **Environmental Complaints, Notification of summons and successful prosecutions**

No complaint, notification of summon and successful prosecution with respect to environmental issues was received in this quarter.



## 1.0 INTRODUCTION

HKPFH Joint Venture (HKPFH-JV) appointed Environmental Team (ET) of ETS-Testconsult Limited (ETL) to undertake the Environmental Monitoring and Audit (EM&A) for the "Contract No: CV/2013/06 –Handling of Surplus Public Fill (2014-2016) – Tseung Kwan O (TKO) Area 137 Fill Bank" (The Project).

In accordance with the Environmental Permit (No.: EP-134/2002/K) (the EP), an EM&A programme should be implemented in accordance with the procedures and requirements in the EM&A Manual of the approved EIA report (Registration No. AEIAR-060/2002). The EM&A programme for this study as stated in Section 2.3.1 of the EM&A Manual covers the following environmental aspects during the establishment, operation and removal phases of the Fill Bank at Tseung Kwan O Area 137:

- *Fugitive Dust;*
- *Noise generation from onsite activities;*
- *Water Quality; and*
- *Landscape and Visual.*

The EM&A programme requires environmental monitoring for air quality, noise and water quality and environmental site inspections for air quality, noise, water quality, landscape and visual, and waste management. The EM&A requirements for each parameter described in the following sections include:

- *All monitoring parameters;*
- *Monitoring schedules for the reporting month and forthcoming months;*
- *Action and Limit levels for all environmental parameters;*
- *Event/Action Plans;*
- *Environmental mitigation measures, as recommended in the Project EIA study final report; and*
- *Environmental requirements in contract documents.*

Baseline monitoring was completed in August and September 2002 by MaterialLab. Action and Limit Levels were established for air and water quality parameters based on the baseline monitoring results.

This quarterly report documented the findings of EM&A Works conducted during the operation phase of Fill Bank at Tseung Kwan O Area 137 from 21 January to 31 March 2014.

## 2.0 PROJECT INFORMATION

### 2.1 Scope of the Project

The scale and scope of the Project as stated in the EP include:

- *Site clearance;*
- *Construction of a temporary storm water system;*
- *Stockpiling of 6 million m<sup>3</sup> of public fill;*
- *Setting up two barging points: one at the Tseung Kwan O Basin (TKO Basin) and one at the Construction and Demolition Material Sorting Facility (C&DMSF) for transporting the stockpiled public fill by barges;*
- *Construction and operation of a Construction and Demolition Material Sorting Facility (C&DMSF);*
- *Setting up a Construction and Demolition Material Crushing Facility at the TKO Basin; and*
- *Remove the temporary fill bank.*



## 2.2 Site Description

Tseung Kwan O Area 137 is located at the southern end of Wan Po Road. In the vicinity of the site are other industrial uses such as SENT landfill, TKO Industrial Estate, etc. Both Island Resort and Fullview Garden are also situated at more than 1.8km from the site. Other existing ASRs and NSRs, including resident developments and schools, are located at a further distance away from TKO Area 137.

## 2.3 Work Programme

Details of work programme in this quarter are shown in Appendix I G.

## 2.4 Project Organization and Management Structure

The project organization chart is shown in Appendix I A.

## 2.5 Contact Details of Key Personnel

The key personnel contact names and telephone numbers are shown in Table 2.1.

Table 2.1 Contact Details of Key Personnel

Organization	Name of Key Staff	Project Role	Tel. No.	Fax No.
CEDD	Mr. P C Mok Mr. K C Wong Mr. C T Chock Mr. Y F Kwong	Engineer's Representative	2762 5514	2714 0113
IEC (ENVIRON)	Mr Tony Cheng	IEC	3465 2888	3465 2899
Contractor (HKPFH-JV)	Mr. K W Li	Project Manager	9750 6438	2744 6937
ET (ETL)	Mr C. L. Lau	ET Leader	2946 7791	2695 3944

## 3.0 SUMMARY OF EM&A REQUIREMENTS

### 3.1 EM&A Programme

The EM&A programme required environmental monitoring for air quality, noise and marine water quality and environmental site inspections for air quality, noise, marine water quality, landscape and visual, and waste management. The EM&A requirements for each parameter described in the following sections include:

- All monitoring parameters;
- Monitoring schedules for the reporting month and forthcoming months;
- Action and Limit levels for all environmental parameters;
- Event/Action Plans;
- Environmental mitigation measures, as recommended in the Project EIA study final report; and
- Environmental requirements in contract documents.

The advice on implementation status of environmental protection and pollution control/mitigation measures is summarized in Section 5 of the Report.

### 3.2 Monitoring Stations and Parameters

The EM&A Manual designates several locations to monitor environmental impacts in terms of air quality, noise and water quality due to the Project. The description and detailed locations of monitoring stations for air quality, noise and marine water quality are shown in Figures 1, 2 and 3 and relevant sections of this Report.

### 3.3 Monitoring Methodology and Calibration Details

All monitoring works were conducted and monitoring equipment was calibrated in according with the EM&A Manual.

### 3.4 Environmental Quality Performance Limits (Action/Limit Levels)

The environmental quality performance limits, i.e. Action/Limit Levels (AL Levels) were derived from the baseline monitoring results. If the measured environmental quality parameters exceed the AL Levels, the respective action plan will be implemented. The AL Levels for each monitoring parameter are given in Appendix I E. The event action plan is given in Appendix I F.

### 3.5 Environmental Mitigation Measures

Relevant mitigation measures were recommended in the EM&A Manual for the Contractor to implement. A list of mitigation measures is given in Appendix I H.

## 4.0 MONITORING RESULTS

### 4.1 Air Quality

In accordance with the EM&A Manual, 1-hr and 24-hr TSP air quality monitoring were conducted three times and once per six days correspondingly.

No exceedance of Action and Limit levels was recorded for 1-hr and 24-hr TSP monitoring in this quarter. The trend of air quality during the reporting quarter is present in Appendix I B. Wind data included wind speed and wind direction were extracted from Tseung Kwan O Station of Hong Kong Observatory and presented in Appendix I K.

Major dust sources in the Fill Bank were dump truck traffic and hauling activities at BHA.

Table 4.1 presents the number of exceedances recorded in each month of the reporting quarter. The number of monitoring event included regular monitoring events and additional ones.

Table 4.1 Summary of Number of Exceedances for 1-hr and 24-hr TSP Monitoring

Monitoring Parameter	Level of Exceedance	21 to 31 January 2014	February 2014	March 2014
24-hr TSP	No of monitoring events	2	5	5
	Action Level	0	0	0
	Limit Level	0	0	0
1-hr TSP	No of monitoring events	6	13	16
	Action Level	0	0	0
	Limit Level	0	0	0

Table 4.2 presents the 1-hr and 24-hr TSP averages in the baseline period and for each month in the reporting quarter. It was found that the 1-hr and 24-hr TSP averages at both stations in the reporting quarter were higher than the baseline levels but they were within the AL Levels. As a result, the Contractor should provide more mitigation measures refer to the EM&A Manual to avoid dust generation.

Table 4.2 Comparison of Baseline and Various Period of Averaged 1-hr and 24-hr TSP Impact monitoring Results

Period	1-hr TSP ( $\mu\text{g}/\text{m}^3$ )		24-hr TSP ( $\mu\text{g}/\text{m}^3$ )	
	TKO-A1	TKO-A2a	TKO-A1	TKO-A2a
Baseline (29/08 – 13/09)	195		123	
21-31 January 2014	229	245	133	139
February 2014	268	244	119	110
March 2014	266	261	151	165



## 4.2 Noise

Noise monitoring was required to be conducted at least once per month. Only daytime noise was monitored in the reporting quarter.

All recorded noise levels complied with the AL Levels. The registered noise levels in the past three months are plotted in Appendices C. Table 4.3 presents the limited level and average impact noise monitoring results during the reporting quarter.

Table 4.3 Summary of Impact Monitoring results of Noise Daytime Monitoring

Monitoring Location	Limit Level	21 to 31 January 2014	February 2014	March 2014
		Leq, dB(A)		
TKO-N1	75	64.4	65.2	61.0

The major noise sources in the reporting quarter were dump truck traffic and construction activities near the site egress. The noise impact was insignificant as the Fill Bank was remote from sensitive receivers.

## 4.3 Marine Water Quality

In accordance with the EM&A Manual, the marine water quality monitoring was conducted at the monitoring station (M4) and the control station (C1) in the reporting quarter.

Impact marine water quality monitoring was conducted three days per week. Measurements were taken at both mid-ebb and mid-flood tides at three depths (i.e. 1m below surface, mid depth and 1m above seabed). The AL Levels are included in Appendix I E.

Table 4.4 presents the total number of marine water quality exceedances in the reporting quarter. The trend of marine water quality in the past three months is depicted in Appendix I D.

Table 4.4 Total Number of Marine Water Quality Exceedances in the Quarter

Parameter	Exceedance Level	21 to 31 January 2014	February 2014	March 2014
Number of monitoring days		4	11	13
Dissolved Oxygen, DO (S&M)	Action	0	0	0
	Limit	0	0	0
Dissolved Oxygen, DO (B)	Action	0	0	0
	Limit	0	0	0
Turbidity	Action	0	0	0
	Limit	0	0	0
Suspended Solids, SS	Action	0	0	0
	Limit	0	0	0
Total Number Exceedances	Action	0	0	0
	Limit	0	0	0

A comparison between the quarterly mean/median of SS and the 1.3 times of the baseline mean was made for each tide at each station. The statistical analysis results are given in Appendix I I and it shows that a generally better marine quality was recorded in the reporting quarter in respect to 130% of the baseline mean. Monitoring stations with significant difference ( $p < 0.05$ ) is summarized in Table 4.5.

Table 4.5 Summary of Statistically Significant Results of SS

Monitoring Station	Significant difference?	
	Mid-ebb	Mid-flood
C1	X	X
M4	X	X

## 5.0 INSPECTION RESULTS

### 5.1 Implementation Status of Environmental Mitigation Measures

ET conducted weekly site inspections to monitor the Contractor's implementation of environmental mitigation measures. After each site inspection, the Contractor was notified of ET's observations and recommendations. A corrective action plan detailing the environmental observations was prepared by ET and the Contractor then completed this plan to propose/report their remedial works.

Air quality was the major environmental issue in the reporting quarter. The Contractor generally implemented most of the environmental mitigation measures in the reporting quarter. Dump truck traffic was the major dust source in the Fill Bank. Generally, the Contractor implemented adequate dust mitigation measures in the reporting quarter including dampening of haul roads, water spraying on the truckloads, operation of automatic wheel washing facilities and mist spraying systems, dampening of fill material prior to handling or stockpiling, etc.

Dump truck traffic and construction activities near the site egress were the major noise sources. As the Fill Bank was remote from the nearby NSRs, the noise impact was minimal. The powered mechanical equipment were generally operated and maintained properly.

Regarding the observations about accumulation of fill materials on the concrete pavement at the BHA in the reporting quarter, the Contractor was reminded to clean up the fill materials as soon as each unloading activity completed to avoid the fill materials from being washed into the sea. Furthermore, the Contractor should also regularly inspect and maintain the oil interceptor at the car park to ensure it properly functions.

Although there were a few observations regarding improper handling of oil drums and chemical containers, such as lack of drip tray and accumulated of stagnant water in the drip tray, the Contractor rectified most of these problems. Besides, the Contractor should provide tarpaulin sheets before repairing and maintenance works and also carry out proper cleaning activities immediately after such works.

The germination rate on the panel was satisfactory in this reporting quarter. The Contractor was reminded to maintain the panel properly.

### 5.2 Status of Environmental Licensing and Permitting

The status of licences and permits is summarized in Table 5.1.

Table 5.1 Summary of environmental licensing and permit status

Description	Permit No.	Valid Month		Section
		From	To	
Amended Environmental Permit	EP-134/2002/K	04/02/13	---	<ul style="list-style-type: none"> <li>▪ Site clearance</li> <li>▪ Construction of a temporary storm water system</li> <li>▪ Stockpiling of 6 million m3 of public fill</li> <li>▪ Setting up two barging points for transporting the stockpiled public fill by barges</li> <li>▪ Setting up a temporary barging point at the existing Explosive Off-loading Barging Point for the month of May 2004 to December 2004 for transporting the stockpiled public fill by barge</li> <li>▪ Construction of operation of a construction and Demolition Material Sorting Facility (C&amp;DMSF)</li> <li>▪ Setting up a Construction and Demolition Material Crushing Facility at the TKO Basin</li> </ul>
Chemical Waste Producer	5213-839-H3552-01	21/01/14	---	Spent Lubricating Oil and Spent Battery

Description	Permit No.	Valid Month		Section
		From	To	
Marine Dumping Permit	EP/MD/14-119	21/01/14	31/03/14	Approval for dumping 2,800,000 tons (approximately equal to 1,555,555 cu.m. bulked quantity) of Public Fill (Reclamation Materials) from Tseung Kwan O Area 137 Fill Bank and Tuen Mun Area 38 Fill Bank to designated dumping area at Guanghaiwan of Taishan
Billing Account for Waste Disposal	7018998	---	---	---
Effluent Discharge License	Application in progress			

### 5.3 Advice on Solids and Liquid Waste Management Status

The Contractor usually disposed of non-inert waste, including general refuse and materials segregated from the existing stockpiles, to SENT landfill. Table 5.2 summarizes data on offsite waste disposal in the quarter.

Table 5.2 Estimated Offsite Waste Disposal in the Reporting Quarter

Waste Type	21 to 31 January 2014	February 2014	March 2014
Public Fill (m <sup>3</sup> )	0	0	0
C&D Waste (general refuse) (kg)	7200	93500	201660
Chemical Waste (kg/L)	0	0	0

The site toilet and shower room and several chemical toilets were in use throughout the reporting quarter. Discharge from the site toilet and shower room was made to the additional drainage DP4 after passing through the sewage treatment system. A licensed collector also regularly collected waste from the chemical toilets.

## 6.0 NON-COMPLIANCE OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

### 6.1 Summary of Non-compliance

In this reporting quarter, no exceedance of Action and limit levels on marine water quality was recorded.

No exceedances on 1-hour and 24-hour TSP monitoring results were recorded in this quarter.

Besides, no day-time noise level measured at the monitoring station exceeded the Action and Limit Level in this quarter.

### 6.2 Review of the Reasons for and the Implications of Non-compliance

Since there was no exceedance recorded in this quarter, the review of the reasons for the non-compliance was not required.

### 6.3 Summary of Actions Taken

Since there was no exceedance recorded in this quarter, no further action was not required to be taken.

#### 6.4 Summary of Environmental Complaint, Notifications of Summons and Successful Prosecutions Handling

No complaint, notification of summon and successful prosecution was received. A summary of environmental complaints and prosecutions was given in Table 6.1.

Table 6.1 Summary of Environmental Complaints and Prosecutions

Period	Complaints logged	Summon served	Successful Prosecution
21 to 31 January 2014	0	0	0
February 2014	0	0	0
March 2014	0	0	0
Cumulative	0	0	0

#### 7.0 COMMENTS, CONCLUSIONS AND RECOMMENDATION

In this quarter, major activity in the Fill Bank was the import and dumping of fill material. Air quality was the major environmental issue in the Fill Bank. Generally, the Contractor implemented most of the mitigation measures to minimize the dust impact.

No exceedance of Action and Limit levels was recorded for 1-hour and 24-hour TSP monitoring in this quarter.

No exceedance of Action and Limit Level of noise was recorded in this reporting quarter.

No exceedance of Action and limit level on marine water quality was recorded in this quarter.

No complaint, notification of summons and successful prosecution with respect to environmental issues was received in this quarter.

According to the ET weekly site inspection and IEC site audits carried out in this quarter, it was indicated that site practices of the Contractor were generally undertaken in an environmentally acceptable manner and the overall site environmental performance was up to standard. The Contractor generally implemented sufficient dust mitigation measures, including operation of the mist spraying systems and automatic wheel washing facilities, dampening of haul roads and stockpiling areas.

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

##### **Air Quality**

- Ensure the frequency of water spraying on haul roads, unloading areas and stockpiles to be sufficient to suppress the dust sources;
- Provide proper maintenance for the powered mechanical equipment and barges to avoid emission of dark smoke;
- Provide water spraying onto the truckloads during inspection of fill material;
- Conduct road sweeping on all paved haul roads and public roads especially outside and near the site egress by the road sweeper. Undertake water spraying on stockpiling area by water bowers;
- Erect adequate speed limit signs to advise the truck drivers of the speed limit;
- Operate mist spraying systems and automatic water sprinklers in the Fill Bank;
- Implement the dust mitigation measures for the site activities;
- Designate proper haul roads to ensure effective water spraying; and
- Ensure all vehicles to be washed before leaving the site egress by provision, operation and maintenance of automatic wheel washing facilities.

##### **Noise**

- Conduct noisy activities at a farther location from the NSRs.

#### **Water Quality**

- Maintain the drainage system, including the trapezoidal channels, permanent desilting chambers, DP3 & DP4 regularly;
- Operate and maintain the silt curtains regularly;
- Operate the cleaning vessel within the TKO Basin regularly;
- Provide proper treatment for the oil discharge from the area near air monitoring station TKO-A1;
- Clean up the fill material on the concrete pavement at BHA frequently; and
- Remove the stagnant water or provide approved pesticides for the stagnant water in the permanent desilting chambers, if any.

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

- Remove waste materials from the site to avoid accumulation regularly;
- Handle and store chemical wastes properly;
- Remove unwanted material in the existing stockpiles and avoid further dumping of such material;
- Provide and maintain sufficient drip trays for diesel drums, chemical containers, chemical waste storage drums and diesel operated generator set;
- Maintain mesh screen on top of the additional drainage, DP3 to avoid improper dumping of rubbish;
- Maintain good housekeeping at the workshop area;
- Ensure sufficient tarpaulin sheets are provided to cover drip trays; and
- Avoid soil being polluted during oil filling and equipment maintenance; hence, properly remove and store the contaminated soil, if any.

