

**Capco** 青山發電有限公司  
Castle Peak Power Co. Ltd.

## Black Point Gas Supply Project

*Fourteenth Monthly Environmental Monitoring & Audit (EM&A) Report – First Phase Project*

14 May 2012

### **Environmental Resources Management**

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**Fourteenth Monthly Environmental Monitoring & Audit (EM&A) Report – First Phase Project**

**ERM Document Code: 0124291\_First Phase 14th Monthly EM&A\_Rev 0.doc**

**CAPCO Document Code : BPGSP-ERML-PR-4-ENV-09-037**

Client: <b>CAPCO</b>		Project No: 0124291			
Summary:  This document presents the Fourteenth Monthly Environmental Monitoring and Audit (EM&A) Report for the First Phase Black Point Gas Supply Project.		Date: 14 May 2012			
		Approved by:    <i>Dr Robin Kennish</i> Director			
0	14 <sup>th</sup> Monthly EM&A Report – First Phase	Var	JNG	RK	14/05/12
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>This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.</p>		<p>Distribution</p> <p><input checked="" type="checkbox"/> Government</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p> <div style="text-align: right;">    </div>			

**Black Point Gas Supply Project (First Phase)  
Environmental Certification Sheet  
EP-391/2010/A**


**Reference Document/Plan**

Document/Plan-to be-Certified/ Verified:	Fourteenth Monthly Environmental Monitoring & Audit (EM&A) Report - April 2012
Date of Report:	11 May 2012
Date prepared by ET:	11 May 2012
Date received by IEC:	11 May 2012


**Reference EM&A Manual/ EP Requirement**

<b>EP Condition:</b>  <i>Condition No. 5.3</i>  Two hard copies and one electronic copy of monthly EM&A Reports shall be submitted to the Director within 2 weeks after the end of the reporting month. Additional copies of the submission shall be provided to the Director upon request from the Director.
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**ET Certification**

I hereby certify that the above referenced document/ <del>plan</del> complies with the above referenced condition of EP-391/2010/A.		
Dr Helen Chiu, Environmental Team Leader:		Date: 11 May 2012

**IEC Verification**

I hereby verify that the above referenced document/ <del>plan</del> complies with the above referenced condition of EP-391/2010/A.		
Dr Anne Kerr, Independent Environmental Checker:		Date: 11 May 2012

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## EXECUTIVE SUMMARY

The Castle Peak Power Company Limited (CAPCO) a joint venture between CLP Power Hong Kong Limited (CLP) and ExxonMobil Energy Limited (EMEL) with CLP as operator and its Contractor for Gas Receiving Station (GRS) construction, Leighton Contractors (Asia) Limited (Leighton), commenced the construction of the First Phase of the Black Point Gas Supply Project (BPGSP) at the Co-located GRS area on 15 March 2011. This is the fourteenth monthly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 1 to 30 April 2012 in accordance with the Updated EM&A Manual for the First Phase Project submitted under EP-391/2010/A, FEP-01/391/2010/A and FEP-02/391/2010/A.

### Summary of Breaches of Action/Limit Levels

No marine water quality monitoring was conducted in the reporting period. Thus, no exceedances of Action and Limit Levels for water quality were recorded during the reporting month.

### Waste Management

CAPCO and the Contractor have followed the Waste Management Plan (WMP) for handling of inert construction and demolition (C&D) materials (public fill) and non-inert C&D materials (construction wastes). Wastes generated during this reporting period were summarised.

### Environmental Site Auditing

A monthly joint environmental site inspection/ audit was carried out by the representatives of the Contractor, the Environmental Team (ET), CLP and the Independent Environmental Checker (IEC). Environmental performance complied with the environmental requirements and all necessary mitigation measures were properly implemented.

### Environmental Complaints, Non-compliance & Summons

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

No environmental complaint was received in this reporting period.

No environmental summons was received in this reporting period.

### Upcoming Works for the Next Reporting Period

Works to be undertaken in the coming monitoring period include continuing construction work of SIE Building and new pipe racks in the co-located GRS area, excavation works, pipe installation and welding for Gas Header, construction of concrete trough for shore approach, and marine dredging works in PRC waters within 2.5 km of HKSAR boundary.

Potential environmental impacts arising from the construction activities in the coming month are expected to be mainly associated with dust, noise, site runoff, waste management, marine water quality and marine ecology.

## 1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) and Mott MacDonald Hong Kong Limited was appointed by the Castle Peak Power Company Limited (CAPCO) as the Environmental Team (ET) and the Independent Environmental Checker (IEC), respectively, to undertake Environmental Monitoring and Audit (EM&A) activities for the First Phase of the Black Point Gas Supply Project (BPGSP) (*the First Phase Project*).

### 1.1 PURPOSE OF THE REPORT

This is the fourteenth monthly EM&A report which summarises the impact monitoring results and inspection/ audit findings for the EM&A programme during the reporting period from 1 to 30 April 2012.

### 1.2 STRUCTURE OF THE REPORT

The structure of the report is as follows:

Section 1 : **Introduction**

details the scope and structure of the report.

Section 2 : **Project Information**

summarises the background and scope of the First Phase Project, works locations, construction programme, the construction works undertaken and the status of Environmental Permits (EP)/licences over the construction phase of the First Phase Project.

Section 3 : **Implementation Status on Environmental Mitigation Measures**

summarises the implementation of environmental mitigation measures as recommended in the approved EIA report, EM&A Manual, EP and relevant environmental requirements stated in the Contract Specification.

Section 4 : **EM&A Results**

summarises the monitoring results, if any, obtained in the reporting period and the findings of the monthly site inspection undertaken within the reporting period.

Section 5 : **Environmental Non-conformance**

summarises any exceedances of environmental performance standard, and environmental complaints and environmental summons received within the reporting period.

Section 6 : **Upcoming Works for the next Reporting Period**  
summarises the impact forecast and monitoring schedule for the next reporting month.

Section 7 : **Conclusions**



## 2 PROJECT INFORMATION

### 2.1 PROJECT BACKGROUND

The Black Point Gas Supply Project (BPGSP) at the Black Point Power Station (BPPS), proposed by the Castle Peak Power Company Limited (CAPCO), a joint venture between CLP Power Hong Kong Limited (CLP) and ExxonMobil Energy Limited (EMEL) with CLP as operator, will provide facilities to import replacement gas from Mainland China.