#### **Landscape and Visual**

- Provide hydroseeding on the exposed slopes, on which the final profile has been formed;
- Erect all the site hoarding/chaining fences in accordance with agreed design at proper location;
- Maintain the hydroseeding slopes in accordance with the Landscape Plan.

- END OF REPORT -

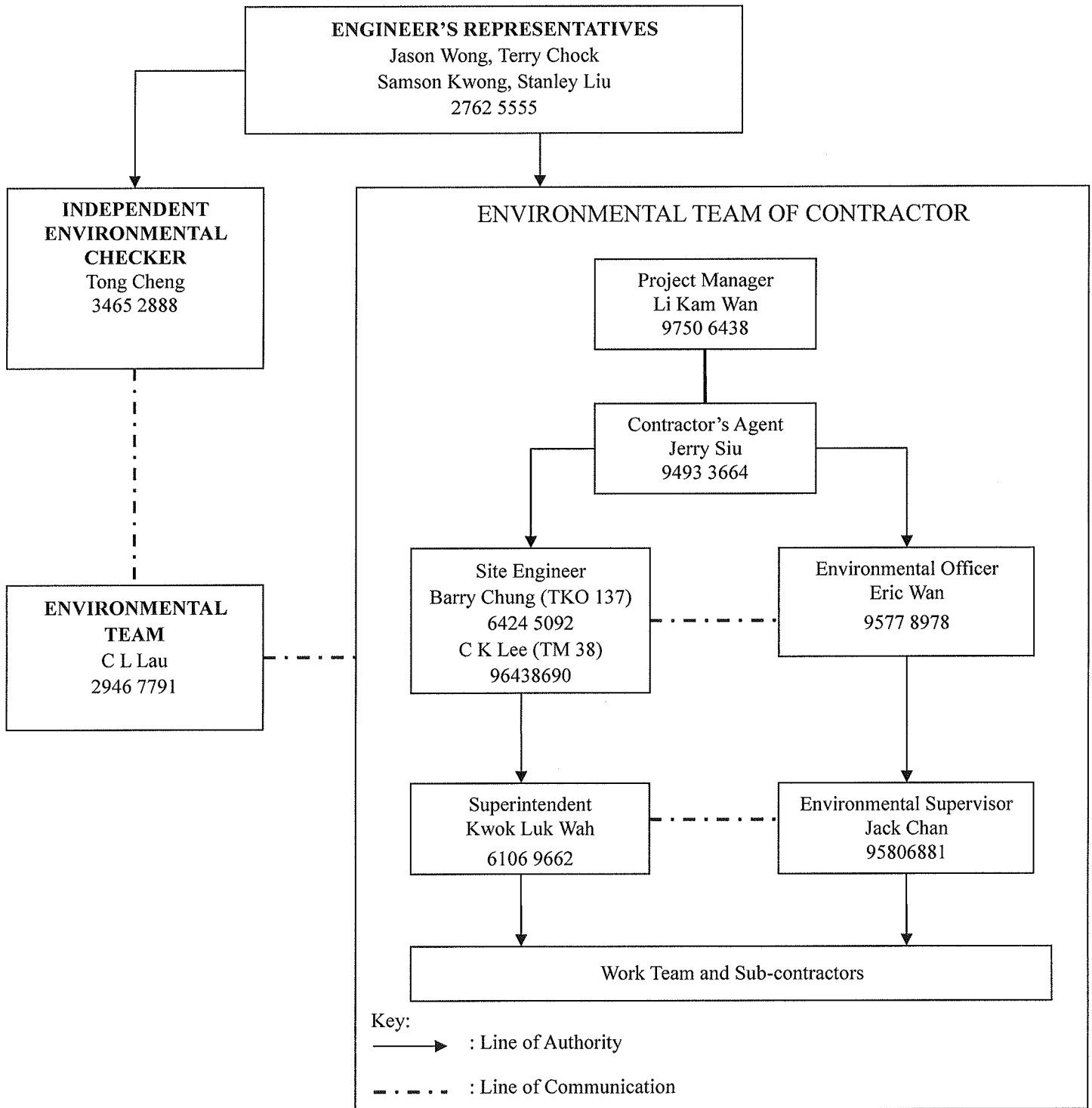


## Appendix I

### A

## Organization Chart

Organization Chart and Contact List for Environmental Management Team of Contractor