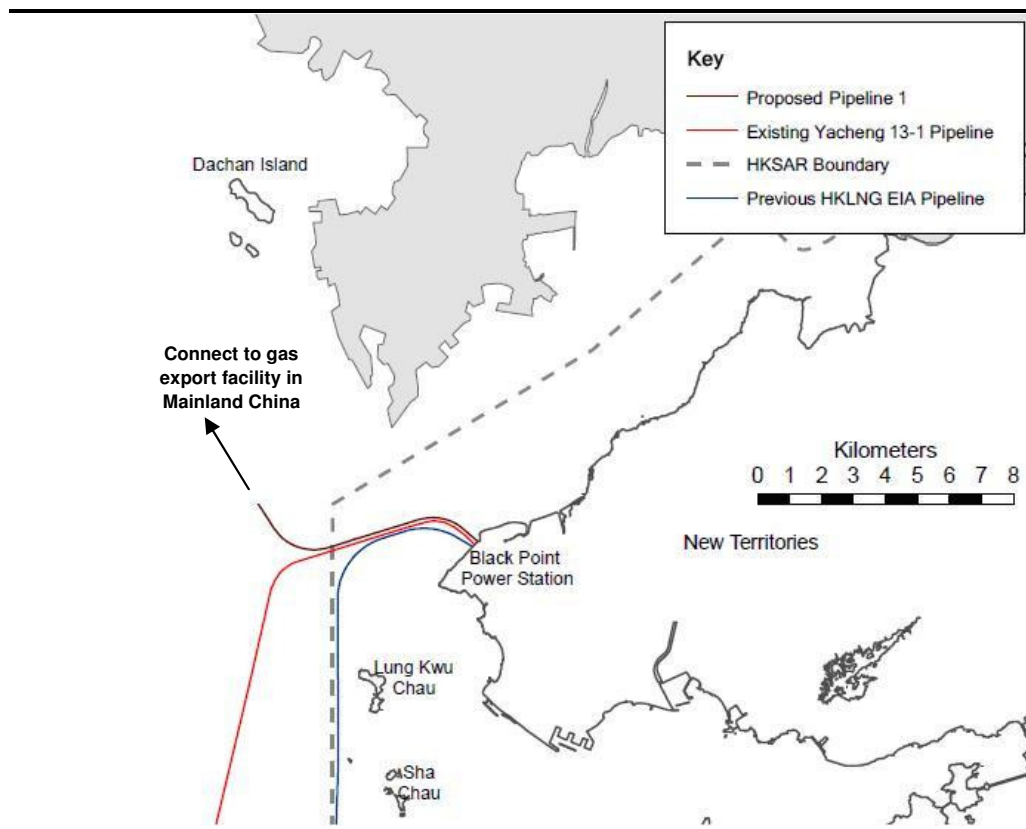
The First Phase of the BPGSP (hereafter referred to as the First Phase Project) will involve the construction and operation by PetroChina Company Limited (as the operator of the new CAPCO/PetroChina pipeline joint venture) of one submarine natural gas pipeline connecting BPPS with a gas export facility in Mainland China, while CAPCO is constructing and operating one gas receiving station (GRS) at BPPS.

An EIA of the BPGSP, including the First Phase Project, was prepared in accordance with the *EIA Study Brief* (No. ESB-208/2009) and the *Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM)* and submitted under the EIAO in February 2010. Subsequent to the approval of the EIA (*EIAO Register Number AEIAR-150/2010*) on 27 April 2010, an Environmental Permit (EP-391/2010) (EP) for the First Phase Project was granted by the Director of Environmental Protection (DEP) on 25 May 2010. A Further Environmental Permit (FEP) FEP-01/391/2010 was granted to the Contractor, Leighton Contractors (Asia) Limited, of the First Phase Project on 24 February 2011. Another FEP, FEP-02/391/2010/A, was issued to the Contractor, Wai Kee (Zens) Construction & Transportation Co., Ltd, on 23 March 2012. Applications for variation of the EP and FEP-01/391/2010 of the First Phase Project were submitted to the DEP and two EP variations, EP-391/2010/A and FEP-01/391/2010/A, were granted to CAPCO and Leighton Contractors (Asia) Limited respectively on 24 November 2011.

### 2.2 PROJECT SCOPE (FIRST PHASE)

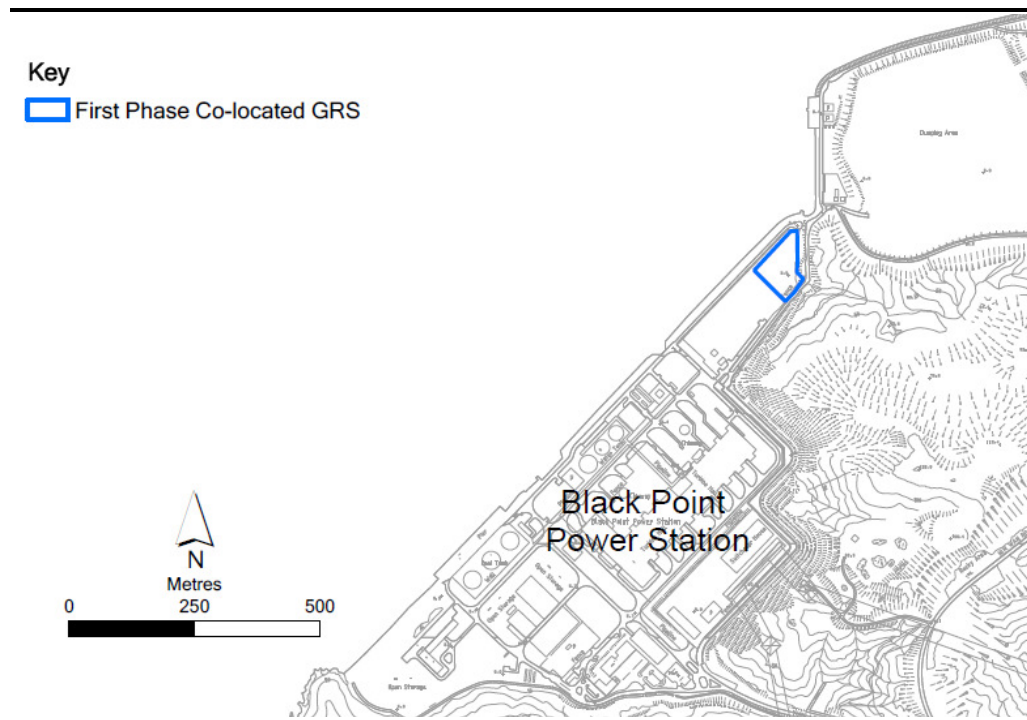
The proposed pipeline will traverse from the BPPS to a natural gas export facility in southern Guangdong Province, across the Urmston Road shipping channel and the Tonggu Waterway. It will be installed to the north of the existing Yacheng 13-1 Pipeline by approximately 100 m. Indicative routing of the proposed pipeline is depicted in *Figure 2.1*.

Figure 2.1 Indicative Alignment of the Cross-Boundary Submarine Gas Pipeline Connecting the BPPS and the New Gas Export Facility in Mainland China



The GRS is proposed to be located at the BPPS and will be constructed and operated within the site boundary of the BPPS, co-located with the existing GRS operated by the China National Offshore Oil Corporation (CNOOC) (hence referred to as the *Co-located GRS*). The proposed location of the Co-located GRS is presented on Figure 2.2.

Figure 2.2 Location of the First Phase Gas Receiving Station (GRS)



2.3 WORKS PROGRAMME & WORKS LOCATIONS

The construction works at the Co-located GRS area commenced on 15 March 2011. The preliminary construction programme is given in Figure 2.3. The locations of works are shown in Figure 2.4. The Sensitive Receivers in the vicinity of the proposed pipeline route are shown in Figure 2.5.

Figure 2.3 Preliminary Construction Programme for the First Phase of the Black Point Gas Supply Project

First Phase Construction Co-located GRS & Pipeline 1	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Construction of GRS																								
- Installation of GRS Facilities																								
Construction of Submarine Pipeline																								
- Dredging																								
- Installation																								
- Jetting																								
- Rock Dumping																								
- Testing																								

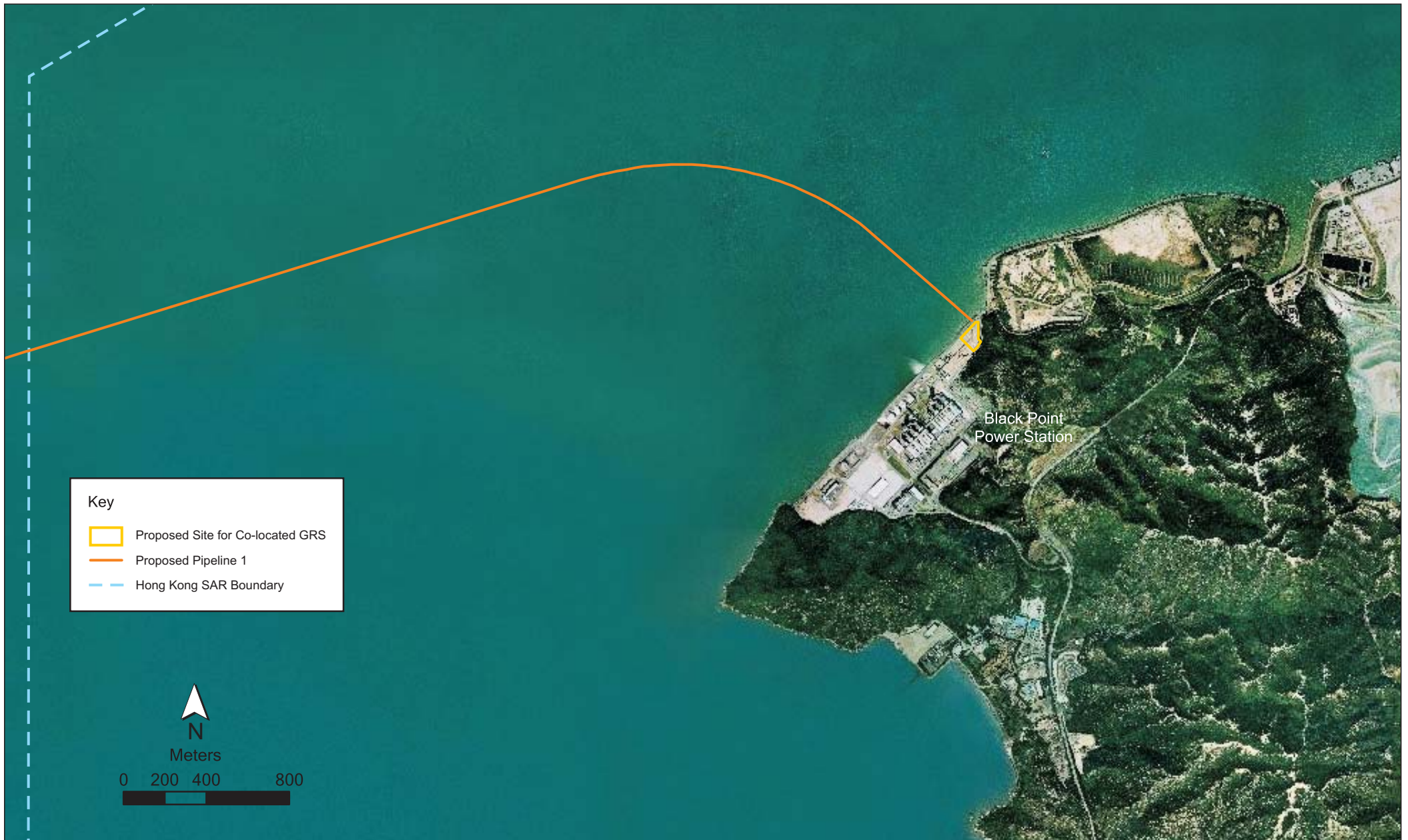


Figure 2.4

Locations of Works for the First Phase of the Black Point Gas Supply Project

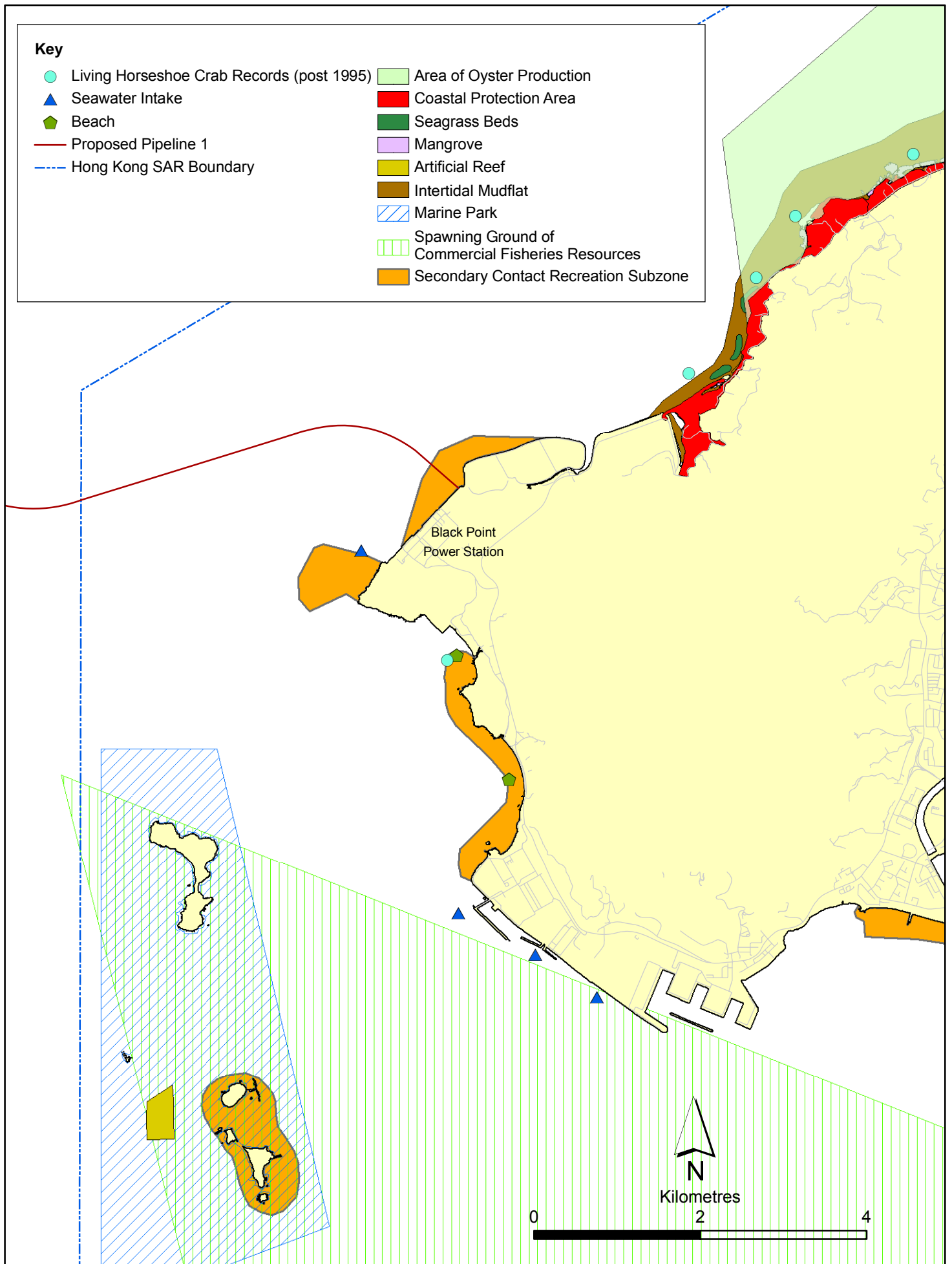


Figure 2.5

Surrounding Environment in the vicinity of Black Point

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Date: 02/12/2010

Environmental  
Resources  
Management



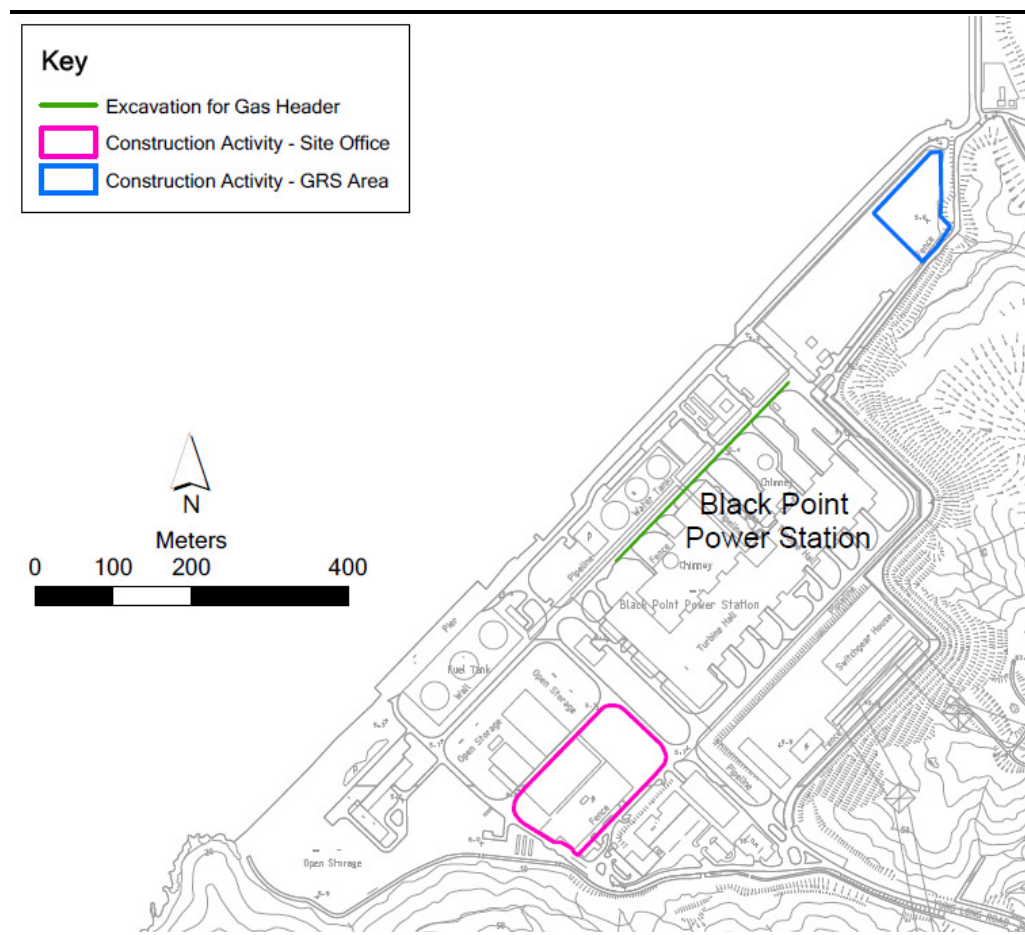
2.4 CONSTRUCTION ACTIVITIES UNDERTAKEN DURING THE REPORTING PERIOD

A summary of the major construction activities undertaken in this reporting period is shown in Table 2.1. The locations of the construction activities are shown in Figure 2.6.

Table 2.1 Summary of Construction Activities Undertaken during the Reporting Period

Construction Activities Undertaken	
•	Construction work of SIE Building and new pipe racks in the co-located GRS area
•	Excavation works, pipe installation and welding for Gas Header
•	Mobilisation for construction of concrete trough for shore approach

Figure 2.6 Locations of the Construction Activities - April 2012



## 2.5

## STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS

A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project is presented in *Table 2.2*.

**Table 2.2** *Summary of Environmental Licensing, Notification and Permit Status*

Permit/ Licenses/ Notification	Reference	Validity Period	Status	Remarks
<i>CAPCO</i>				
Environmental Permit	EP-391/2010	Throughout the Contract	Superseded by Environmental Permit No. EP-391/2010/A	Permit granted on 25 May 2010
Environmental Permit	EP-391/2010/A	Throughout the Contract	Valid	Permit granted on 24 Nov 2011
Allocation of Sediment Disposal Sites	(OHS3C-01) in FM4/IC/70A	up to 31 July 2012	Valid	Allocation granted on 4 Oct 2010, extension applied on 23 Dec 2011 and subsequently approved.
<i>Leighton Contractors (Asia) Limited</i>				
Further Environmental Permit	FEP-01/391/2010	Throughout the Contract	Superseded by Environmental Permit No. FEP-01/391/2010/A	Permit granted on 24 February 2011
Further Environmental Permit	FEP-01/391/2010/A	Throughout the Contract	Valid	Permit granted on 24 Nov 2011
Notification of Construction Works under Air Pollution Control (Construction Dust) Regulation	--	--	--	Reference Number for Notification Pursuant to APC (Construction Dust) Regulation: 325647
Construction Noise Permit	GW-RW00286-11	1 May 2011 to 30 Oct 2011	Expired; new permit granted	Permit granted on 21 April 2011
Construction Noise Permit	GW-RW0423-11	3 July 2011 to 21 August 2011	Expired; new permit granted	Permit granted on 28 June 2011
Construction Noise Permit	GW-RW0461-11	31 July 2011 to 29 January 2012	Expired; new permit granted	Permit granted on 12 July 2011

Permit/ Licenses/ Notification	Reference	Validity Period	Status	Remarks
Construction Noise Permit	GW-RW0491-11	21 August 2011 to 21 Feb 2012	Expired; new permit granted	Permit granted on 22 July 2011
Construction Noise Permit	GW-RW0526-11	11 September 2011 to 4 March 2012	Expired; new permit granted	Permit granted on 5 August 2011
Construction Noise Permit	GW-RW0033-12	30 January 2012 to 30 July 2012	Valid	Permit granted on 17 January 2012