## **Appendix I**

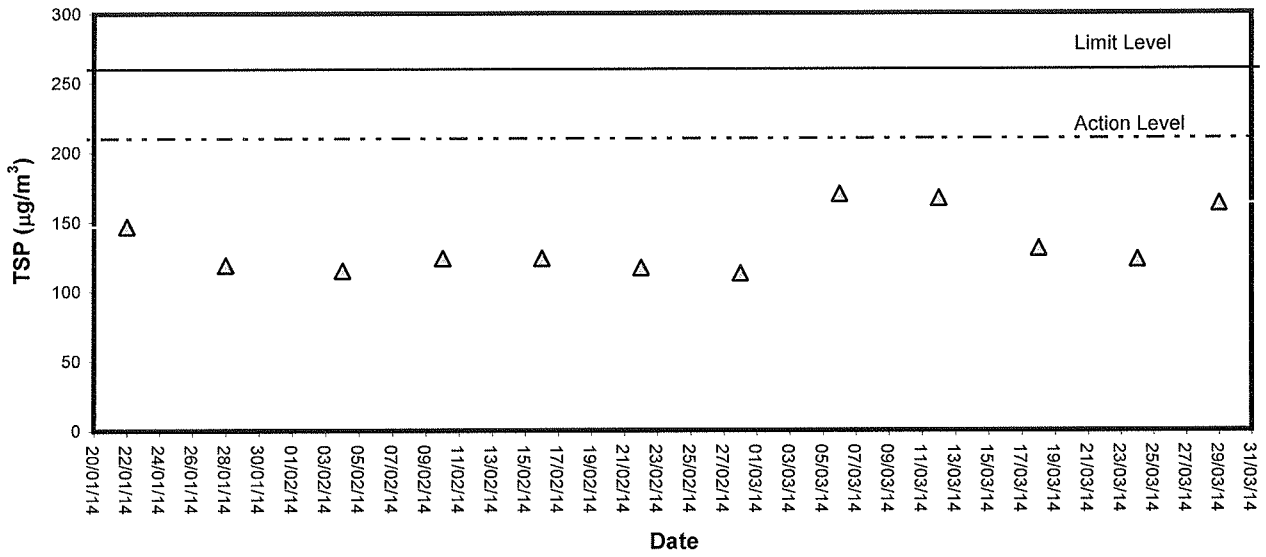
### **B**

## **Graphical Plots of Air Quality Monitoring Data**

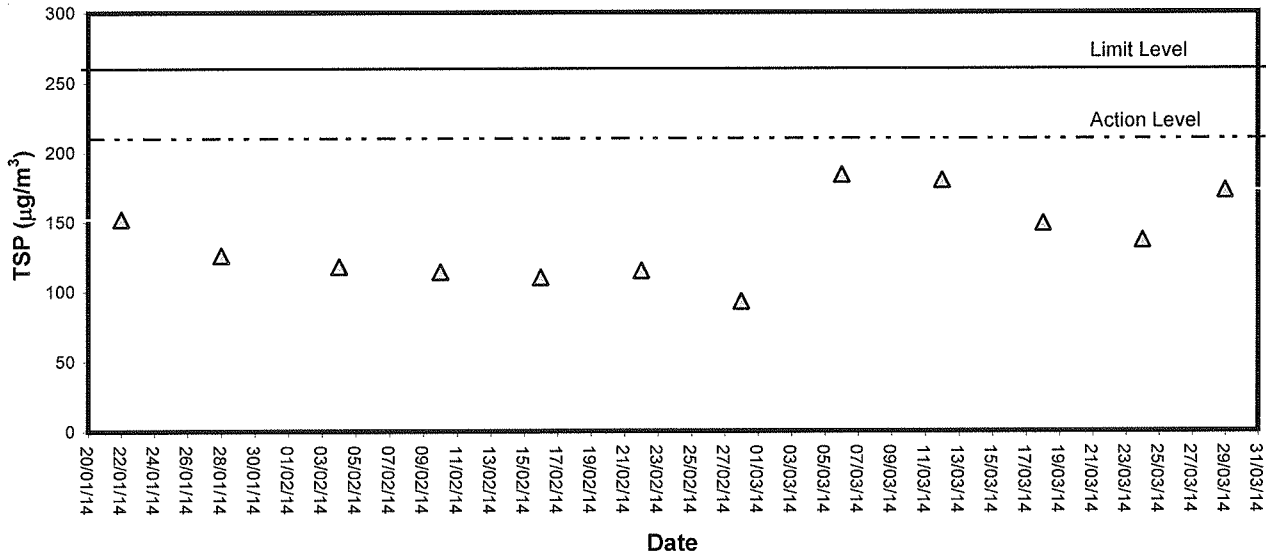




**24-hour TSP level at TKO-A1**

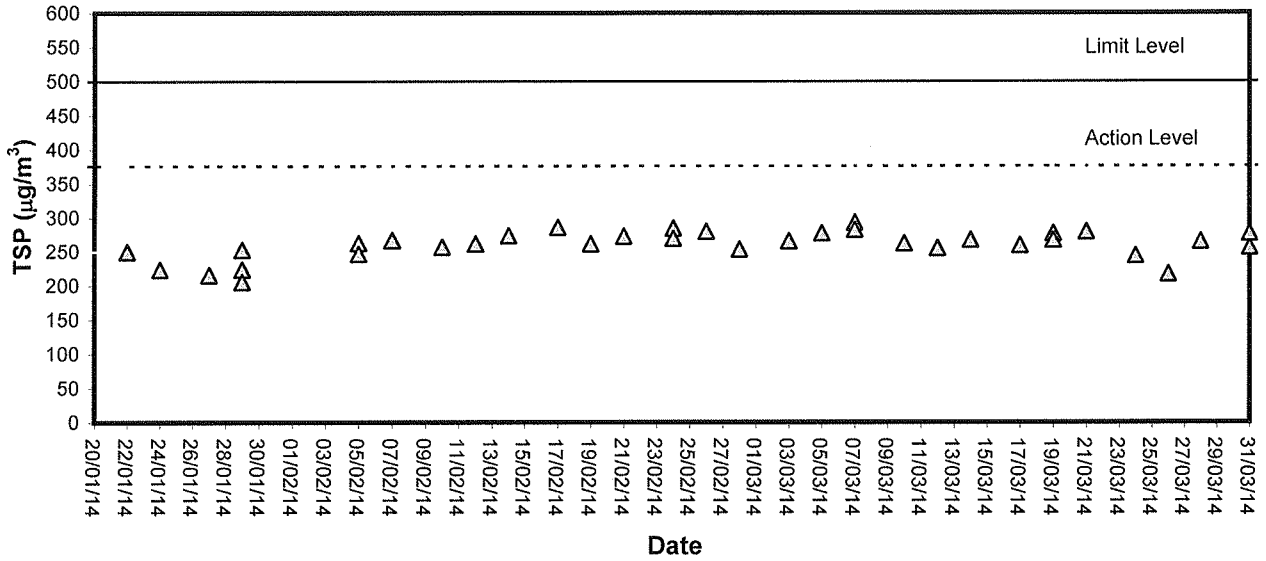


**24-hour TSP level at TKO-A2a**

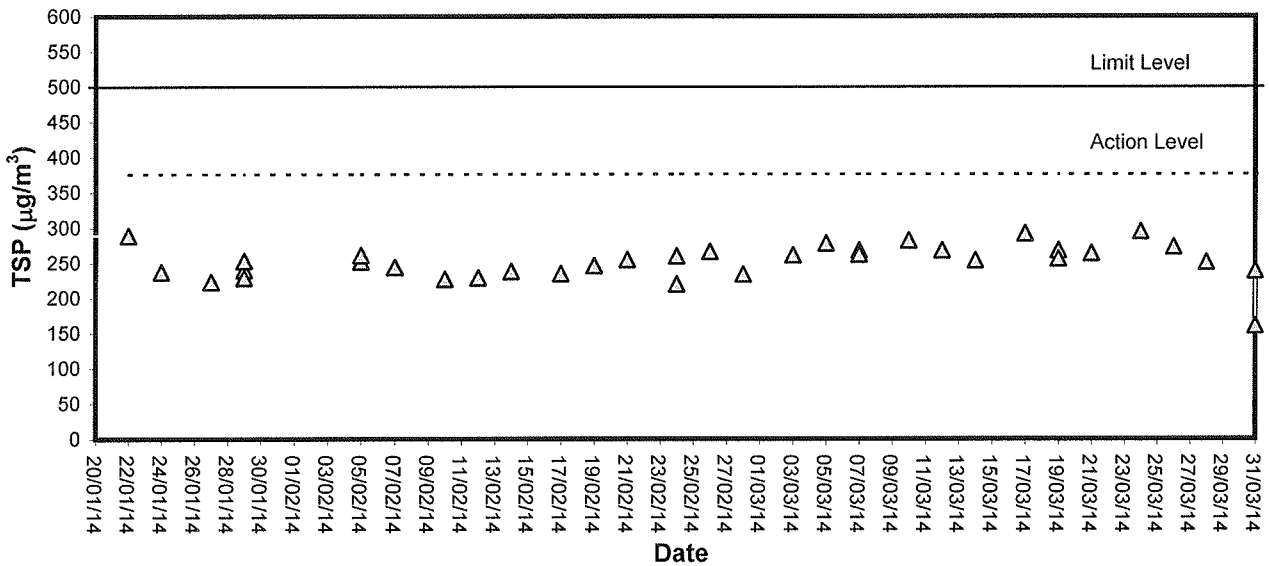




### 1-hour TSP level at TKO-A1



### 1-hour TSP level at TKO-A2a



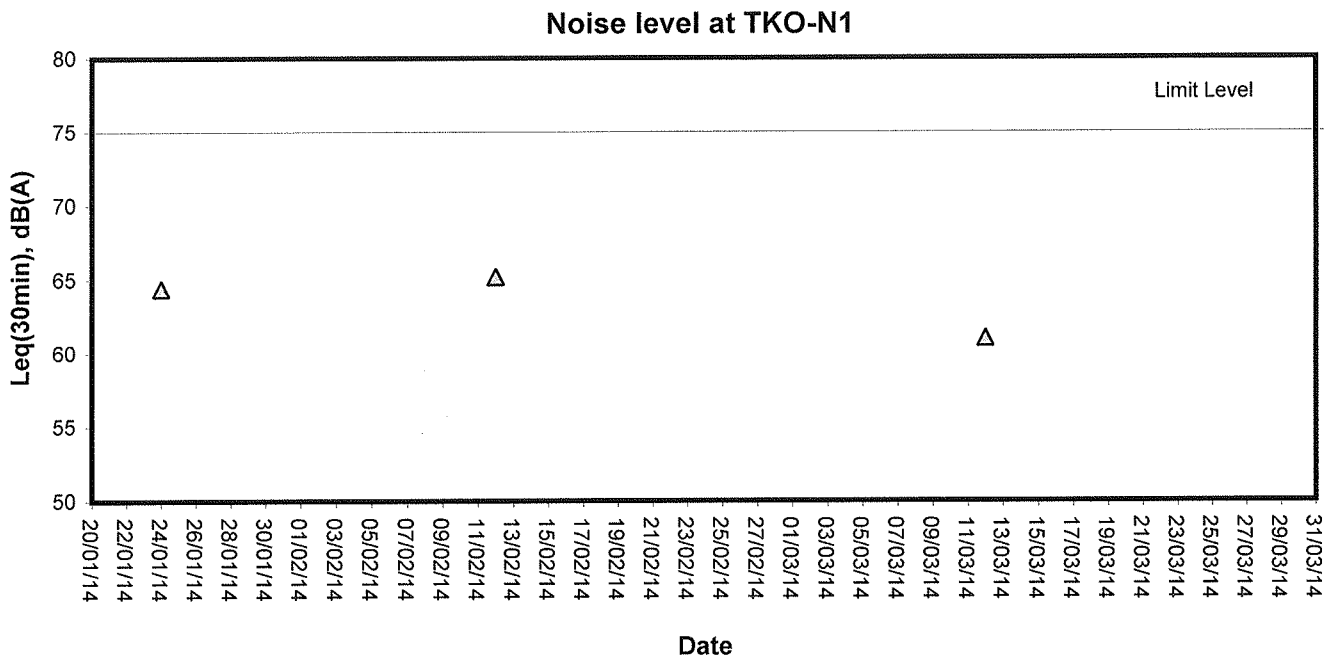
## **Appendix I**

### **C**

## **Graphical Plots of Noise Monitoring Data**



## Noise Monitoring (Day-time)



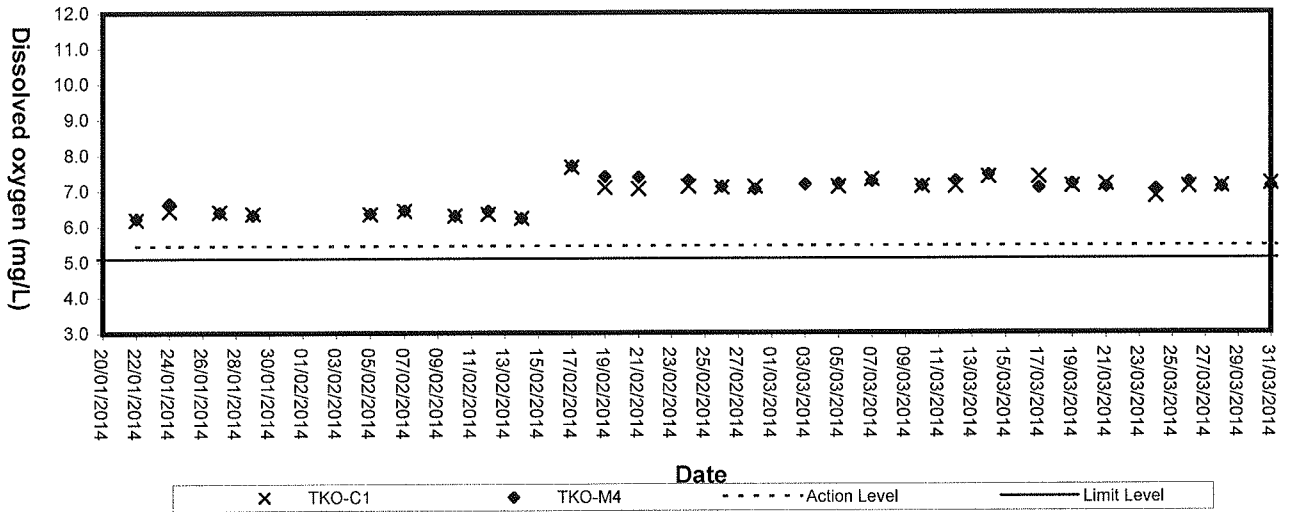
## **Appendix I**

### **D**

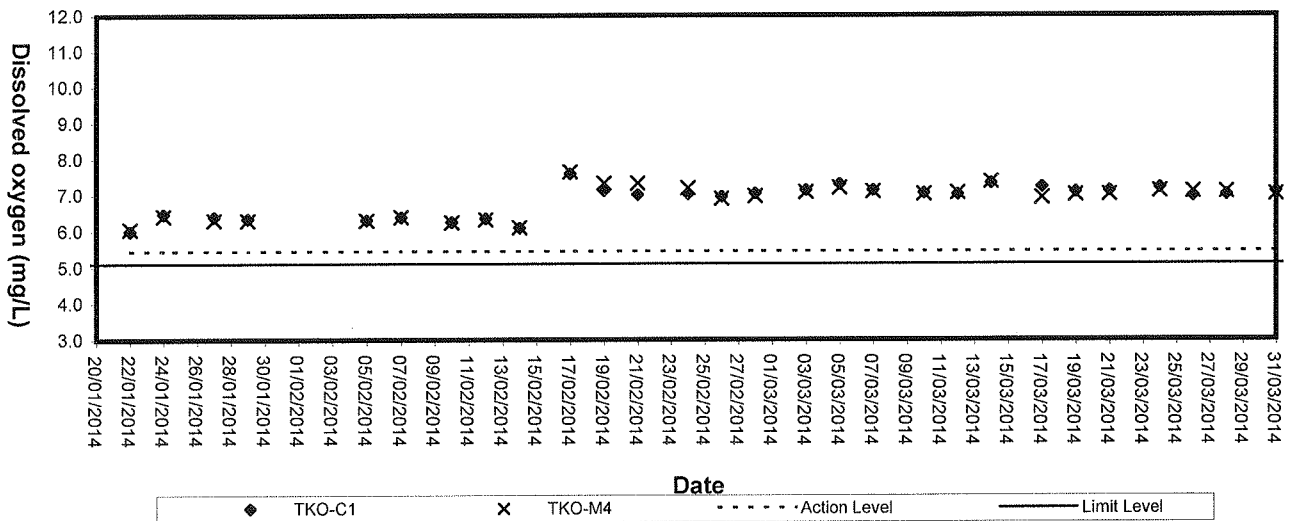
#### **Graphical Plots of Impact Marine Water Quality Monitoring Data**



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

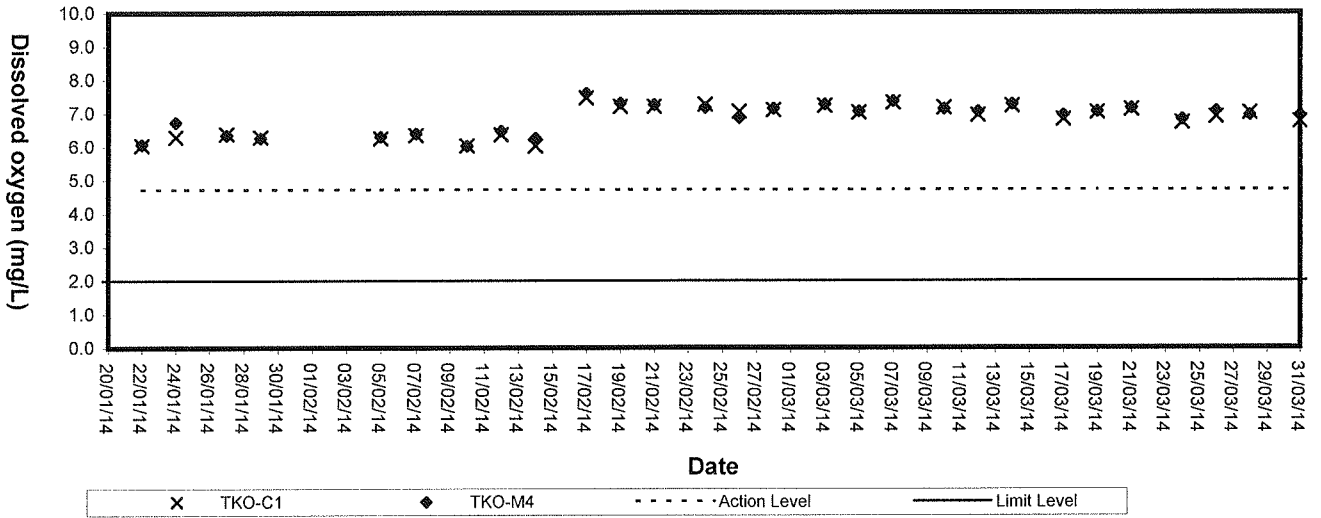


### Dissolved Oxygen (Surface & Middle) at Mid-Ebb Tide

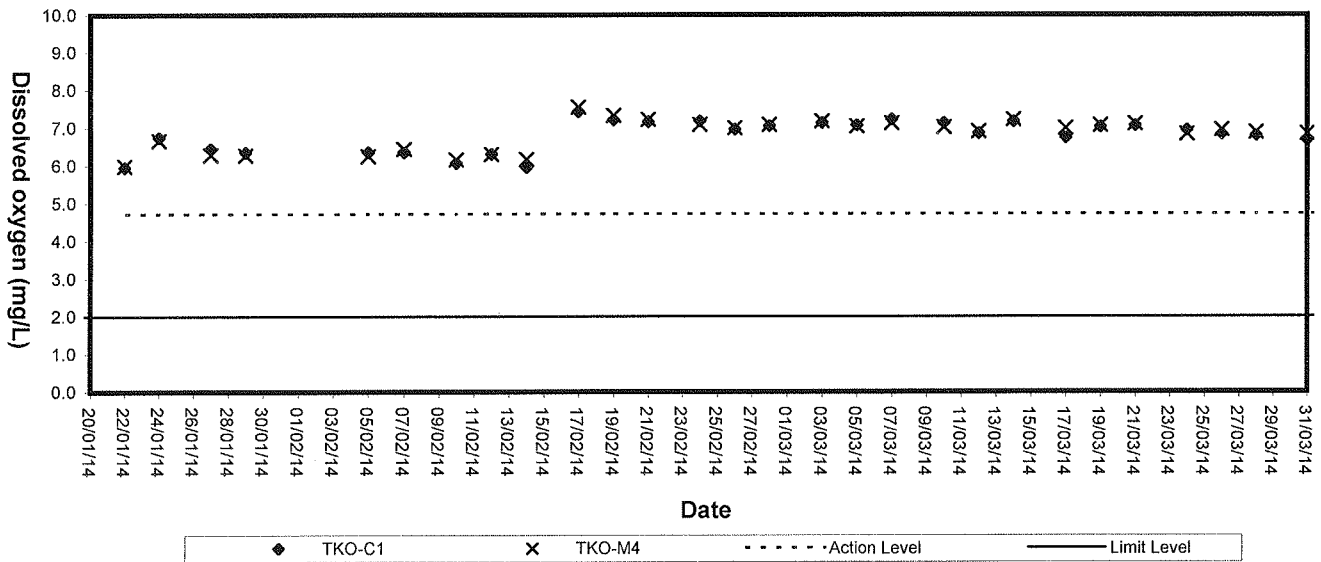




### Dissolved Oxygen (Bottom) at Mid-Flood Tide

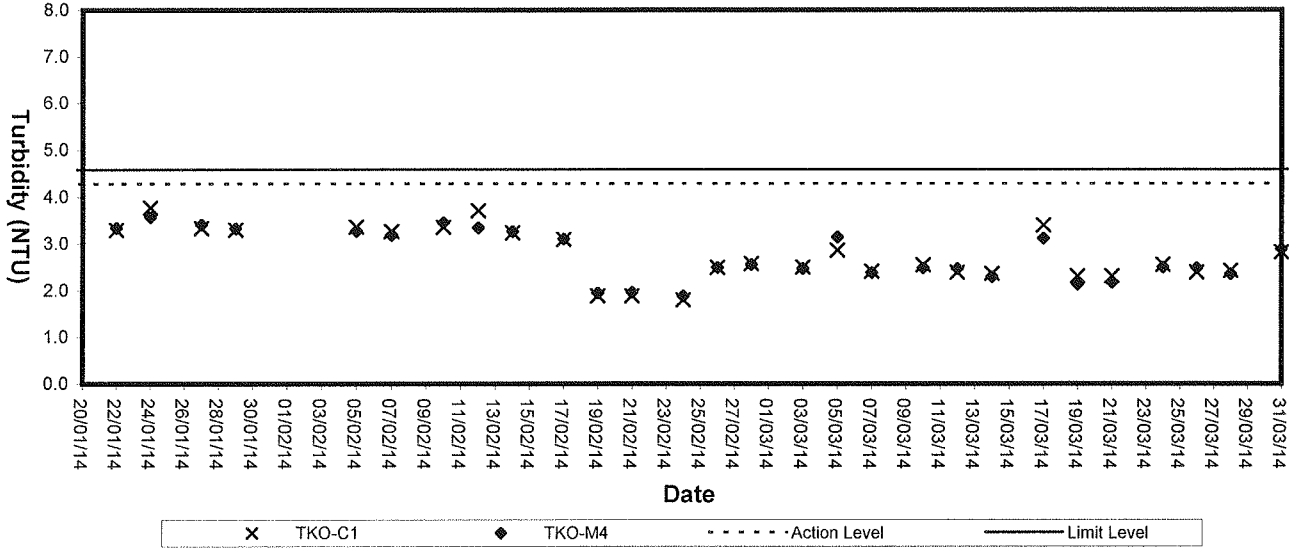


### Dissolved Oxygen (Bottom) at Mid-Ebb Tide

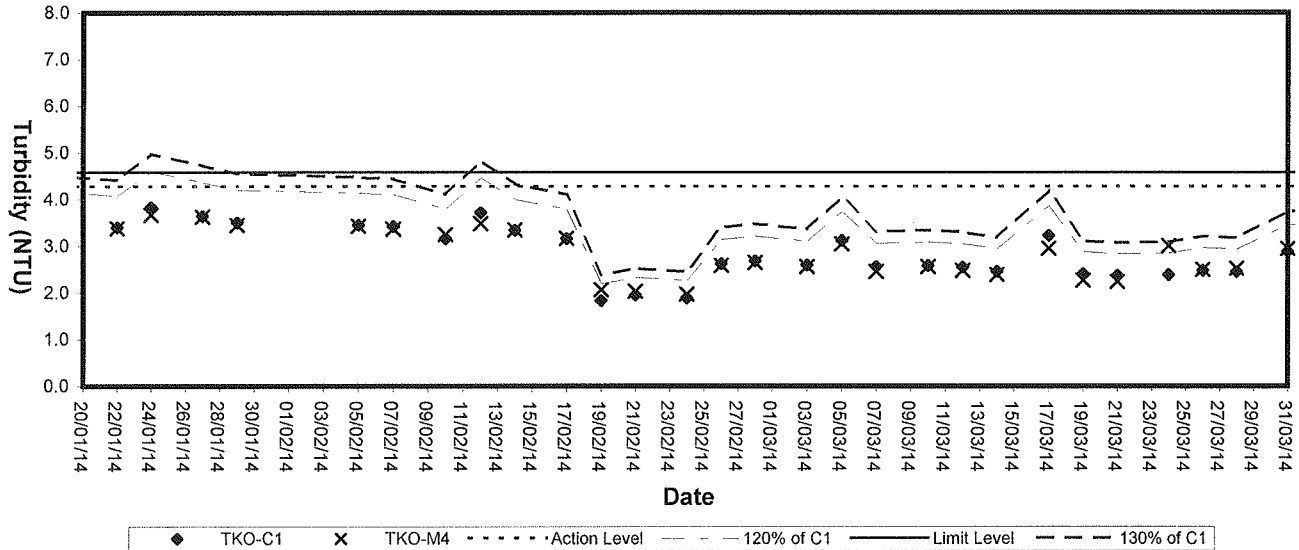




### Turbidity (Depth-average) at Mid-Flood Tide



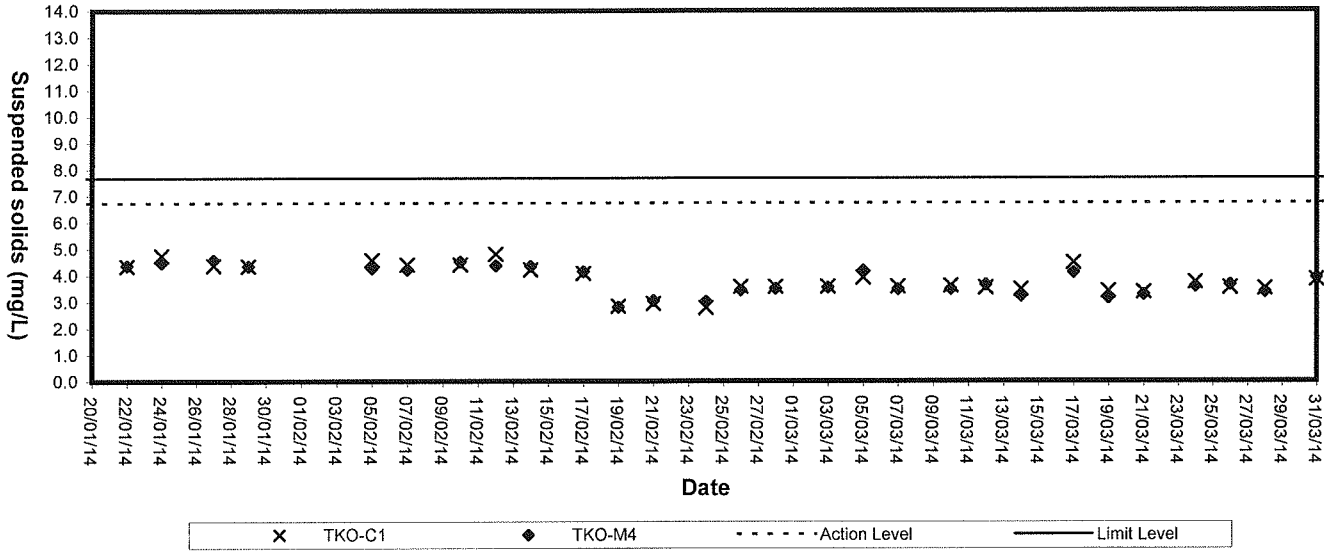
### Turbidity (Depth-average) at Mid-Ebb Tide



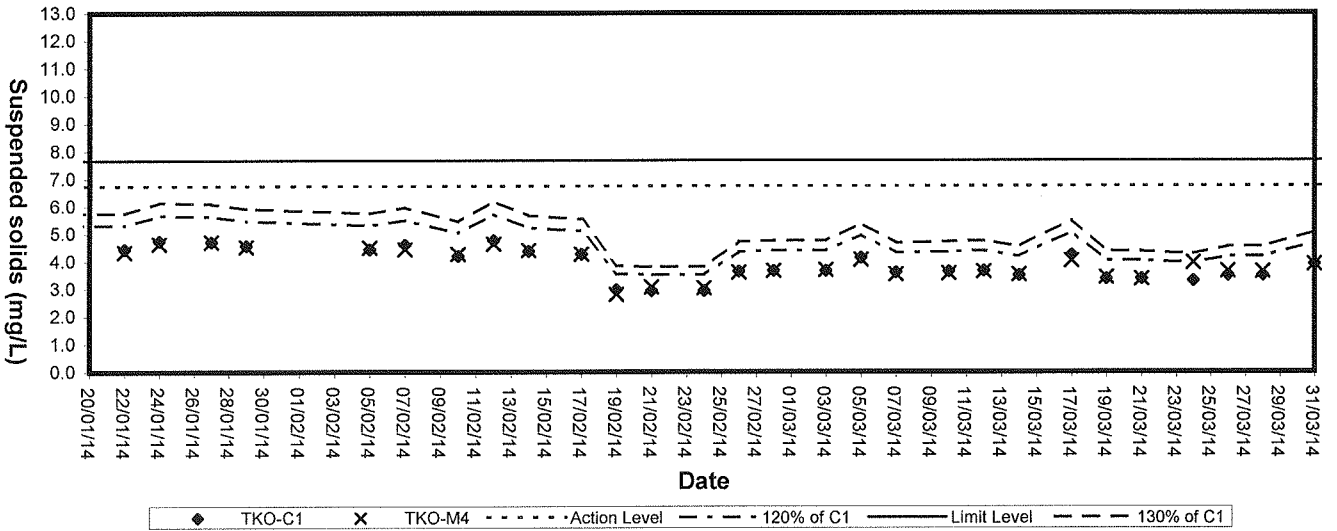




### Suspended solids (Depth-average) at Mid-Flood Tide



### Suspended Solids (Depth-average) at Mid-Ebb Tide





## Appendix I

### E

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

**Action and Limit Levels for Air Quality**

**Action and Limit Levels for 1-Hour TSP**

Location	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
A1	376	500
A2		

**Action and Limit Levels for 24-Hour TSP**

Location	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
A1	210	260
A2		

**Action and Limit Levels for Noise**

Time Period	Action	Limit
0900-2100 hrs on all days	When one documented complaint is received	75*dB(A)

**Action and Limit Levels for Water Quality**

Parameters	Action	Limit
Dissolved oxygen, DO mg/L (Surface, Middle & Bottom)	<u>Surface &amp; Middle</u> DO < 5.45 (5%-ile of baseline data) <u>Bottom</u> DO < 4.72 (5%-ile of baseline data)	<u>Surface &amp; Middle</u> DO < 5.10 (1%-ile of baseline data) <u>Bottom</u> 2 mg/L
Suspended solids, SS mg/L (Depth-averaged)	SS > 6.74 (95%-ile of baseline data or SS > 120% of upstream control stations SS at the same tide of the same day)	SS > 7.67 (99%-ile of baseline data or SS > 130% of upstream control stations SS at the same tide of the same day)
Turbidity, Tby NTU (Depth-averaged)	Tby > 4.28 (95%-ile of baseline data or Tby > 120% of upstream control stations Tby at the same tide of the same day)	Tby > 4.58 (99%-ile of baseline data or Tby > 130% of upstream control stations Tby at the same tide of the same day)



## **Appendix I**

### **F**

## **Event-Action Plans**



## EVENT/ACTION PLAN FOR AIR QUALITY EXCEEDANCE

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

## EVENT/ACTION PLAN FOR NOISE EXCEEDANCE

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

## EVENT AND ACTION PLAN FOR WATER QUALITY EXCEEDANCE

Event	ACTION			
	ET Leader	Contractor	ER	IEC
<p>Action level being exceeded by one sampling day</p>	<ol style="list-style-type: none"> <li>1. Identify source(s) of impact;</li> <li>2. Repeat in-situ measurement to confirm findings;</li> <li>3. Notify Contractor in writing within 24 hours of identification of the exceedance</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Carry out investigation</li> <li>6. Report the results of investigation to the Contractor within 3 working days of identification of exceedance and advise contractor if exceedance is due to contractor's construction works</li> <li>7. Discuss mitigation measures with Contractor if exceedance is due to the construction works within 4 working days</li> <li>8. Repeat measurement on next day of exceedance if exceedance is due to the construction works</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify the ER and IEC in writing within 24 hours of identification of exceedance</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Submit investigation report to IEC and ER within 3 working days of the identification of an exceedance</li> <li>5. Consider changes of working method if exceedance is due to the construction works</li> <li>6. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER if exceedance is due to the construction works within 4 working days of identification of an exceedance</li> <li>7. Implement the agreed mitigation measures within reasonable time scale</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify EPD and other relevant governmental agencies in writing within 24 hours of the identification of the exceedance</li> <li>2. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>3. Require contractor to propose remedial measures for the analysed problem if related to the construction works</li> <li>4. Ensure remedial measures are properly implemented</li> <li>5. Assess the effectiveness of the mitigation measure</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET</li> <li>2. Confirm ET assessment if exceedance is due / not due to the works</li> <li>3. Discuss with ET, ER and Contractor on the mitigation measures</li> <li>4. Review contractor's mitigation measures whenever necessary to ensure their effectiveness and advise the ER accordingly</li> <li>5. Supervise the implementation of mitigation measures</li> </ol>



## EVENT AND ACTION PLAN FOR WATER QUALITY

Event	ACTION		
	ET Leader	Contractor	ER
<p>Action level being exceeded by more than one consecutive sampling days</p>	<ol style="list-style-type: none"> <li>1. Identify source(s) of impact;</li> <li>2. Repeat in-situ measurement to confirm findings</li> <li>3. Notify Contractor in writing within 24 hours of identification</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Carry out investigation</li> <li>6. Report the results of investigation to the Contractor within 3 working days of identification of exceedance and advise contractor if exceedance is due to contractor's construction works</li> <li>7. Discuss mitigation measures with IEC and Contractor within 4 working of identification of an exceedance</li> <li>8. Ensure mitigation measures are implemented;</li> <li>9. Prepare to increase the monitoring frequency to daily;</li> <li>10. Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify IEC and ER in writing within 24 hours of identification of exceedance</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>5. Submit the results of the investigation to IEC and ER within 3 working days of the identification of an exceedance</li> <li>6. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 4 working days of identification of an exceedance</li> <li>7. Implement the agreed mitigation measures within reasonable time scale</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify EPD and other relevant governmental agencies in writing within 24 hours of the identification of the exceedance</li> <li>2. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>3. Require contractor to propose remedial measures for the analysed problem if related to the construction works</li> <li>4. Ensure remedial measures are properly implemented</li> <li>5. Assess the effectiveness of the mitigation measure</li> </ol>
			<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET</li> <li>2. Confirm ET assessment if exceedance is due / not due to the works</li> <li>3. Discuss with ET, ER and Contractor on the mitigation measures.</li> <li>4. Review contractor's mitigation measures whenever necessary to ensure their effectiveness and advise the ER accordingly</li> <li>5. Assess the effectiveness of the implemented mitigation measures.</li> </ol>

**EVENT AND ACTION PLAN FOR WATER QUALITY EXCEEDANCE**

Event	ACTION		
	ET Leader	Contractor	ER IEC
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Notify Contractor in writing within 24 hours of identification of the exceedance</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Carry out investigation</li> <li>6. Report the results of investigation to the Contractor within 3 working days of identification of exceedance and advise contractor if exceedance is due to contractor's construction works</li> <li>7. Discuss mitigation measures with IEC, ER and Contractor within 4 working of identification of an exceedance</li> <li>8. Ensure mitigation measures are implemented;</li> <li>9. Increase the monitoring frequency to daily until no exceedance of Limit Level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify IEC and ER in writing; within 24 hours of the identification of the exceedance</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>5. Submit the results of the investigation to IEC and ER within 3 working days of the identification of an exceedance</li> <li>6. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 4 working days of the identification of an exceedance</li> <li>7. Implement the agreed mitigation measures within reasonable time scale</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify EPD and other relevant governmental agencies in writing within 24 hours of identification of exceedance</li> <li>2. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>3. Request Contractor to critically review the working methods;</li> <li>4. Ensure remedial measures are properly implemented</li> <li>5. Assess the effectiveness of the implemented mitigation measures.</li> </ol>
			<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET</li> <li>2. Confirm ET assessment if exceedance is due / not due to the works</li> <li>3. Discuss with ET, ER and Contractor on the mitigation measures.</li> <li>4. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly.</li> <li>5. Assess the effectiveness of the implemented mitigation measures</li> </ol>

## EVENT AND ACTION PLAN FOR WATER QUALITY EXCEEDANCE

Event	ACTION			IEC
	ET Leader	Contractor	ER	
Limit Level being exceeded by more than one consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurement to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Notify Contractor in writing within 24 hours of identification of the exceedance</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Carry out investigation</li> <li>6. Report the results of investigation to the Contractor within 3 working days of identification of exceedance and advise contractor if exceedance is due to contractor's construction works</li> <li>7. Discuss mitigation measures with IEC, ER and Contractor;</li> <li>8. Ensure mitigation measures are implemented;</li> <li>9. Increase the monitoring frequency to daily until no exceedance of Limit Level for two consecutive days.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify ER and IEC in writing within 24 hours of the identification of the exceedance and Rectify unacceptable practice;</li> <li>2. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>8. Submit the results of the investigation to IEC and ER within 3 working days of the identification of an exceedance</li> <li>5. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 4 working days;</li> <li>6. Implement the agreed mitigation measures within reasonable time scale</li> <li>7. As directed by the Engineer, to slow down or to stop all or part of the marine work or construction activities.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify EPD and other relevant governmental agencies in writing within 24 hours of identification of exceedance</li> <li>2. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>3. Request Contractor to critically review the working methods;</li> <li>6. Ensure remedial measures are properly implemented</li> <li>4. Assess the effectiveness of the implemented mitigation measures;</li> <li>5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit Level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET</li> <li>2. Confirm ET assessment if exceedance is due / not due to the works</li> <li>3. Discuss with ER, ET and Contractor on the mitigation measures.</li> <li>4. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly.</li> <li>5. Assess the effectiveness of the implemented mitigation measures.</li> </ol>

## **Appendix I**

### **G**

## **Work Programme**

Master Programme of Contract No. CV/2013/06 - Handling of Surplus Public Fill

Site Location : Tseung Kwan O Area 137 Fill Bank

ID	Activity	Original Duration	Start	Finish
A1150	Take Over	0	23-Jan-14	
A1170	Operation	1100	23-Jan-14	26-Jan-17
A1370	Hand Over to CEDD	0		26-Jan-17
Stage A1 Construction of New Office				
A1080	Submission	30	28-Nov-13	27-Dec-13
A1090	Approval by Engineer	7	28-Dec-13	03-Jan-14
A1100	Installation	64	23-Jan-14	27-May-14
A1110	Hand Over to Engineer	0		27-May-14
Stage A1 Surveillance System				
A1190	Submission	30	28-Nov-13	27-Dec-13
A1200	Approval by Engineer	7	28-Dec-13	03-Jan-14
A1210	Installation	64	23-Jan-14	27-May-14
A1230	Hand Over to Engineer	0		27-May-14

## **Appendix I**

### **H**

# **Implementation Schedule of Environmental Mitigation Measures (EMIS)**

## Environmental Mitigation Implementation Schedule

Environmental Protection Measures		Location	Implementation Status		
Air Quality	Implemented		Partially implemented	Not implemented	Not Applicable
<ul style="list-style-type: none"> <li>Dust control / mitigation measures shall be provided to prevent dust nuisance.</li> <li>A buffer zone of at least 100m shall be maintained between the edge of the stockpiling area and the nearest ASRs at the TKO Industrial Estate. Within the buffer zone, no dusty material shall be stockpiled and no loading / unloading and similar activities should be allowed.</li> <li>Water sprays shall be provided and used to dampen materials.</li> <li>Regular cleaning and watering the site shall be provided to minimize the fugitive dust emissions.</li> <li>All vehicles shall be restrict to a maximum speed of 10 km per hour.</li> <li>Any vehicle with open load carrying area used for moving materials which has the potential to create dust shall have properly fitting side and tail boards. Material 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.</li> <li>The designated site main haul rout shall be paved or regular watering.</li> <li>Frequent watering of work site shall be at least three times per day.</li> <li>Wheel washing facilities including high pressure water jet shall be provided at the entrance of work site.</li> <li>Every vehicle shall be washed to remove any dusty materials from its body and wheels before leaving the fill bank.</li> <li>The temporary slope surfaces, especially those facing to the north of the site shall be covered with impermeable sheet or sprayed with water or protected by other method approved by CEDD.</li> <li>Final slope surfaces, especially those facing to the north of the site shall be treated by compaction, followed by hydroseeding, vegetation planting or sealing with shotconcrete, latex, vinyl, bitumen, or other suitable surface stabilizer approved by CEDD.</li> <li>When fill material is transfer by belt conveyor systems, the conveyors shall be enclosed on top and 2 sides.</li> <li>The belt scraper shall be equipped with bottom plates or other similar means to prevent falling of material from the return belt.</li> <li>The level of stockpiling belt conveyor shall be adjustable such that the vertical distance between the belt conveyor and the material landing point is maintained at no more than 1m.</li> <li>All plant and equipment should be well maintained e.g. without black smoke emission.</li> </ul>			√		
<b>Noise Impact</b>					
<ul style="list-style-type: none"> <li>Approved method of working, equipment and sound-reducing measures (e.g. use of silenced type of equipment, etc.) shall be adapted.</li> <li>Only well maintained plant should be operated on-site and plant should be serviced regularly during the construction works.</li> <li>Powered mechanical equipment (PME) should be covered or shielded by appropriate acoustic materials.</li> <li>Air compressors and hand held breakers should have noise labels.</li> <li>Machines and plants that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.</li> <li>Noisy equipment and mobile plant shall always be site away from NSRs.</li> </ul>					
		All areas		√	
		Northern Site Boundary	√		
		All areas	√		
		All areas	√		
		All areas	√		
		Site Egress	√		
		All haul roads		√	
		All areas	√		
		Site Egress	√		
		Site Egress	√		
		All areas	√		
		All areas	√		
		C&DMSF			√
		C&DMFS			√
		C&DMFS			√
			√		
		All areas	√		
		All areas	√		
		All areas	√		
		All areas	√		
		All areas	√		
		All areas	√		

Remark: √ = Implemented, ∇ = Partially Implemented X = Not Implemented N/A = Not Applicable







## **Appendix I**

### **I**

## **Statistical Analysis of the Trend of Suspended Solids in the Quarter**

## Statistical Analysis of the Trend of Suspended Solids

### For Mid-Flood Tide

#### Station: M4

#### t-test

Group Name	N	Missing	Mean	Std Dev	SE
130% Baseline Mean	12	0	6.969	1.069	0.3086
Quarterly Mean	28	0	3.7762	0.5296	0.1001

#### Result:

Probability that two variances are equal (f-test) = 0.00142

Difference between means = 3.1928 (Std Dev = 1.1865 and SE = 0.3244)  
(95% CI : 2.557 < Diff < 3.8286)

t-value of difference = 9.842 (12 degrees of freedom)  
P = 1 (>0.05)

#### Conclusion:

There is no statistically significant difference between the groups.

#### Station: C1

#### t-test

Group Name	N	Missing	Mean	Std Dev	SE
130% Baseline Mean	12	0	6.969	0.950	0.2742
Quarterly Mean	28	0	3.8333	0.5588	0.1056

#### Result:

Probability that two variances are equal (f-test) = 0.01205

Difference between means = 3.1357 (Std Dev = 1.1142 and SE = 0.2939)  
(95% CI : 2.5597 < Diff < 3.7117)

t-value of difference = 10.67 (13.9 degrees of freedom)  
P = 1 (>0.05)

#### Conclusion:

There is no statistically significant difference between the groups.

## Statistical Analysis of the Trend of Suspended Solids

### For Mid-Ebb Tide

#### Station: M4

#### t-test

Group Name	N	Missing	Mean	Std Dev	SE
130% Baseline Mean	12	0	6.897	1.449	0.4183
Quarterly Mean	28	0	3.8893	0.5247	0.0992

#### Result:

Probability that two variances are equal (f-test) = 0.000001

Difference between means = 3.0077 (Std Dev = 1.5049 and SE = 0.4299)  
(95% CI : 2.1651 < Diff < 3.8503)

t-value of difference = 6.997 (11.8 degrees of freedom)  
P = 0.99999 (>0.05)

#### Conclusion:

There is no statistically significant difference between the groups.

#### Station: C1

#### t-test

Group Name	N	Missing	Mean	Std Dev	SE
130% Baseline Mean	12	0	6.933	1.045	0.3017
Quarterly Mean	28	0	3.8774	0.5685	0.1074

#### Result:

Probability that two variances are equal (f-test) = 0.00483

Difference between means = 3.0556 (Std Dev = 1.1929 and SE = 0.3202)  
(95% CI : 2.428 < Diff < 3.6832)

t-value of difference = 9.542 (13.4 degrees of freedom)  
P = 1 (>0.05)

#### Conclusion:

There is no statistically significant difference between the groups.