Construction Noise Permit	GW-RW0121-12	11 March 2012 to 09 September 2012	Valid	Permit granted on 21 February 2012
Registration of Waste Producer under Waste Disposal (Chemical Waste)(General) Regulation	WPN 5213-432- L1048-05	Throughout the Contract	Valid	Granted on 19 April 2011 Renewed on 14 March 2012
Marine Dumping Permit	EP/MD/ 12-128	1 April 2012 to 31 July 2012	Valid	Permit granted on 23 March 2012
<i>Wai Kee (Zens) Construction &amp; Transportation Co., Ltd</i>				
Further Environmental Permit	FEP- 02/391/2010/A	Throughout the Contract	Valid	Permit granted on 23 March 2012
Construction Noise Permit	GW-RW0215-12	15 April 2012 to 14 October 2012	Valid	Permit granted on 26 March 2012
Marine Dumping Permit	EP/MD/12-141	26 April 2012 to 25 May 2012	Valid	Permit granted on 26 April 2012
Marine Dumping Permit	EP/MD/12-142	20 April 2012 to 30 July 2012	Valid	Permit granted on 20 April 2012



### IMPLEMENTATION STATUS ON ENVIRONMENTAL MITIGATION MEASURES

The Contractor has implemented environmental mitigation measures and requirements as stated in the EIA Report, EM&A Manual, EP and FEP. The implementation status of the measures during the reporting period is summarised in the Implementation Schedule of Mitigation Measures (*Annex A*).

Status of required submissions under the EP during the reporting period is presented in *Table 3.1*.

**Table 3.1** *Status of Required Submission*

EP Condition	Submission	Date of Submission to EPD
Condition 1.11	Notification on commencement of construction of the Project	14 January 2011
Condition 2.3	Submission of Updated EM&A Manual	1 March 2011
Condition 2.4	Submission of Updated EM&A Programme	1 March 2011
Condition 3.1	Notification on Management Organization of the Main Construction Company	22 February 2011
Condition 3.4	Submission of Waste Disposal Plan (WDP)	1 March 2011
Condition 3.5	Submission of Waste Management Plan (WMP)	11 April 2011
Condition 5.1	Submission of Baseline Marine Water Quality Monitoring Report (Final)	18 April 2011
Condition 5.3	Submission of Monthly EM&A Report – March 2012	13 April 2012

## 4 EM&A RESULTS

### 4.1 SITE INSPECTIONS & AUDITS

A monthly joint site inspection was conducted by representatives of the Contractor, the ET, CAPCO and the IEC on 26 April 2012. Locations inspected included the Co-located GRS area, the project site office compound, the gas header excavation area, temporary stockpiling areas and the project store. There was no non-compliance recorded during the site inspection.

Environmental performance complied with environmental requirements and all necessary mitigation measures were properly implemented. It was observed that most stockpiles of excavated materials were properly covered by tarpaulin, and a few stockpiles at the temporary stockpiling area were being covered by the Contractor. The Contractor was to complete covering all stockpiles with tarpaulin.

The ET will keep track of the construction activities to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

### 4.2 WATER QUALITY MONITORING

Since there was no dredging/ jetting activities during this reporting period, no water quality monitoring was conducted during the reporting period <sup>(1)</sup>.