## **Appendix I**

### **J**

## **Site General Layout plan**



## **Appendix I**

### **K**

#### **Weather Condition**

## Extract of Meteorological Observations for Tseung Kwan O Automatic Weather Station, January 2014

Date	Mean Pressure at M.S.L. (hPa)	Air Temperature			Mean Dew Point Temperature (deg C)	Relative Humidity		
		Max. (deg C)	Mean (deg C)	Min. (deg C)		Max. (%)	Mean (%)	Min. (%)
Jan 1	*****	21.3	13.1	8.4	3.9	87	59	23
Jan 2	*****	20.4	15.3	10.2	10.6	99	75	49
Jan 3	*****	24.9	18.6	14.4	13.0	91	72	47
Jan 4	*****	22.8	17.6	13.7	5.5	81	47	26
Jan 5	*****	18.7	14.5	10.0	7.0	87	62	35
Jan 6	*****	18.5	15.6	13.5	10.3	89	71	54
Jan 7	*****	17.6	16.8	15.7	13.4	93	81	67
Jan 8	*****	22.9	18.2	13.5	15.4	99	84	65
Jan 9	*****	16.4	14.5	12.8	7.7	79	64	55
Jan 10	*****	15.7	14.6	13.5	10.1	83	75	66
Jan 11	*****	19.2	15.6	12.7	11.4	91	77	53
Jan 12	*****	22.7	16.6	12.4	11.0	98	72	48
Jan 13	*****	17.2	12.9	9.9	6.4	79	65	49
Jan 14	*****	17.5	12.4	8.6	5.3	86	63	45
Jan 15	*****	16.5	12.3	7.8	3.9	83	59	32
Jan 16	*****	16.8	13.2	9.9	6.6	88	65	42
Jan 17	*****	21.5	14.5	10.6	9.8	97	77	39
Jan 18	*****	21.1	15.2	11.7	3.1	89	47	23
Jan 19	*****	17.1	13.1	10.2	7.3	87	70	42
Jan 20	*****	22.9	15.0	9.4	3.0	87	49	20
Jan 21	*****	18.4	14.0	11.0	-5.4	40	26	15
Jan 22	*****	17.5	11.4	7.6	-1.6	81	44	20
Jan 23	*****	15.9	11.4	8.0	6.2	90	73	41
Jan 24	*****	18.5	14.7	10.0	10.2	91	75	53
Jan 25	*****	21.8	17.8	15.0	13.4	90	76	57
Jan 26	*****	25.1	18.2	15.3	13.4	90	76	42
Jan 27	*****	19.2	15.3	12.5	10.3	94	74	49
Jan 28	*****	20.8	15.7	13.0	11.1	94	77	43
Jan 29	*****	21.5	15.6	11.6	11.6	95	79	48
Jan 30	*****	23.7	16.8	12.4	13.4	99	82	54
Jan 31	*****	24.9	18.0	12.6	14.0	99	81	43
<b>Mean</b>	*****	20.0	15.1	11.5	8.4	88	68	43
<b>Maximum</b>	*****	25.1	18.6	15.7	15.4	99	84	67
<b>Minimum</b>	*****	15.7	11.4	7.6	-5.4	40	26	15

Extract of Meteorological Observations for Tseung Kwan O Automatic Weather Station, January 2014

Date	Total Rainfall (mm)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
Jan 1	0.0	070	3.5
Jan 2	0.0	010	3.8
Jan 3	0.0	360	2.7
Jan 4	0.0	070	8.0
Jan 5	0.0	020	4.6
Jan 6	0.0	020	8.4
Jan 7	0.0	020	7.5
Jan 8	0.0	060	4.8
Jan 9	0.0	070	7.4
Jan 10	0.0	070	7.8
Jan 11	0.0	030	7.2
Jan 12	0.0	060	7.1
Jan 13	0.0	070	7.5
Jan 14	0.0	340	6.3
Jan 15	0.0	080	5.5
Jan 16	0.0	020	8.2
Jan 17	0.0	320	5.3
Jan 18	0.0	360	7.9
Jan 19	0.0	080	6.4
Jan 20	0.0	350	6.2
Jan 21	0.0	030	9.1
Jan 22	0.0	340	5.5
Jan 23	0.0	070	6.0
Jan 24	0.0	020	7.3
Jan 25	0.0	070	6.1
Jan 26	0.0	020	6.6
Jan 27	0.0	030	6.8
Jan 28	0.0	020	5.4
Jan 29	0.0	010	4.0
Jan 30	0.0	360	3.2
Jan 31	0.0	350	4.1
<b>Mean</b>	-----	070	6.1
<b>Total</b>	0.0	---	-----
<b>Maximum</b>	0.0	---	9.1
<b>Minimum</b>	0.0	---	2.7

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# missing (less than 24 hourly observations a day)

Rainfall measured in increment of 0.5 mm. Amount of < 0.5 mm cannot be detected



**Extract of Meteorological Observations for Tseung Kwan O Automatic Weather Station, February 2014**

Date	Mean Pressure at M.S.L. (hPa)	Air Temperature			Mean Dew Point Temperature (deg C)	Relative Humidity		
		Max. (deg C)	Mean (deg C)	Min. (deg C)		Max. (%)	Mean (%)	Min. (%)
Feb 1	*****	26.2	19.1	15.7	16.0	100	84	50
Feb 2	*****	25.9	19.3	14.9	14.7	100	77	46
Feb 3	*****	26.0	19.1	14.3	14.2	94	75	47
Feb 4	*****	18.1	16.9	15.3	14.2	94	84	77
Feb 5	*****	18.6	16.2	15.2	13.3	98	83	67
Feb 6	*****	19.5	17.5	15.4	15.8	98	90	79
Feb 7	*****	23.1	19.3	17.3	17.4	97	89	72
Feb 8	*****	19.1	15.5	14.5	14.2	99	92	78
Feb 9	*****	15.7	13.3	8.7	12.6	98	95	89
Feb 10	*****	8.9	8.0	7.1	3.7	91	75	64
Feb 11	*****	9.2	7.3	6.4	1.4	76	67	57
Feb 12	*****	9.8	7.8	6.0	5.4	96	85	72
Feb 13	*****	9.1	7.7	7.1	6.4	99	91	78
Feb 14	*****	14.7	9.6	7.1	4.1	89	70	47
Feb 15	*****	13.3	10.9	7.2	7.0	89	77	68
Feb 16	*****	15.0	13.7	12.8	11.7	96	88	79
Feb 17	*****	18.6	16.6	14.6	16.1	100	97	88
Feb 18	*****	23.2	16.9	11.4	14.9	100	88	70
Feb 19	*****	11.8	9.1	6.9	4.1	93	72	55
Feb 20	*****	17.1	9.9	4.3	3.4	95	69	25
Feb 21	*****	15.2	13.1	8.7	8.1	97	73	53
Feb 22	*****	16.6	14.0	11.7	9.5	88	75	57
Feb 23	*****	18.3	15.4	13.7	11.6	89	78	59
Feb 24	*****	18.2	16.3	14.1	13.1	91	82	65
Feb 25	*****	19.2	17.5	16.4	15.2	98	86	75
Feb 26	*****	24.6	19.0	16.8	17.2	100	90	65
Feb 27	*****	21.8	18.7	17.4	17.1	98	91	76
Feb 28	*****	17.8	17.2	16.6	15.2	94	88	81
<b>Mean</b>	*****	17.7	14.5	12.1	11.3	95	83	66
<b>Maximum</b>	*****	26.2	19.3	17.4	17.4	100	97	89
<b>Minimum</b>	*****	8.9	7.3	4.3	1.4	76	67	25

## Extract of Meteorological Observations for Tseung Kwan O Automatic Weather Station, February 2014

Date	Total Rainfall (mm)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
Feb 1	0.0	320	3.8
Feb 2	0.0	350	3.9
Feb 3	0.0	290	3.3
Feb 4	0.0	060	6.6
Feb 5	0.0	020	6.1
Feb 6	0.5	030	4.8
Feb 7	0.0	080	3.3
Feb 8	2.0	020	6.0
Feb 9	14.5	060	8.2
Feb 10	0.0	060	7.8
Feb 11	0.0	070	6.9
Feb 12	0.5	350	6.1
Feb 13	22.5	070	6.0
Feb 14	0.0	070	6.1
Feb 15	0.0	050	6.2
Feb 16	0.0	050	6.5
Feb 17	0.0	080	3.2
Feb 18	0.0	360	5.5
Feb 19	3.5	060	8.8
Feb 20	0.0	070	5.6
Feb 21	0.0	050	8.4
Feb 22	0.0	030	9.3
Feb 23	0.0	060	8.3
Feb 24	0.0	030	8.9
Feb 25	0.0	360	5.3
Feb 26	0.0	070	3.3
Feb 27	0.0	020	6.8
Feb 28	0.0	360	6.7
<b>Mean</b>	-----	070	6.1
<b>Total</b>	43.5	---	-----
<b>Maximum</b>	22.5	---	9.3
<b>Minimum</b>	0.0	---	3.2

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# missing (less than 24 hourly observations a day)

Rainfall measured in increment of 0.5 mm. Amount of < 0.5 mm cannot be detected

## Extract of Meteorological Observations for Tseung Kwan O Automatic Weather Station, March 2014

Date	Mean Pressure at M.S.L. (hPa)	Air Temperature			Mean Dew Point Temperature (deg C)	Relative Humidity		
		Max. (deg C)	Mean (deg C)	Min. (deg C)		Max. (%)	Mean (%)	Min. (%)
Mar 1	*****	21.9	19.2	17.5	17.2	98	89	80
Mar 2	*****	22.3	17.6	14.0	16.4	100	93	65
Mar 3	*****	14.9	14.4	13.6	13.3	99	94	83
Mar 4	*****	17.5	15.7	14.1	14.7	99	94	85
Mar 5	*****	16.6	15.6	14.9	13.3	100	87	74
Mar 6	*****	15.1	14.1	13.4	12.6	98	90	78
Mar 7	*****	14.3	13.6	12.9	12.0	99	90	84
Mar 8	*****	14.6	13.9	13.3	13.4	99	97	89
Mar 9	*****	14.4	13.4	12.8	11.4	98	87	78
Mar 10	*****	14.1	13.4	12.8	10.1	89	81	66
Mar 11	*****	14.8	14.2	13.5	12.0	99	87	78
Mar 12	*****	18.3	16.6	14.5	16.4	100	99	96
Mar 13	*****	22.2	19.5	17.8	14.8	100	76	56
Mar 14	*****	19.3	15.9	13.0	11.3	91	75	45
Mar 15	*****	16.5	14.6#	12.6	9.5#	97	73#	46
Mar 16	*****	18.6	18.1#	17.4	12.8#	89	72#	52
Mar 17	*****	22.7	19.7	17.4	17.8	97	89	75
Mar 18	*****	25.7	21.3	19.1	19.5	99	90	71
Mar 19	*****	26.2	21.4	18.0	19.5	99	90	70
Mar 20	*****	25.1	20.4	16.5	16.5	100	80	60
Mar 21	*****	16.7	15.2	14.2	8.8	75	66	58
Mar 22	*****	19.8	16.3	14.0	9.2	81	65	41
Mar 23	*****	20.9	17.3	14.6	11.4	86	69	45
Mar 24	*****	22.9	18.4	14.8	13.1	92	72	47
Mar 25	*****	26.8	20.6	16.7	15.2	96	74	45
Mar 26	*****	27.3	21.7	17.8	18.6	98	84	60
Mar 27	*****	28.1	22.5	18.1	19.5	99	84	57
Mar 28	*****	21.9	20.8	19.7	20.1	99	96	91
Mar 29	*****	22.6	21.0	19.8	20.6	100	98	92
Mar 30	*****	23.1	21.0	18.5	20.7	100	98	90
Mar 31	*****	20.6	19.4	18.4	19.2	100	99	97
<b>Mean</b>	*****	20.2	17.7#	15.7	15.0#	96	85#	69
<b>Maximum</b>	*****	28.1	22.5#	19.8	20.7#	100	99#	97
<b>Minimum</b>	*****	14.1	13.4#	12.6	8.8#	75	65#	41

## Extract of Meteorological Observations for Tseung Kwan O Automatic Weather Station, March 2014

Date	Total Rainfall (mm)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
Mar 1	0.0	080	3.8
Mar 2	6.0	020	6.1
Mar 3	1.5	020	7.8
Mar 4	0.5	070	4.9
Mar 5	0.0	070	6.3
Mar 6	2.0	040	9.1
Mar 7	1.5	050	8.4
Mar 8	1.5	060	6.0
Mar 9	0.0	070	6.3
Mar 10	0.5	050	9.4
Mar 11	1.5	020	7.5
Mar 12	0.5	030	3.1
Mar 13	0.5	060	6.3
Mar 14	1.0	030	7.0
Mar 15	0.0#	030#	6.7#
Mar 16	0.0#	050#	5.4#
Mar 17	0.0	080	3.7
Mar 18	0.0	080	4.3
Mar 19	0.0	190	3.2
Mar 20	0.0	060	5.0
Mar 21	0.0	360	6.5
Mar 22	0.0	020	8.5
Mar 23	0.0	030	10.4
Mar 24	0.0	020	7.1
Mar 25	0.0	060	4.2
Mar 26	0.0	180	3.7
Mar 27	0.0	190	4.7
Mar 28	0.0	020	4.3
Mar 29	16.0	190	2.9
Mar 30	106.0	030#	3.3#
Mar 31	82.0	***	*****
<b>Mean</b>	-----	030#	5.9#
<b>Total</b>	221.0#	---	-----
<b>Maximum</b>	106.0#	---	10.4#
<b>Minimum</b>	0.0#	---	2.9#

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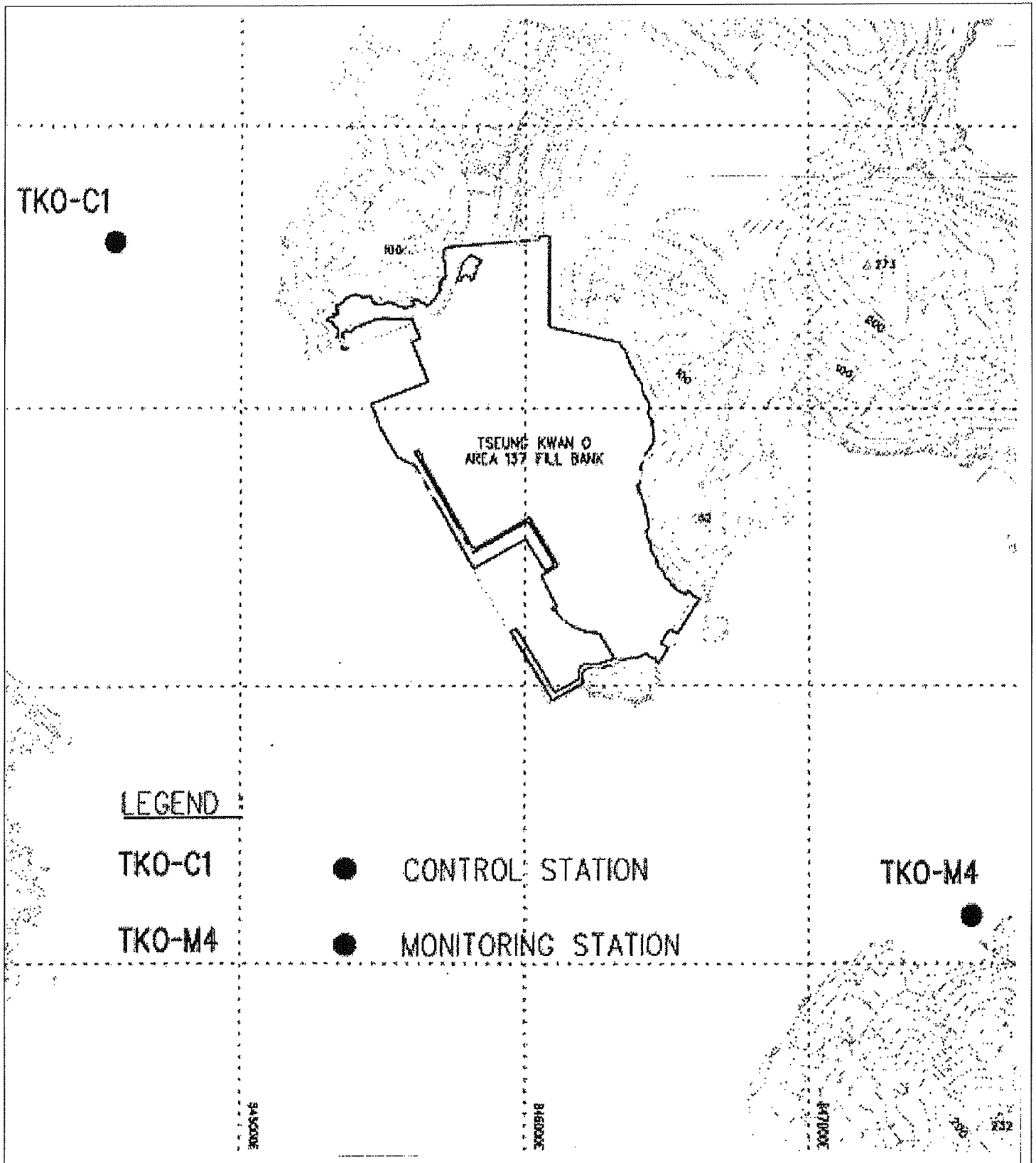
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Rainfall measured in increment of 0.5 mm. Amount of < 0.5 mm cannot be detected



## Appendix I

### Figures

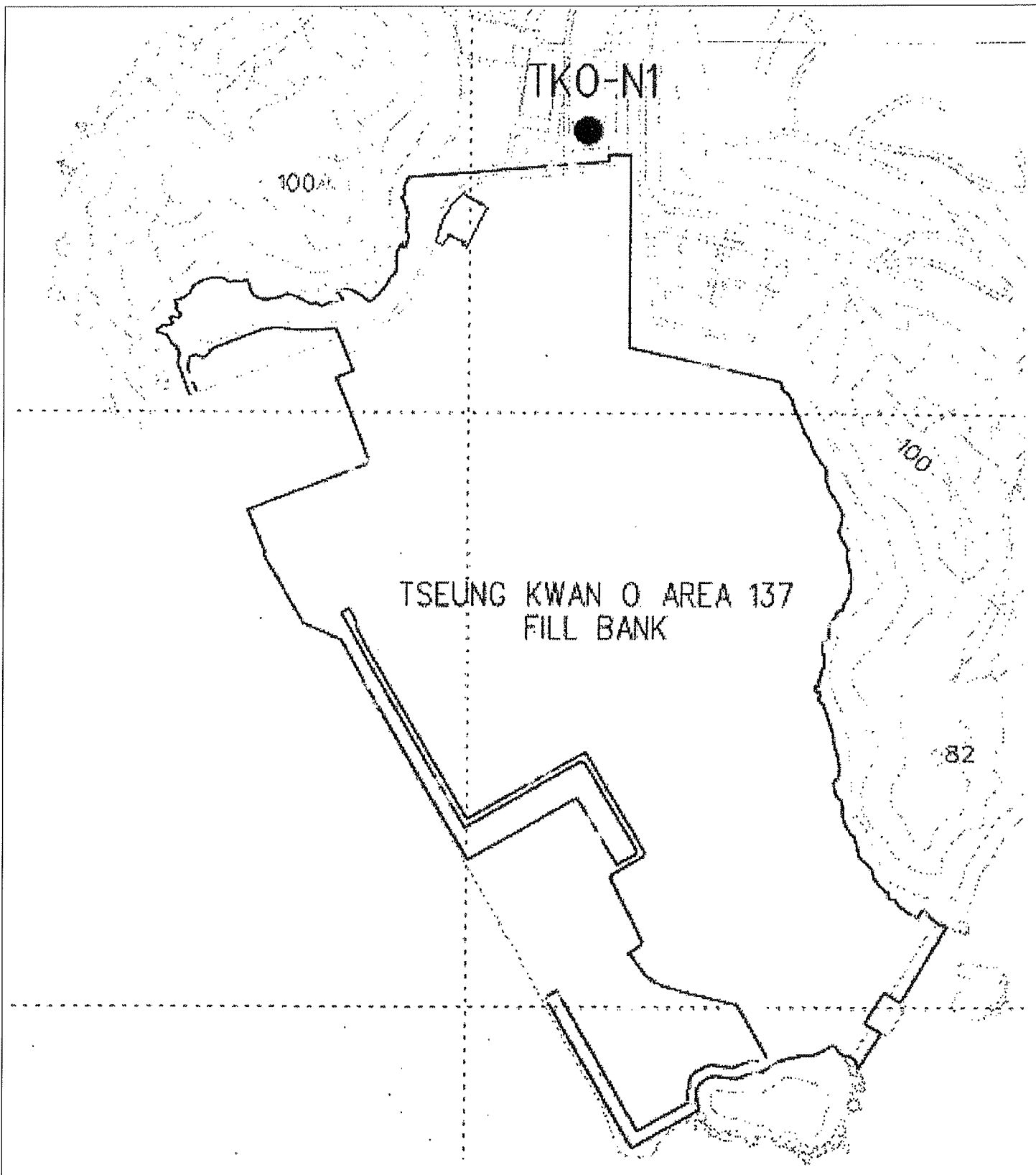


Contract No. CV/2013/06  
 Handling of Surplus Public Fill (2014-2016)