### 4.3 WASTE MANAGEMENT

Wastes generated during this reporting period include mainly construction and demolition (C&D) materials (inert public fill and non-inert construction wastes) and sewage. Reference has been made to the Monthly Summary Waste Flow Table prepared by Leighton Contractors (Asia) Limited (*Annex B*). The quantities of different types of wastes are summarized in *Table 4.1* with reference to relevant handling records for this Project.

(1) Marine dredging activities planned for April 2012 were delayed and hence impact monitoring for marine water quality and additional marine mammal monitoring scheduled for April 2012 were cancelled and postponed to May 2012.

Table 4.1 Quantities of Different Wastes Generated during the Reporting Period

Month / Year	Quantity					
	C&D Materials (inert) <sup>(a)</sup>	C&D Materials (non-inert) <sup>(b)</sup>	Chemical Waste <sup>(c)</sup>	Recyclable Materials <sup>(d)</sup>	C&D Materials (Inert) Re-used <sup>(e)</sup>	Sewage <sup>(f)</sup>
April 2012	833.5 tonnes	33.9 tonnes	0 kg	790 kg	0 tonnes	160 m <sup>3</sup>

Notes:

- (a) Inert C&D materials include concrete, rubble, earth, boulder, sand, tile, masonry and used bentonite and were disposed of at the Tuen Mun Area 38 Public Fill.
- (b) Non-inert C&D materials after segregation were sent to WENT Landfill.
- (c) A licensed waste collector has been engaged for the collection of chemical wastes for disposal or recycling at licensed facilities.
- (d) Recyclable materials include metals, paper, cardboard, plastics, timber and others.
- (e) Inert C&D materials recycled include broken concrete, materials reused in the First Phase Project and materials reused in other Projects.
- (f) Sewage generated by toilets with holding tanks was collected and disposed of off-site at Pillar Point Sewage Treatment Works.

#### 4.4 MARINE ECOLOGY MONITORING

Additional monitoring of the distribution and abundance of dolphins during the pre-construction phase of the First Phase Project was completed in October 2011 and the results were reported in the *Ninth Monthly EM&A Report* for the First Phase Project.

Since there was no dredging/ jetting activities during this reporting period, no construction phase marine ecology monitoring was conducted during the reporting period <sup>(1)</sup>.

(1) Marine dredging activities planned for April 2012 were delayed and hence impact monitoring for marine water quality and additional marine mammal monitoring scheduled for April 2012 were cancelled and postponed to May 2012.

5 ENVIRONMENTAL NON-CONFORMANCE

5.1 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

No non-compliance of Action and Limit Levels for water quality was recorded during the reporting month.

No non-compliance of EIA/ EM&A/ EP/ legislative requirements was recorded during the reporting period.

5.2 SUMMARY OF ENVIRONMENTAL COMPLAINT

No complaint was received during the reporting period.

5.3 SUMMARY OF ENVIRONMENTAL SUMMON AND SUCCESSFUL PROSECUTION

No summons/ prosecution was received during the reporting period.

## 6 UPCOMING WORKS FOR THE NEXT REPORTING PERIOD

### 6.1 CONSTRUCTION ACTIVITIES FOR THE COMING MONTH

Works to be undertaken for the coming reporting period are summarized in *Table 6.1*.

**Table 6.1 Construction Works to Be Undertaken in the Coming Month**

Work to be taken
<ul style="list-style-type: none"> <li>• Continue construction work of SIE Building and new pipe racks in the co-located GRS area</li> <li>• Excavation works, pipe installation and welding for Gas Header</li> <li>• Construction of concrete trough for shore approach</li> <li>• Marine dredging works in PRC waters within 2.5 km of HKSAR boundary</li> </ul>

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

A maximum of five (5) closed grab dredgers will be deployed for the dredging activities in the PRC waters within a distance of about 2.5 km from the HKSAR Boundary. Quantitative computational modelling was undertaken to assess potential water quality impacts during the dredging works along this pipeline section. Results of the water quality modelling confirmed that potential water quality impacts (impacts of suspended sediment dispersion, sediment deposition, dissolved oxygen depletion, nutrients, heavy metals and micro-organic pollutants) associated with the said dredging works are anticipated to be in compliance with the relevant WQOs and assessment criteria at the point specific sensitive receivers in HKSAR waters in both wet and dry seasons. Based on the modelling results, no unacceptable impacts to water quality of HKSAR waters, marine ecology and fisheries have been predicted to occur. Detailed results of the modelling works are presented in *Annex D*.

### 6.2 MONITORING SCHEDULE FOR THE COMING MONTHS

Impact monitoring for marine water quality and additional marine mammal monitoring are scheduled for the next reporting period (*Annex C*). The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress.

## CONCLUSIONS

This Fourteenth Monthly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 to 30 April 2012, in accordance with EM&A Manual and the requirements of EP-391/2010/A, FEP-01/391/2010/A and FEP-02/391/2010/A.

Since there was no dredging/ jetting activities during this reporting period, no construction phase water quality and marine mammal monitoring was deemed necessary and hence none was conducted during the reporting period. No exceedance of Action and Limit Levels of water quality was reported during the reporting period.

A monthly joint environmental site inspection was conducted in the reporting period. It confirmed that the environmental mitigation measures recommended in the EIA Report were properly implemented by the Contractor.

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

No complaint and summons/prosecution was received during the 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.

Annex A

# Implementation Schedule of Mitigation & Precautionary Measures

## Annex A-1 Implementation Schedule for Environmental Protection Measures for the Black Point Gas Supply Project (First Phase)

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
<b>1. Air Quality Measures</b>					
S4.8	Dust control measures stipulated in the <i>Air Pollution Control (Construction Dust) Regulation</i> will be implemented during the construction of the GRS to control the potential fugitive dust emissions.	Land Site / During Construction	Contractor(s)	Air Pollution Control (Construction Dust) Regulation	✓
S4.8	Site practices such as regular maintenance and checking of the diesel powered mechanical equipment will be adopted to avoid any black smoke emissions and to minimize gaseous emissions.	Land Site / During Construction	Contractor(s)	-	✓
S4.10	EM&A in the form of site inspection and audit of dust generating activities.	Land Site / During Construction	Environmental Team (ET) & Independent Environmental Checker (IEC)	Environmental Impact Assessment Ordinance	✓
S4.10	A commissioning test for heaters will be conducted to ensure the stack design, heater operation and the emission information adopted in the assessment is maintained.	Land Site / During Construction/ commissioning	CAPCO	-	N/A. Test to be conducted prior to commissioning.
S4.6, EP4.1	The GRS shall be designed and operated in accordance with the following parameters: <ul style="list-style-type: none"> <li>The maximum number of gas heaters shall not be more than seven, and no more than six gas heaters shall be operated simultaneously. The total amount of NO<sub>x</sub> and CO emissions emitted from the heaters in operation shall not be more than 8.22kg and 5.14kg per hour respectively;</li> <li>The stack height shall not be less than 15m above ground;</li> <li>The exhaust gas velocity of the gas heaters shall not be less than 10ms<sup>-1</sup> under full load operation; and</li> <li>The exhaust gas temperature of the gas heaters shall not be less than 280 °C under full load operation.</li> </ul>	Land Site / During Design and Operation	CAPCO	-	N/A. To be checked during detailed engineering stage.



EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
<b>2. Noise</b>					
S5.7	EM&A in the form of site inspection and audit of construction activities.	Land Site / During Construction	Environmental Team (ET) & Independent Environmental Checker (IEC)	Environmental Impact Assessment Ordinance	✓
<b>3. Water Quality</b>					
S6 Annex 6A	Dredging/ jetting plants will be required to comply with the rates modelled in the EIA (S6 Annex 6A and Annex 14A-2) for the various activities assessed.	Marine works areas / During Construction	Contractor(s) and ET	-	N/A. No dredging/jetting during the reporting period
S6.9	Dredged marine mud will be disposed of in a gazetted marine disposal area in accordance with the <i>Dumping at Sea Ordinance (DASO)</i> permit conditions.	Dredged areas/ During Construction	Contractor(s)	Dumping at Sea Ordinance	N/A. No dredging/jetting during the reporting period
S6.9	Disposal vessels will be fitted with tight bottom seals in order to prevent leakage of material during transport.	Dredged areas/ During Construction	Contractor(s)	Dumping at Sea Ordinance	N/A. No dredging/jetting during the reporting period
S6.9	Barges will be filled to a level, which ensures that material does not spill over during transport to the disposal site and that adequate freeboard is maintained to ensure that the decks are not washed by wave action.	Dredged areas/ During Construction	Contractor(s)	-	N/A. No dredging/jetting during the reporting period
S6.9	After dredging, any excess materials will be cleaned from decks and exposed fittings before the vessel is moved from the dredging area.	Dredged areas/ During Construction	Contractor(s)	Dumping at Sea Ordinance	N/A. No dredging/jetting during the reporting period
S6.9	The contractor(s) will confirm that the works cause no visible foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the dredging site.	Dredged areas/ During Construction	Contractor(s)	-	N/A. No dredging/jetting during the reporting period

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S6.9	Monitoring and automation systems will be used to improve the crew's information regarding the various dredging parameters to improve dredging accuracy and efficiency.	Dredged areas/ During Construction	Contractor(s)	-	N/A. No dredging/jetting during the reporting period
S6.9	Control and monitoring systems will be used to alert the crew to leaks or any other potential risks such as chemicals and oils.	Dredged areas/ During Construction	Contractor(s)	-	N/A. No dredging/jetting during the reporting period
S6.9	When the dredged material has been unloaded at the disposal areas, any material that has accumulated on the deck or other exposed parts of the vessel will be removed and placed in the hold or a hopper. Under no circumstances will decks be washed clean in a way that permits material to be released overboard.	Dredged areas/ During Construction	Contractor(s)	Dumping at Sea Ordinance	N/A. No dredging/jetting during the reporting period
S6.9	Dredgers will maintain adequate clearance between vessels and the seabed at all states of the tide and reduce operations speed to ensure that excessive turbidity is not generated by turbulence from vessel movement or propeller wash.	Dredged areas/ During Construction	Contractor(s)	-	N/A. No dredging/jetting during the reporting period
S6.9	Mitigation measures to be implemented during submarine pipeline installation activities are presented in <i>Annex 14A-2</i> .	Marine works areas / During Construction	Contractor(s)	-	N/A. No marine works during the reporting period
S6.9	Channels, earth bunds or sand bag barriers will be provided on site to direct stormwater to silt removal facilities. The design of silt removal facilities (e.g. silt traps or sedimentation facilities) will make reference to the guidelines in <i>Appendix A1</i> of <i>ProPECC PN 1/94</i> . All drainage facilities and erosion and sediment control structures will be inspected on a regular basis and maintained to confirm proper and efficient operation at all times and particularly during rainstorms. Deposited silt and grit will be removed regularly.	Land Site / During Construction	Contractor(s)	ProPECC PN 1/94 TM standard under the WPCO	✓

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S6.9	Earthworks to form the final surfaces will be followed up with surface protection and drainage works to prevent erosion caused by rainstorms.	Land Site / During Construction	Contractor(s)	-	N/A
S6.9	Appropriate surface drainage will be designed and provided where necessary.	Land Site / During Construction	Contractor(s)	-	✓
S6.9	The precautions to be taken at any time of year when rainstorms are likely together with the actions to be taken when a rainstorm is imminent or forecasted and actions to be taken during or after rainstorms are summarised in <i>Appendix A2 of ProPECC PN 1/94</i> .	Land Site / During Construction	Contractor(s)	ProPECC PN 1/94	N/A
S6.9	Oil interceptors will be provided in the drainage system where necessary and regularly emptied to prevent the release of oil and grease into the storm water drainage system after accidental spillages.	Land Site / During Construction	Contractor(s)	-	N/A
S6.9	Temporary and permanent drainage pipes and culverts provided to facilitate runoff discharge will be adequately designed for the controlled release of storm flows.	Land Site / During Construction	Contractor(s)	-	✓
S6.9	The temporary diverted drainage will be reinstated to the original condition when the construction work has finished or when the temporary diversion is no longer required.	Land Site / During Construction	Contractor(s)	-	N/A
S6.9	During the early stages of work, portable chemical toilets will be used and the effluent will either be shipped offsite or be disposed of at sewage treatment work (STW) at BPPS.	All facilities / During Construction	Contractor(s)	-	✓. Toilets with holding tanks have been provided. Portable chemical toilets will be provided
S6.9	Debris and refuse generated on-site will be collected, handled and disposed of properly to avoid entering the nearby WSRs. Stockpiles of cement and other construction materials will be kept covered when not being used.	All facilities / During Construction	Contractor(s)	-	✓
S6.9	Oil leakage or spillage will be contained and clean up immediately. Waste oil will be collected and stored for recycling or disposal, in accordance with the <i>Waste Disposal Ordinance</i> .	All facilities / During Construction	Contractor(s)	Waste Disposal Ordinance	✓

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S6.10	Water quality monitoring shall be undertaken for suspended solids, salinity, turbidity, and dissolved oxygen. If exceedances occur due to dredging/ jetting activities, event and action plan shall be adopted.	Designated monitoring stations as defined in EM&A Manual / Construction period for dredging/ jetting works	ET	Environmental Impact Assessment Ordinance	N/A. No water quality monitoring during reporting period
S6.9	The surface runoff from the GRS should be connected to a storm water channel via a grit and oil interceptor. These grit and oil interceptors will be regularly cleaned and maintained in good working condition. Trapped oil and grease should be disposed of periodically by waste collection contractor using a suitable liquid waste collection vehicle	GRS/ During Operation	CAPCO	-	✓
S6.9	Any oil leakage or spillage will be contained and cleaned up immediately.	GRS/ During Operation	CAPCO	-	✓
S6.9	Waste oil will be collected and stored for recycling or disposal in accordance with the <i>Waste Disposal Ordinance</i> .	GRS/ During Operation	CAPCO	Waste Disposal Ordinance	✓
<b>4. Waste Management</b>					
S7.5	The Contractor shall identify a coordinator/ approved personnel for implementing standard site practices and managing wastes. The waste coordinator shall implement the Waste Management Plan which specifies procedures such as a recording system to facilitate tracking of loads and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. Responsibilities also include arrangements for collection and effective disposal of wastes to appropriate facilities.	Contract mobilisation / During construction	Contractor(s)	-	✓

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S7.5	The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges. A trip ticket system (TTS) for the removal of C&D materials from the site to the designated disposal facility will be implemented.	Contract mobilisation / During construction	Contractor(s)	Waste Disposal (Chemical Waste) (General) Regulation  Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes  DEVB TC(W) No. 6/2010, Trip-ticket System for Disposal of Construction and Demolition Material  Water Pollution Control Ordinance	✓
S7.5	A 'chit' ticket system (TTS) for the disposal of C&D materials will be implemented.	Contract mobilisation / During construction	Contractor(s)	Waste Disposal (Charges for Disposal of Construction Waste) Regulation	✓
S7.5	No waste shall be burnt on site. Wastes shall be collected by licensed waste haulier and be disposed of at licence sites.	Land site/ During construction	Contractor(s)	Air Pollution Control Ordinance	✓
S7.5	Rock and soil may be excavated from site formation works and that will be reused as fill material for the Project as far as practicable.	Land site / During construction	Contractor(s)	WBTC No. 2/93, Public Dumps	✓
S7.5	Material shall be reused on site as far as practicable, including formwork plywood, topsoil and excavated material.	Land site / During construction	Contractor(s)	WBTC 32/92, The Use of Tropical Hard Wood on Construction Site	✓