Figure 1  
 Locations of Water Quality Monitoring Stations –  
 Tseung Kwan O Area 137 Fill Bank



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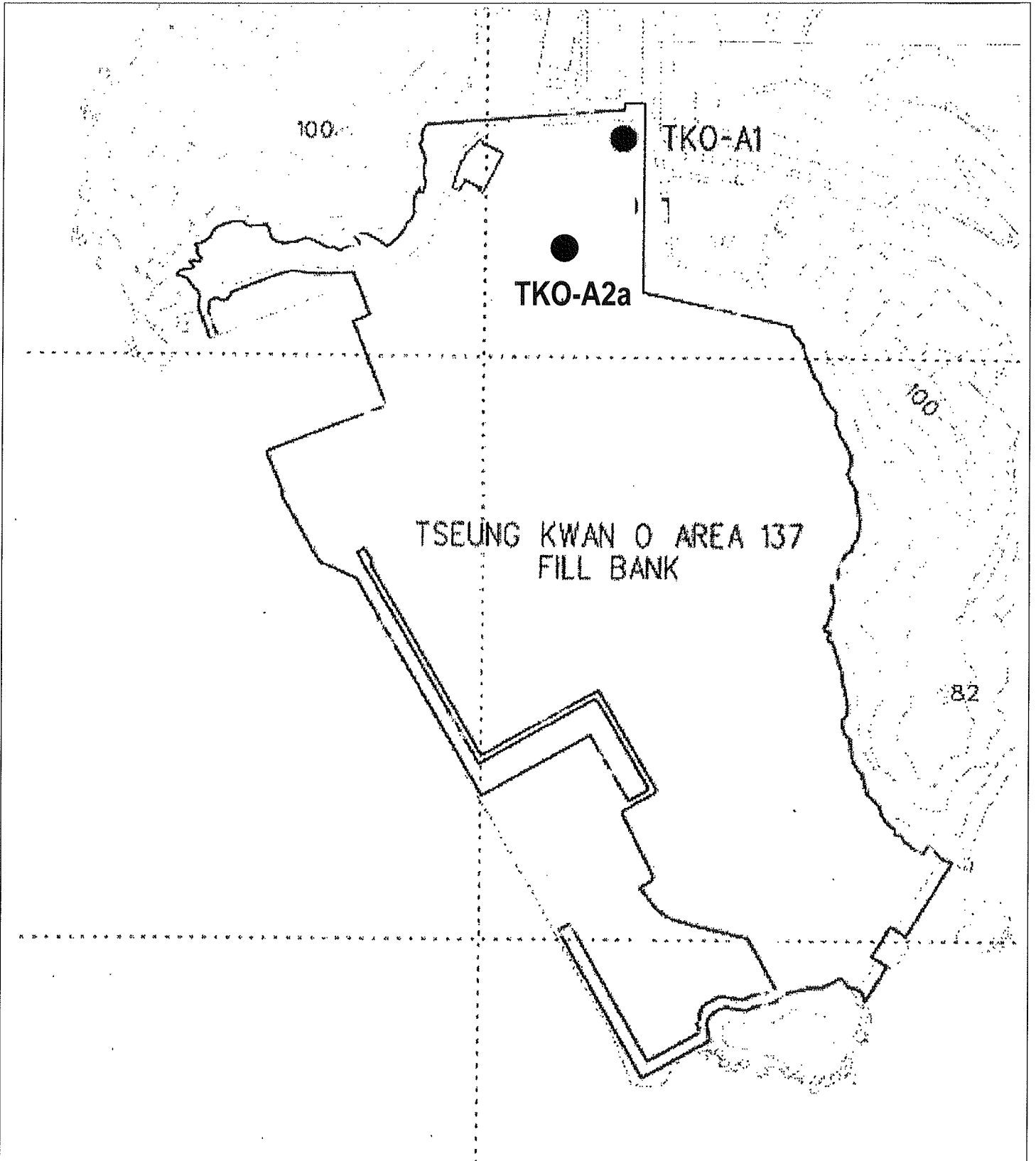
Contract No. CV/2013/06  
Handling of Surplus Public Fill (2014-2016)

Figure 2

Location of Noise Monitoring Station –  
Tseung Kwan O Area 137 Fill Bank



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Contract No. CV/2013/06  
Handling of Surplus Public Fill (2014-2016)

Figure 3  
Locations of Air Quality Monitoring Stations –  
Tseung Kwan O Area 137 Fill Bank



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ETS-TESTCONSULT LIMITED





## **Appendix II**

**Quarterly Water Quality Monitoring Summary Report for  
Contract No. HY/2010/02 Hong Kong – Zhuhai – Macao Bridge,  
Hong Kong Boundary Crossing Facilities – Reclamation Works**

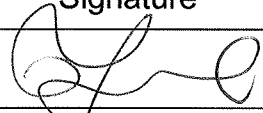

**China Harbour Engineering Company Limited**

Contract No. HY/2010/02

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

**Quarterly  
Impact Water Quality Monitoring  
Summary Report  
for TKO 137 Fill Bank  
December 2013 to March 2014**

[04/2014]

	Name	Signature
Prepared & Checked:	Isabella Yeung	
Reviewed & Approved:	Y T Tang	

Version:	Rev. 0	Date: 25 April 2014
<p><b>Disclaimer</b></p> <p>This report is prepared for China Harbour Engineering Company Limited and is given for its sole benefit in relation to and pursuant to Contract No. HY/2010/02 Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities-Reclamation Works and may not be disclosed to, quoted to or relied upon by any person other than China Harbour Engineering Company Limited without our prior written consent. No person (other than China Harbour Engineering Company Limited) into whose possession a copy of this report comes may rely on this report without our express written consent and China Harbour Engineering Company Limited may not rely on it for any purpose other than as described above.</p>		

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Appendix A Graphical Presentation of Impact Water Quality Results over the Past Four Months

## **EXECUTIVE SUMMARY**

On-site sorting facilities for imported material (public fill) for reclamation works of the “Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Work (here below, known as “the Project”) were proposed to establish in Tseung Kwan O (TKO) 137 Fill Bank area (here below known as “the Works Area). Impact monitoring of water quality was conducted at the designated monitoring location. This report will be incorporated into the first Quarterly EM&A Report for the “Contract No. CV/2013/06 – Handling of Surplus Public Fill (2014-2016)” and presents the impact monitoring results regarding water quality aspects performed from December 2013 to March 2014 to in line with the reporting schedule of Contract No. CV/2013/06.

### *Water Quality*

Impact water quality monitoring was conducted at three monitoring stations, C1a, M4a & M5. Monitoring Station C1a serves as the control station; Monitoring Station M4a and M5 are the impact stations. The impact monitoring was carried out three times per week (from 1 December 2013 to 31 March 2014.) during the operation of the mentioned facilities for both mid-ebb and mid-flood tides. Data of temperature, salinity, dissolved oxygen (DO), turbidity (Tby) and suspended solids (SS) were collected and analysed.

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

No exceedance of Action and Limit Level of water quality monitoring results was recorded in the reporting quarter.

## **1 INTRODUCTION**

### **1.1 Background**

- 1.1.1 Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Work (here below, known as “the Project”) mainly comprises reclamation at the northeast of the Hong Kong International Airport of an area of about 130-hectare for the construction of an artificial island for the development of the Hong Kong Boundary Crossing Facilities (HKBCF), and about 19-hectare for the southern landfall of the Tuen Mun - Chek Lap Kok Link (TMCLKL).
- 1.1.2 On-site sorting facilities for imported material (public fill) for reclamation works of the Project were proposed to establish in Tseung Kwan O (TKO) 137 Fill Bank area (here below, known as “the Works Area”). The proposed sorting facilities together with barging points, tipping halls and associated facilities will be installed at the Works Area.
- 1.1.3 The latest Environmental Permit (EP) for Fill Bank at TKO Area 137 was issued on 4 February 2013 (EP-134/2002/K) by the Environmental Protection Department (EPD) to Civil Engineering and Development Department (CEDD), the Permit Holder, regarding the Project. Condition 3.2 of the EP requires the water quality monitoring frequency and parameters at stations C1a, M4a and M5 shall be same as the requirements set out in the EM&A Manual for TKO 137 Fill Bank (here below, known as “EM&A Manual”) and the monitoring results shall summarised in the quarterly EM&A reports.

### **1.2 Purpose of the Report**

- 1.2.1 The purpose of this report is to summarise the results of water quality measurements in accordance with the EM&A Manual.
- 1.2.2 This impact report presents the monitoring works of water quality monitoring, at two monitoring stations (M4a and M5) and one control station (C1a), conducted in the period from 1 December 2013 to 31 March 2014. A layout plan of the Works Area is provided in Figure 1.1.

### **1.3 Structure of the Report**

- 1.3.1 The structure of the report is as follows:

Section 1: Introduction, background, purpose and the structure of the report.  
Section 2: Summary of impact water quality monitoring results.  
Section 3: Conclusions.

## 2 WATER QUALITY

### 2.1 Action and Limit Levels

2.1.1 The Action and Limit Levels (AL levels) have been set in accordance with the derivation criteria specified in the EM&A Manual. This is shown in Table 2.1.

**Table 2.1 Action and Limit Levels for Water Quality**

Parameters	Action	Limit
DO in mg/L (Surface & Middle, Bottom)	Surface & Middle 5.5 mg/L  Bottom 5.2 mg/L	Surface & Middle 4.0 mg/L  Bottom 2.0 mg/L
SS in mg/L (depth-averaged)	4.9 mg/L or 120% of upstream control station's SS at the same tide of the same day	5.2 mg/L or 130% of upstream control station's SS at the same tide of the same day and specific sensitive receiver water quality requirements (e.g. required suspended solids level at FCZ)
Turbidity in NTU (depth-averaged)	3.9 NTU or 120% of upstream control station's turbidity at the same tide of the same day	4.2 NTU or 130% of upstream control station's turbidity at the same tide of the same day

- Notes:
1. "depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
  2. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
  3. For turbidity, SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
  4. All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.

## 2.2 Summary of impact water quality monitoring results

- 2.2.1 The measurements were taken at the control station (C1) and two impact stations (M4a & M5). The two impact stations were chosen on the basis of their proximity to the Works Area, which would be under the greatest potential for water quality impacts. In addition, a control station was also set up for ebb-tide references respectively of the surrounding ambient.
- 2.2.2 Impact marine water quality monitoring at 3 water quality monitoring stations should be established. In accordance with the EM&A Manual, impact water quality monitoring should be conducted 3 days per week during the operation of the facilities in the Works Area. Moreover, as stipulated in the latest EP, water quality monitoring should be conducted since 2 weeks before commencement of operation of the additional barging points. Measurements shall be taken at the 3 designated stations, 2 impact and 1 control stations at mid-flood and mid-ebb tides at three water depths, i.e., 1 m below surface, mid-depth and 1 m from seabed.
- 2.2.3 The summary of impact water quality exceedance in the reporting quarter is shown in Table 2.2. The trend of marine quality in the past four months is presented in Appendix A.

**Table 2.2 Summary of Marine Water Monitoring Exceedance**

Monitoring Station	Exceedance Level	DO (SM)		DO(Bottom)		Turbidity		SS		Total	
		Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb
M4a	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
M5	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0

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

- 2.2.4 No exceedance of Action and Limit Level of water quality monitoring results was recorded in the reporting quarter.



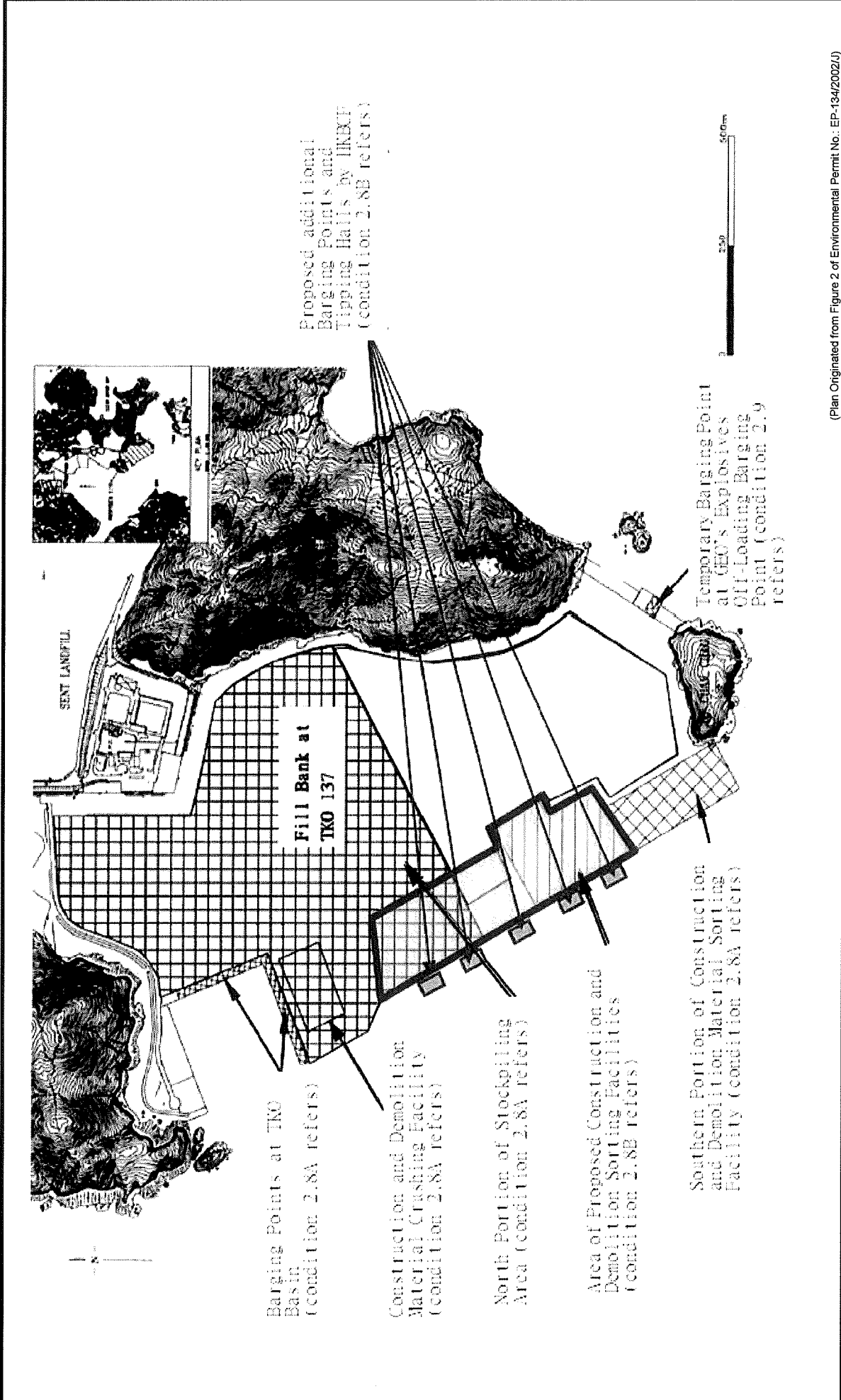
### **3 CONCLUSIONS**

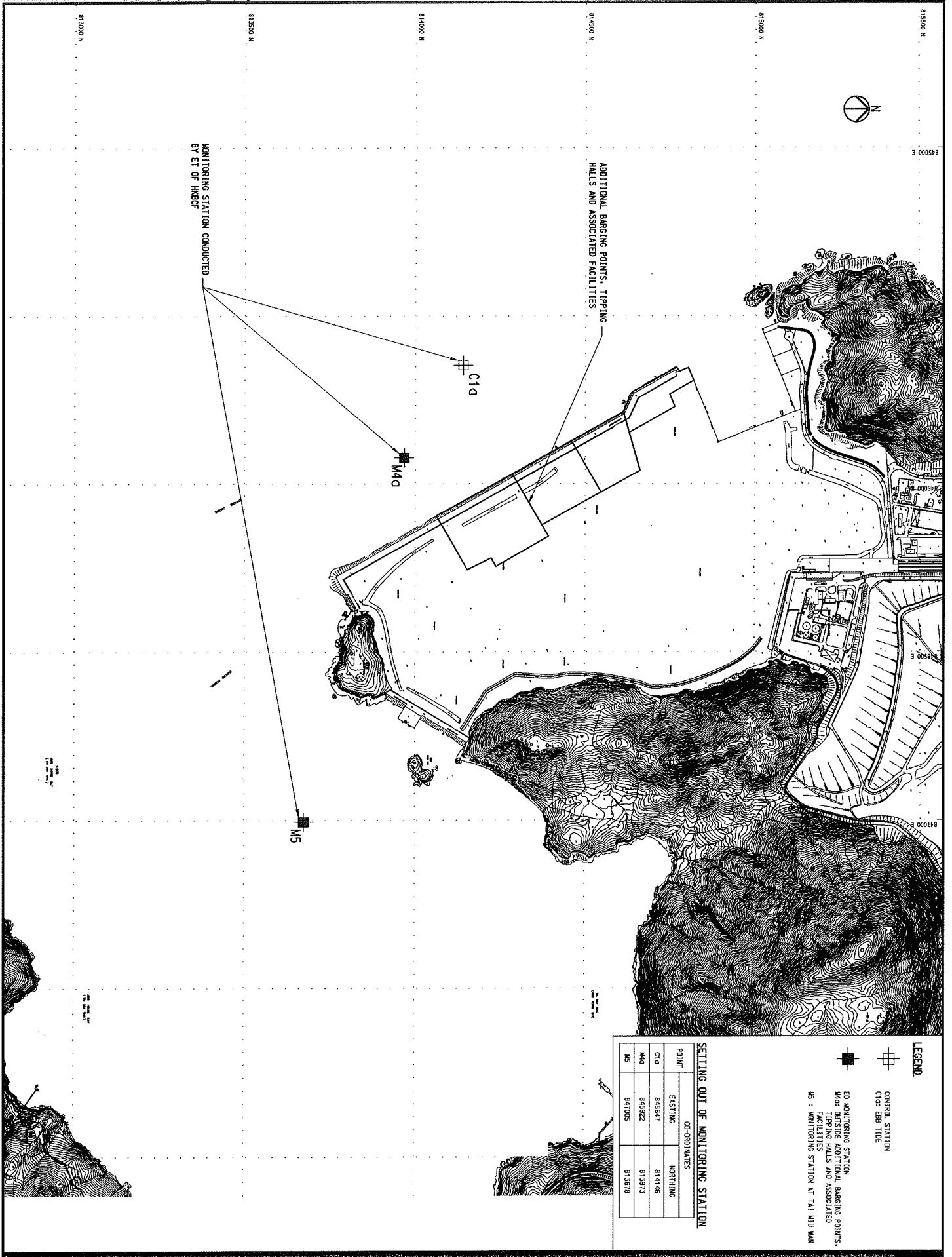
- 3.1.1 This report summarise the impact monitoring results for water quality at designated locations C1a, M4a and M5 in accordance with the EM&A Manual. Monitoring Station C1a serves as the control station; Monitoring Station M4a and M5 are the impact stations.
- 3.1.2 All laboratory results satisfied the QA/QC requirements and all monitoring equipment is properly calibrated and with valid calibration certificates.
- 3.1.3 No exceedance of Action and Limit Level of water quality monitoring results was recorded in the reporting quarter.