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S7.5	C&D materials will be sorted on site into inert waste (public fill) and non-inert waste (construction waste). Public fill will be disposed of at public fill reception facilities (e.g. Tuen Mun Area 38 or other locations as agreed with CEDD). Construction waste, such as timber, paper, plastics and general refuse, cannot be reused and need to be disposed of at the West New Territories (WENT) Landfill.	Land site / During construction	Contractor(s)	-	✓
S7.5	The site and surroundings shall be kept tidy and litter free. Waste storage area shall be properly cleaned and shall not cause windblown litter and dust nuisance.	All areas / During construction	Contractor(s)	WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness. Works Bureau, Hong Kong SAR Government	✓
S7.5	Stockpiled material shall avoid vegetated areas.	Land site / During construction	Contractor(s)		✓
S7.5	Stockpiles shall be covered by tarpaulins and/or watered as needed.	Land site / During construction, particularly dry season	Contractor(s)	Air Pollution Control (Construction Dust) Regulation	<>
S7.5	Storage of material on site shall be kept to a minimum. Construction materials shall be planned and stocked carefully to reduce amount of waste generated and avoid unnecessary generation of waste.	All areas / During construction	Contractor(s)	-	✓
S7.5	Use of reusable non-timber formwork to reduce the amount of C&D materials	All areas / During construction	Contractor(s)	Works Branch Technical Circular (WBTC) No. 32/92, The Use of Tropical Hard Wood on Construction Site	✓

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S7.5	Prior to disposal of construction waste, wood, steel and other metals will be separated to the extent practical, for re-use and/or recycling to reduce the quantity of waste to be disposed of to landfill	All areas / During construction	Contractor(s)	-	✓
S7.5	Wheel washing facilities shall be used by all trucks leaving the site to prevent the transfer of mud onto public roads.	Site entrances and exits / During construction	Contractor(s)	Air Pollution Control (Construction Dust) Regulation	✓
S7.5	Any unused chemicals and those with remaining functional capacity shall be recycled to the extent practical.	Land site / During construction	Contractor(s)	-	✓
S7.5	Temporary storage areas for general refuse shall be enclosed or contained to avoid environmental impacts.	All areas / During construction	Contractor(s)	WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness.	✓
S7.5	Sufficient dustbins shall be provided for storage of waste. Wastes shall be timely cleared and shall be disposed of to the nearest licensed facility.	All areas / During construction	Contractor(s)	WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness.	✓
S7.5	Waste oils, chemicals or solvents shall not be disposed of to drain. Drainage systems, sumps and oil interceptors shall be cleaned and maintained regularly.	All facilities / During construction	Contractor(s)	-	✓
S7.5	Standard site practice shall be implemented to avoid waste generation and promote waste minimisation.	All facilities / During construction	Contractor(s)	-	✓
S7.5	Waste materials such as paper, metal, timber and waste oil shall be recycled as far as practicable. Different types of waste shall be segregated and stored of in different containers, skips or stockpiles to enhance reuse or recycling of material and their proper disposal. Recycling bins will be provided at strategic locations to facilitate recovery of aluminium can and waste paper from the site.	Land Site / During construction	Contractor(s)	ETWBTC No. 33/2002, Management of Construction and Demolition Material Including Rock	✓

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S7.5	C&D materials will be wetted as quickly as possible to the extent practice after filling to reduce the potential dust and water quality impacts of site formation works	All facilities / During construction	Contractor(s)	-	✓
S7.5	Dredged marine mud shall be disposed of in marine disposal sites designated by the Marine Fill Committee (MFC) and under the requirements of the <i>Dumping at Seas Ordinance</i> .	Dredging / During construction	Contractor(s)	Dumping at Sea Ordinance	N/A. No dredging during the reporting period
S7.5	Waste containers shall be in good condition and fitted with lids or covers to prevent waste from escaping or the ingress of water. Waste containers shall be in a secure area on hardstanding.	All facilities / During construction	Contractor(s)	WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness.	✓
S7.5	Proper storage and site practices shall be adopted to reduce the potential for damage or contamination of construction materials.	All facilities / During construction	Contractor(s)	-	✓
S7.5	Plan and stock construction materials carefully to reduce amount of waste generated and avoid unnecessary generation of waste	All facilities / During construction	Contractor(s)	-	✓
S7.5	Emergency equipment to deal with any spillage or fire shall be kept on site.	All facilities / During construction	Contractor(s)	Waste Disposal (Chemical Waste) (General) Regulation  Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes	✓



EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S7.5	Suitable chemical waste storage areas shall be formed at the works site for temporary storage pending collection. Chemical wastes shall be separated for special handling and shall be disposed of via a licensed waste collector at appropriate licensed treatment facility, e.g. the Chemical Waste Treatment Centre at Tsing Yi.	Land site/ Chemical Waste Treatment Centre at Tsing Yi/ During construction	Contractor(s)	Waste Disposal (Chemical Waste) (General) Regulation  Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes	✓
S7.5	Containers used for storage of chemical waste shall be: <ul style="list-style-type: none"> <li>• Maintained in good condition and clearly labelled in both English and Chinese;</li> <li>• Suitable for the substance they are holding, resistant to corrosion, and securely closed; and</li> <li>• Capacity of less than 450 L unless the specifications have been approved by the EPD.</li> </ul>	All facilities / During construction	Contractor(s)	Waste Disposal (Chemical Waste) (General) Regulation  Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes	✓
S7.5	Storage areas for chemical waste shall: <ul style="list-style-type: none"> <li>• Be clearly labelled and used solely for the storage of chemical waste;</li> <li>• Be enclosed on at least 3 sides;</li> <li>• Have adequate ventilation;</li> <li>• Be arranged so that incompatible materials are appropriately separated</li> <li>• Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest; and</li> <li>• Be covered to prevent rainfall from entering</li> </ul>	All facilities / During construction	Contractor(s)	Waste Disposal (Chemical Waste) (General) Regulation  Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes	✓

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S7.5	Leaking containers shall be contained and removed from site as soon as is reasonably practicable.	All facilities / During construction	Contractor(s)	Waste Disposal (Chemical Waste) (General) Regulation  Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes	✓
S7.5	Training shall be provided to site personnel in proper waste management and chemical handling procedures, the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling.	All facilities / During construction	Contractor(s)	-	✓
S7.5	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site inspection and audit programme shall be undertaken. Waste flow tables (WFT) will be used as a recording system to document the amount of waste generated, recycled and disposed of (including the disposal sites).	All facilities / During construction	ET and IEC	-	✓
S7.5	Appropriate measures to reduce windblown litter and dust transportation of waste by either covering trucks or by transporting wastes in enclosed containers.	All facilities / During construction	Contractor(s)	-	✓
<b>5. Marine Ecology (Marine Mammals)</b>					
S8.8	The vessel operators will be required to control and manage all effluent from vessels	Marine works area / During construction	Contractor(s) and ET	-	N/A. No marine works during the reporting period
S8.8	A policy of no dumping of rubbish, food, oil, or chemicals will be strictly enforced. This will also be covered in the contractor briefings	Marine works area / During construction	Contractor(s) and ET	-	N/A. No marine works during the reporting period