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## FIGURES

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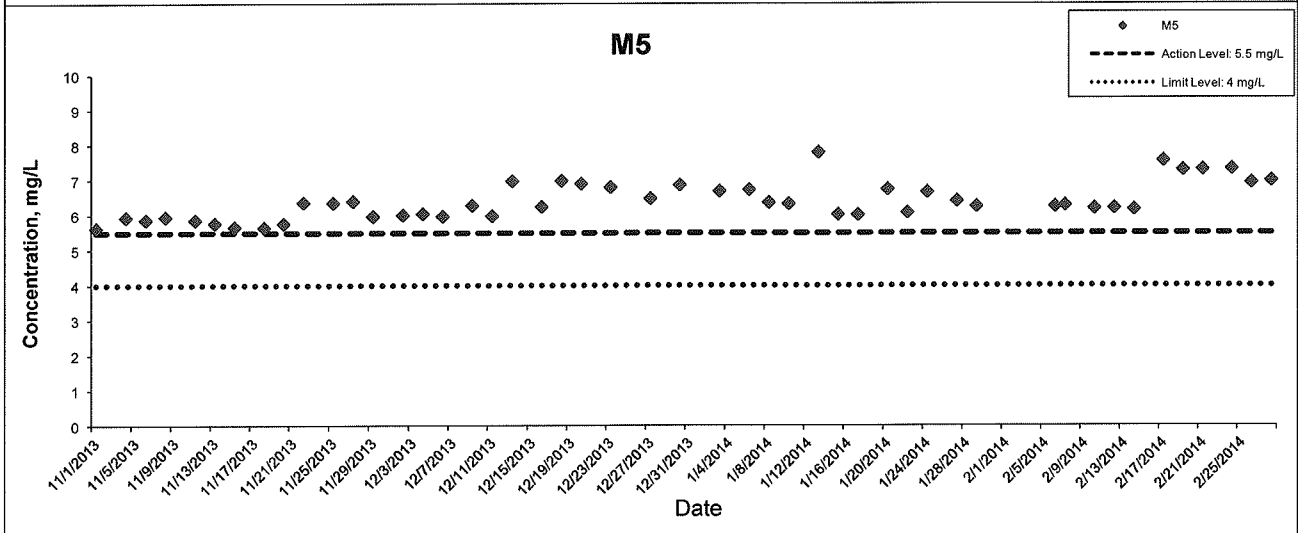
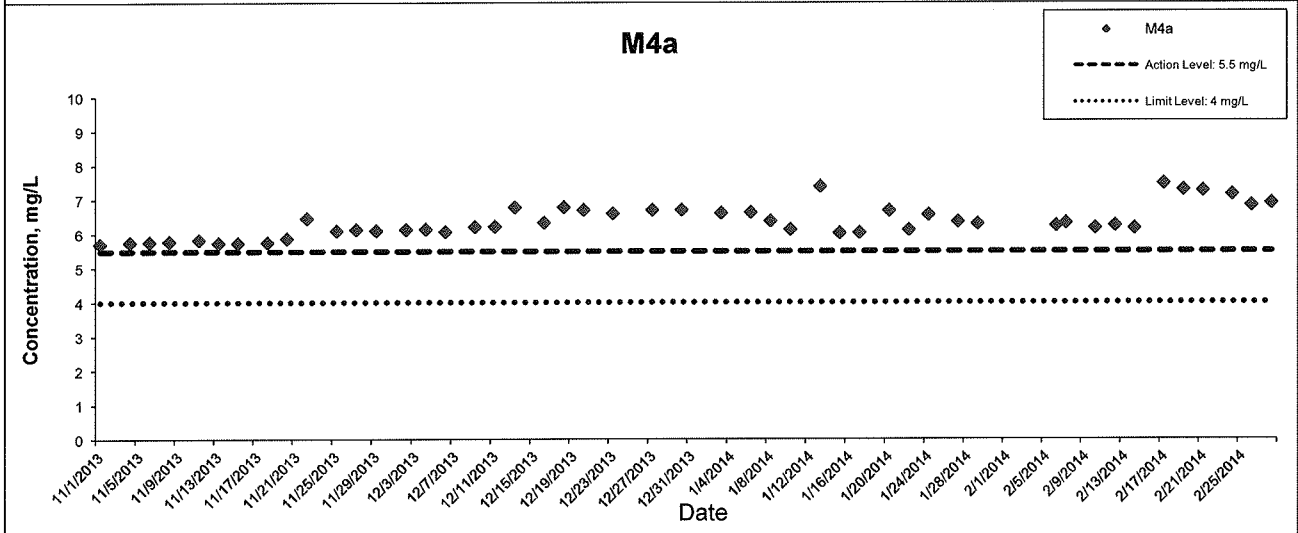
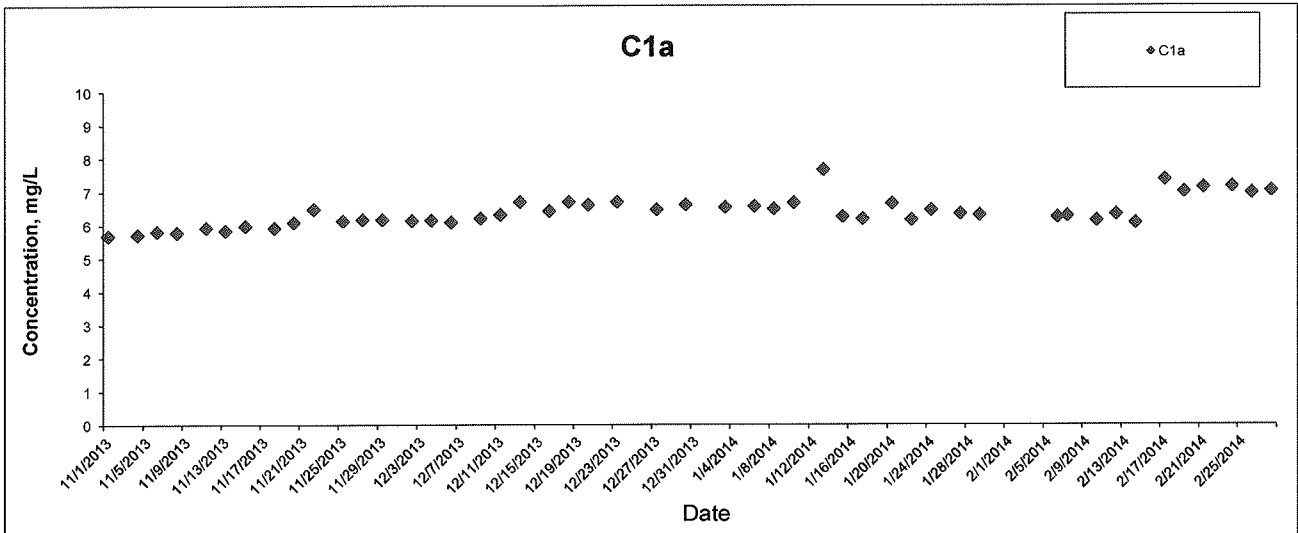


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**APPENDIX A  
GRAPHICAL PRESENTATION OF IMPACT  
WATER QUALITY RESULTS OVER THE  
PAST FOUR MONTHS**

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



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HONG KONG BOUNDARY CROSSING FACILITIES

- RECLAMATION WORKS

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

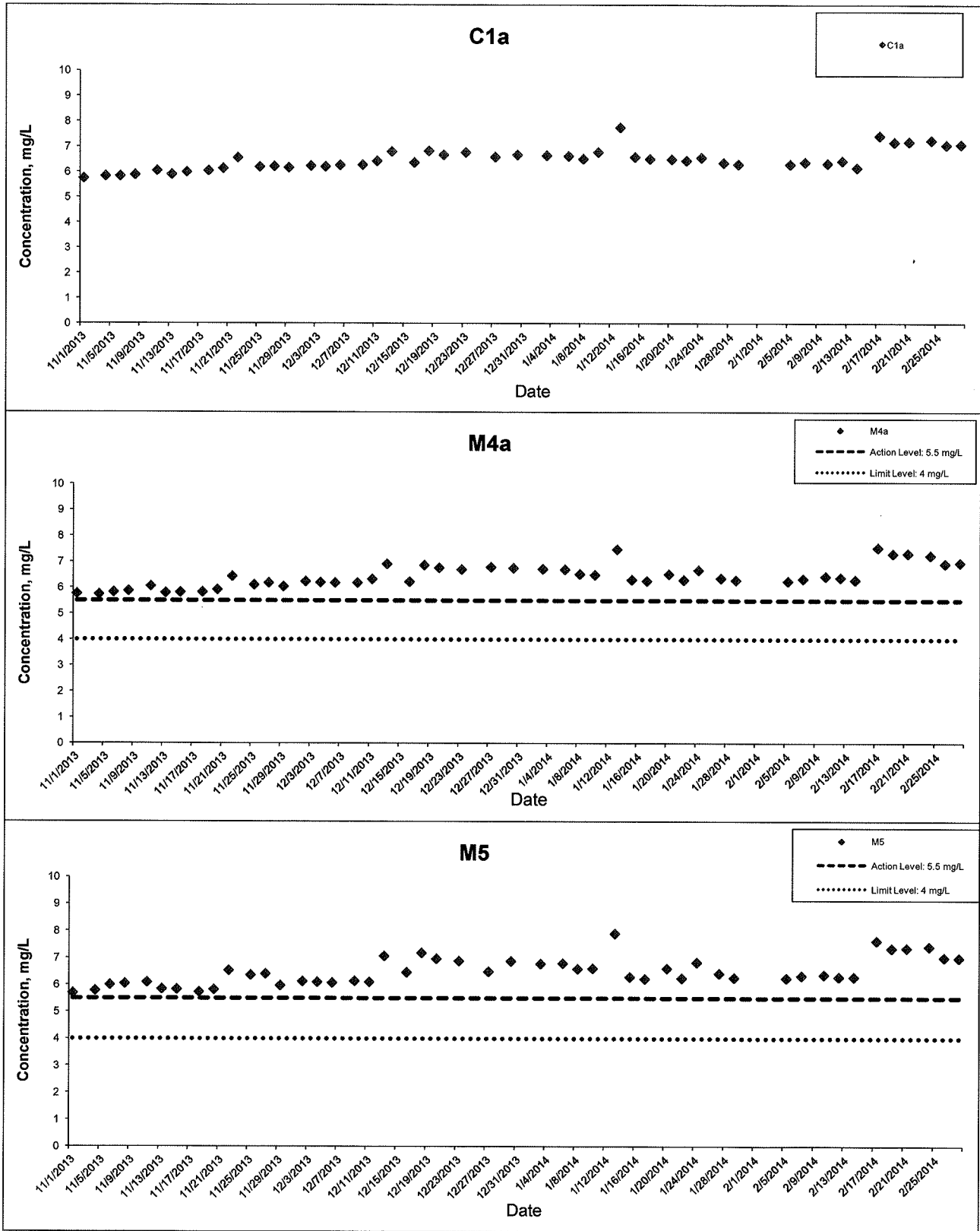


Project No.: 60249820

Date: March 2014

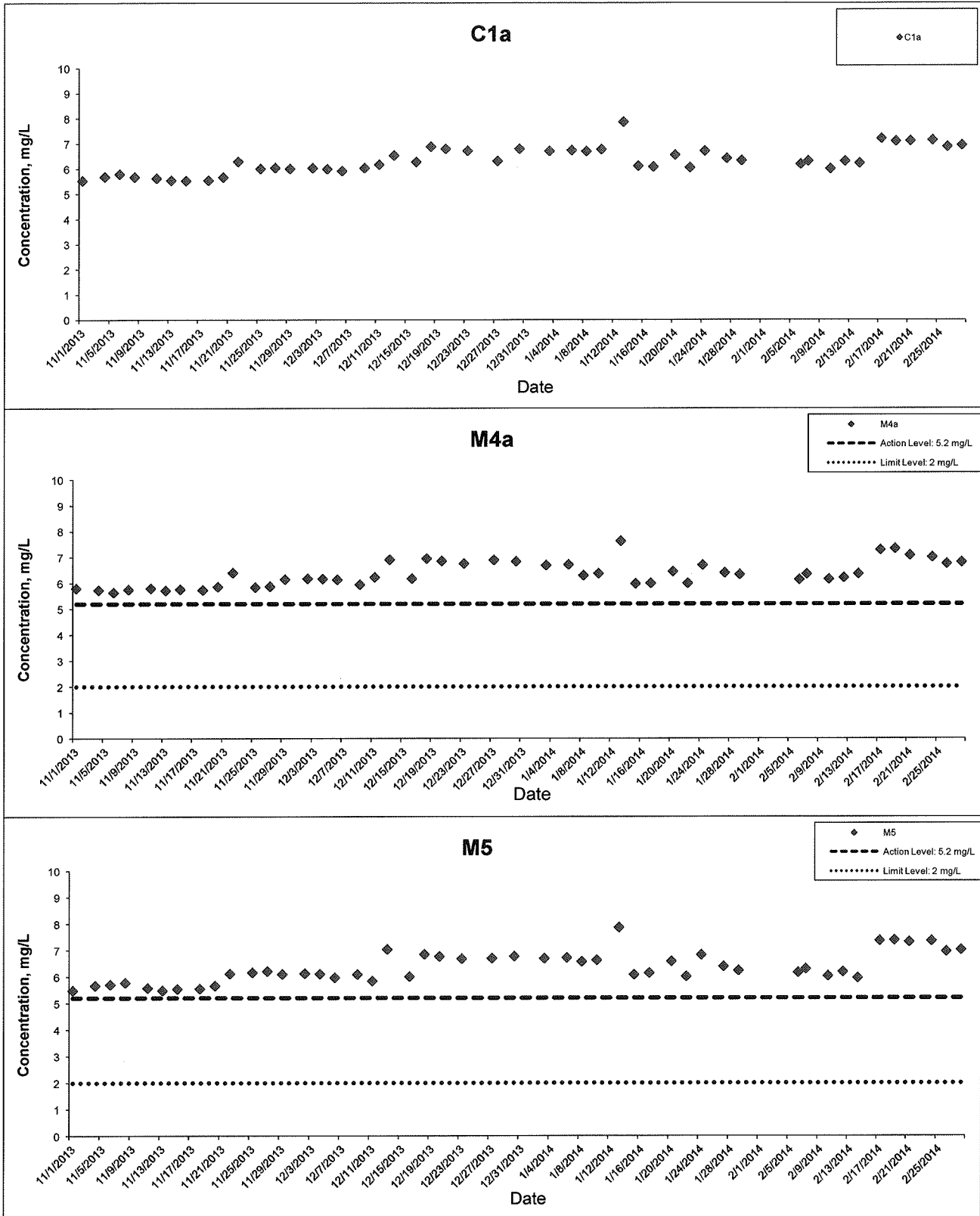
Appendix C

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



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



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### Graphical Presentation of Impact Water Quality Monitoring Results



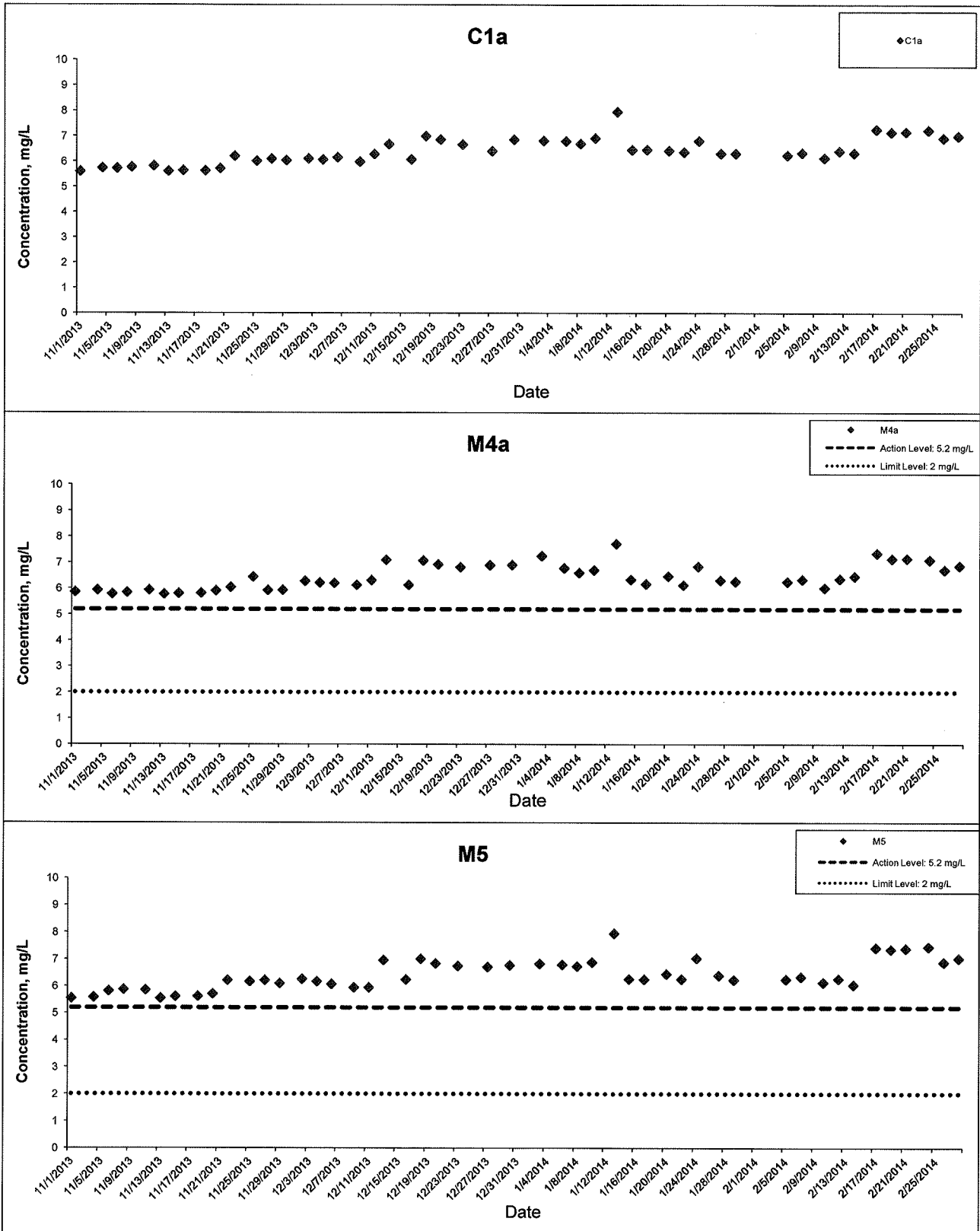
Project No.: 60249820

Date: March 2014

Appendix C



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



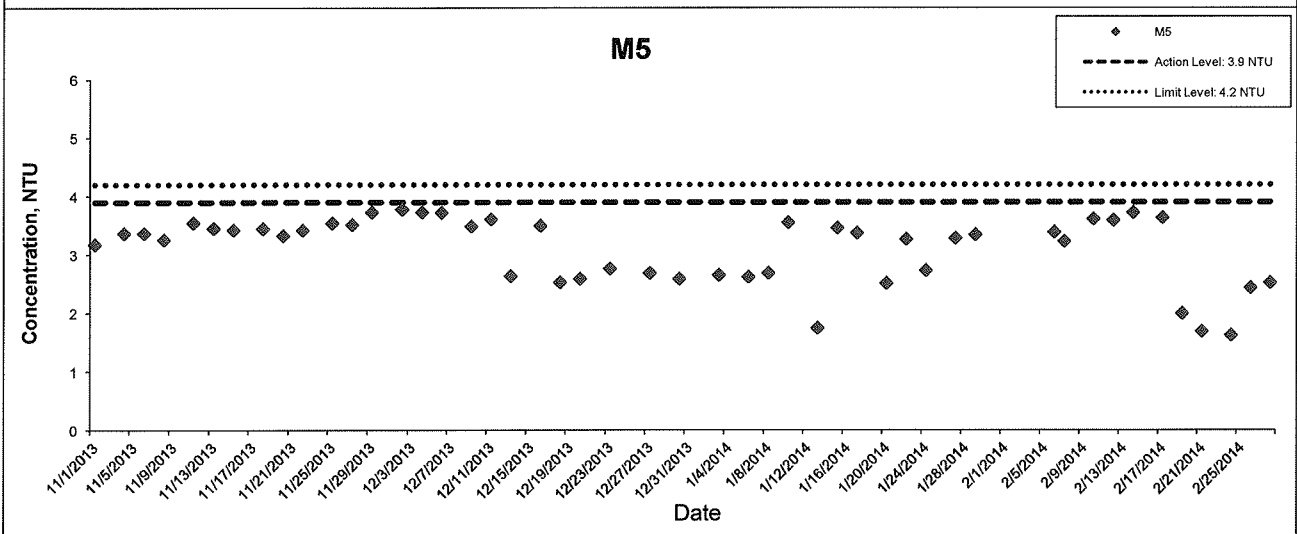
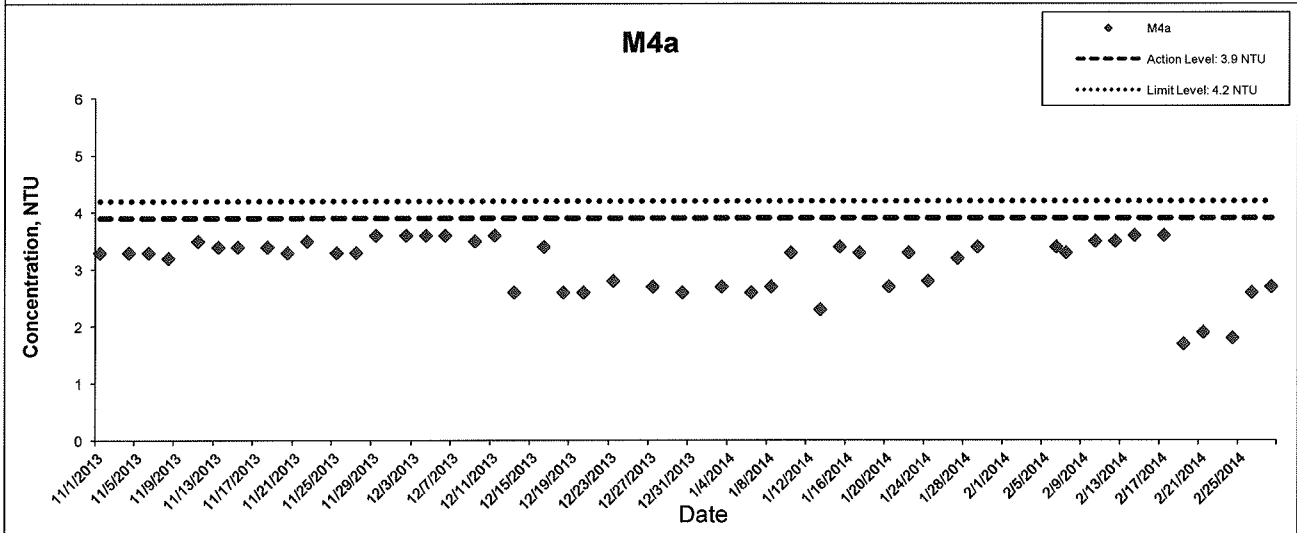
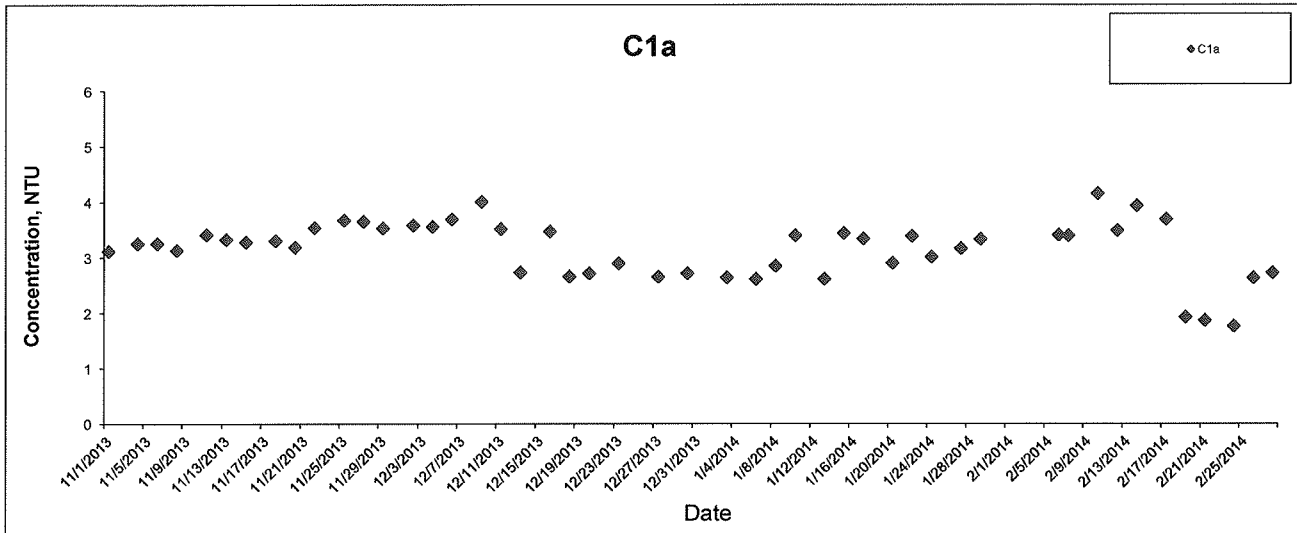
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 - RECLAMATION WORKS

Graphical Presentation of Impact Water Quality  
 Monitoring Results

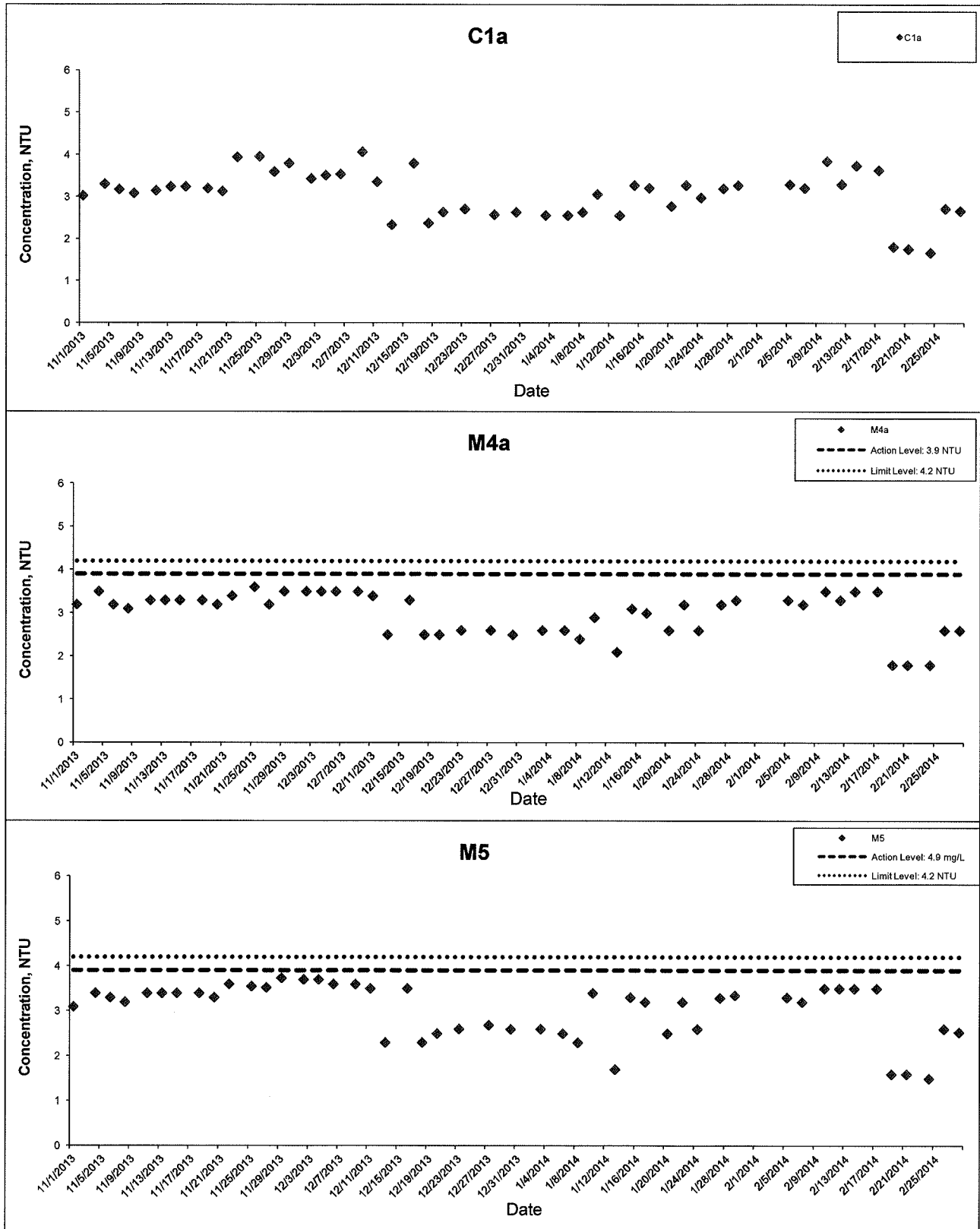


### Turbidity at Mid-Ebb Tide



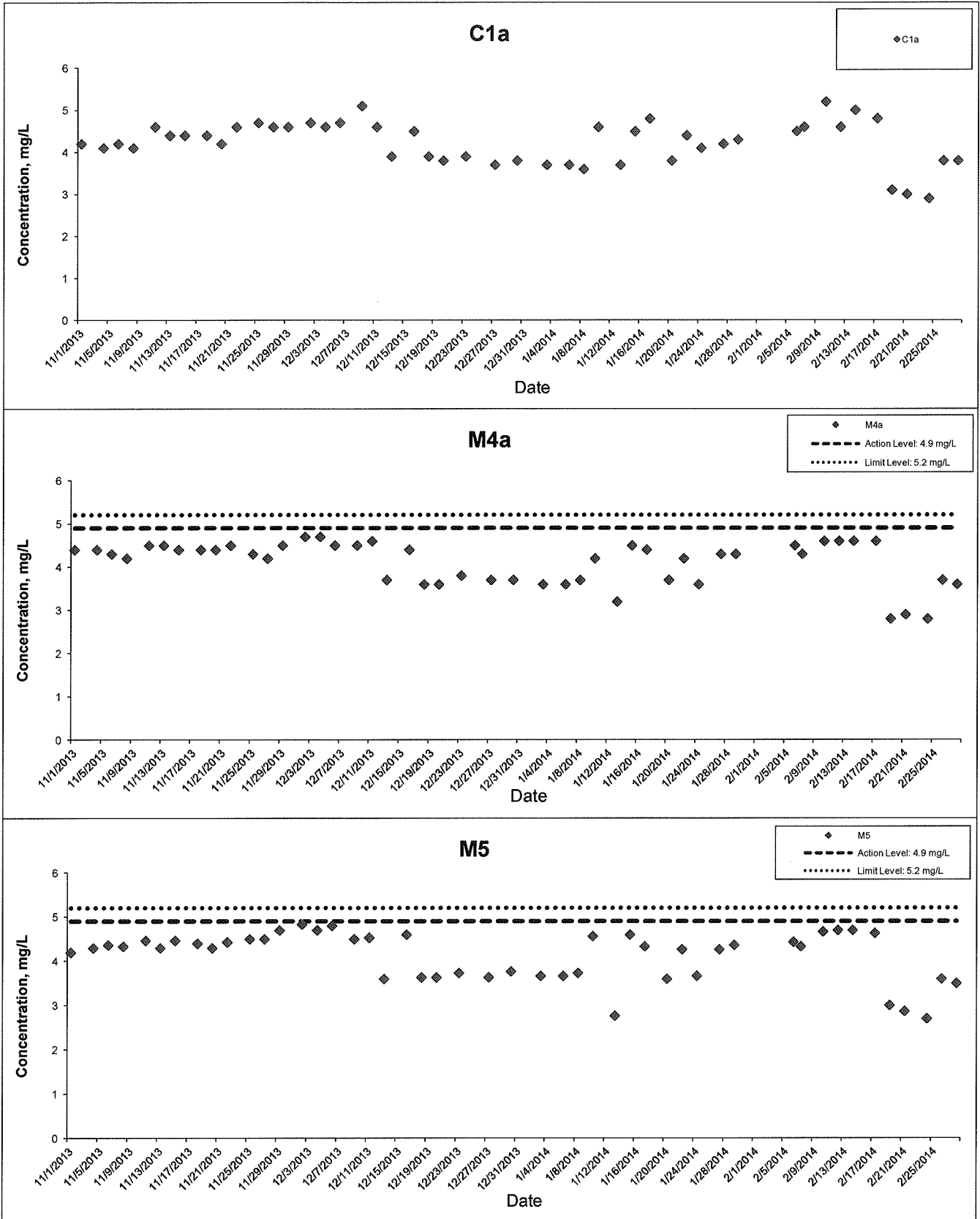
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### Turbidity at Mid-Flood Tide



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## Suspended Solids at Mid-Ebb Tide



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Monitoring Results**



### Suspended Solids at Mid-Flood Tide