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
S8.8	All vessel operators working on the Project construction phase will be given a briefing, alerting them to the possible presence of dolphins in the area, and the guidelines for safe vessel operation in the presence of cetaceans. If high speed vessels are used by the contractors, they will be required to slow to 10 knots when passing through a high density dolphin area (Sha Chau and Lung Kwu Chau)	Marine works area / During construction	Contractor(s) and ET	-	N/A. No marine works during the reporting period
S8.8	The vessel operators engaged during the construction phase will be required to use predefined and regular routes, as these will become known to dolphins using these waters	Marine works area / During construction	Contractor(s) and ET	-	N/A. No marine works during the reporting period
S8.8	A marine mammal exclusion zone within a radius of 250 m from dredgers/ jetting machine will be implemented during the construction phase. Qualified observer(s) will scan the 250 m-exclusion zone for at least 30 minutes prior to the start of dredging. If cetaceans are observed in the exclusion zone, dredging/ jetting will be delayed until they have left the area. As per previous practice in Hong Kong, should cetaceans move into the works area during dredging/ jetting, it is considered that cetaceans will have acclimatised themselves to the works therefore cessation of dredging is not required	Works areas along the pipeline route / During Dredging/ Jetting for the Gas Pipeline Installation	Contractor(s) and ET	-	N/A. No works along pipeline route/dredging/ jetting during the reporting period
S8.8	Except for the pipeline section along Urmston Road, dredging/ jetting works shall be restricted to a daily maximum of 12 hours with daylight operations. Because of marine traffic constraints, dredgers/ jetting machine may need to operate 24 hours on the pipeline section which crosses the Urmston Road channel off Black Point enabling completion in the shortest possible time	Works areas along the pipeline route / During Dredging/ Jetting for the Gas Pipeline Installation	Contractor(s) and ET	-	N/A. No works along pipeline route/dredging/ jetting during the reporting period
S8.8	Monitoring will be conducted for the distribution and abundance of dolphins during the construction and post-construction phase of the project. Three months of pre-construction dolphin monitoring will also be conducted. The protocols for this will be agreed with AFCD in advance.	Marine works areas / Pre-construction, during construction and post-construction	CAPCO	-	N/A. No marine works during the reporting period

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Relevant Legislation & Guidelines	Status
<b>6. Fisheries</b>					
S9.10	Geophysical survey will be conducted during the pre-construction and post-construction of pipeline works to confirm the seabed would be reinstated to its original level.	Pre-construction and Post-construction after pipeline works	ET	-	✓. Pre-construction phase geophysical survey completed.
<b>7. Landscape &amp; Visual</b>					
S10.5.11	Site hoardings to be compatible with surrounding landscape.	Land site / During Construction	Contractor(s)	-	✓
S10.5.11	The tree requiring removal is to be compensated in accordance with relevant government guidelines	Land site / During Construction	Contractor(s)	-	N/A. To be implemented.
S10.6.13	The colours of the proposed GRS should be selected to complement the existing industrial surroundings.	Land site / Pre-Construction (Detail Design)	Contractor(s)	-	N/A. To be checked.
<b>8. Cultural Heritage</b>					
No mitigation measures were specified in the EIA report as no sites of terrestrial or marine archaeological potential are located in the Project Area.					
<b>9. Hazard to Life</b>					
EP3.12	The first major piece of equipment in the GRS for connecting the offshore pipeline shall be an Emergency Shutdown (ESD) valve, which can be closed in order to isolate the GRS from the source of gas in the event of an emergency	Land site / Pre-Construction (Detail Design)	CAPCO	-	N/A. To be checked during detailed engineering design.

## Remark:

- ✓ Compliance of Mitigation Measures
- <> Compliance of Mitigation but need improvement
- x Non-compliance of Mitigation Measures
- ▲ Non-compliance of Mitigation Measures but rectified by Leighton Contractors (Asia) Limited
- Δ Deficiency of Mitigation Measures but rectified by Leighton Contractors (Asia) Limited
- N/A Not Applicable in Reporting Period

## Annex A-2 Summary of Mitigation Measures during the Dredging/ Jetting Activities for this Project

Marine Work Location (Zone)	Marine Work & Plant Type	No. of Plant	Specific Mitigation Measures	Status
Gas Pipeline – Shore Approach (KP 4.89 – KP 4.78)	Dredging by Closed Grab Dredger	1	Grab dredging speed shall be no more than 57 m per day or 4.75 m per hour, whichever is less. Silt curtain(s) will be installed during grab dredging operations along this pipeline section *.	N/A. No dredging/jetting during the reporting period
Gas Pipeline – Black Point to Urmston Road (KP 4.78 – KP 2.52)	Trenching by Jetting Machine	1	Jetting speed shall be no more than 360 m per day or 30 m per hour, whichever is less. Silt curtain(s) will be installed along the marine works areas during jetting operations for the installation of this pipeline section *. The extent of silt curtain(s) installation will be determined based on site condition (e.g. bathymetry of the works area) and navigation safety considerations. Details of the design and implementation of the silt curtain(s) will be developed before construction and verified by the Independent Environmental Checker (IEC) and agreed with EPD. Should non-compliance occur at the respective impact station during water quality monitoring, the use of additional mitigation measures will be examined by the ET and the IEC, discussed with the Contractor, EPD and CAPCO.	N/A. No dredging/jetting during the reporting period
Gas Pipeline – across Urmston Road (KP 2.52 – KP 0.73)	Dredging by Closed Grab Dredger	1	Grab dredging speed shall be no more than 57 m per day or 2.5 m per hour, whichever is less. Should non-compliance occur at the respective impact station during water quality monitoring, the use of additional mitigation measures, such as cage-type silt curtain, will be examined by the ET and the IEC, discussed with the Contractor, EPD and CAPCO *.	N/A. No dredging/jetting during the reporting period
Gas Pipeline – from Urmston Road to HKSAR boundary (KP 0.73 – KP 0)	Trenching by Jetting Machine	1	Jetting speed shall be no more than 360 m per day or 30 m per hour, whichever is less. Should non-compliance occur at the respective impact station during water quality monitoring, the use of additional mitigation measures will be examined by the ET and the IEC, discussed with the Contractor, EPD and CAPCO *.	N/A. No dredging/jetting during the reporting period

\* Details of silt curtain installation shall be submitted to the IEC for verification prior to the commencement of dredging/jetting works.

## Remark:

- ✓ 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

Annex B

## Waste Flow Table

## Waste Flow Table Year: 2012

Month	Actual Quantities of Inert Construction Waste Reused/Recycled			Actual Quantities of Construction Waste Recycled						Actual Quantities of Disposed Material			
	Broken Concrete <sup>1</sup> Recycled (tonnes)	Re-used in Project (tonnes)	Re-used in Other Projects <sup>2</sup> (tonnes)	Metals Recycled (kg)	Paper Recycled (kg)	Cardboard Packaging Recycled (kg)	Plastic <sup>3</sup> Recycled (kg)	Timber (kg)	Others <sup>4</sup> (nos.)	Chemical Waste <sup>5</sup> to Licensed Facilities		Inert Construction Waste <sup>6</sup> to Public Fill (tonnes)	Construction Waste to Landfill (tonnes)
										Liquid (litres)	Solid (kg)		
Jan	0	0	0	0	0	0	0	0	0	0	0	4974.25	11.55
Feb	0	0	0	10	780	0	0	0	0	0	250	2786.54	10
Mar	0	0	0	6445	625	0	0	0	0	0	0	3574.56	6.69
Q1 total	0	0	0	6455	1405	0	0	0	0	0	250	11335	28.24
Apr	0	0	0	15	775	0	0	0	0	0	0	833.48	33.92
May													
Jun													
Q2 total	0	0	0	15	775	0	0	0	0	0	0	833	33.92
Jul													
Aug													
Sep													
Q3 total	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct													
Nov													
Dec													
Q4 total	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Grand total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6470</b>	<b>2180</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>250</b>	<b>12168.83</b>	<b>62.16</b>

Note / Definition:

1. Broken concrete for recycling into aggregates (eg Tuen Mun Area 38).
2. Other projects include third-parties (eg quarries).
3. Plastic refers to plastic bottles/containers, plastic sheets/foam from packaging material.
4. Examples of other waste recycled may include tyres and computer equipment

5. Chemical waste is split into 2 components: liquid waste (eg spent lubricating oil) and solid waste (eg spent batteries).

6. Inert construction waste is also known as public fill. It includes, for example, concrete, rubble, earth, boulder, sand, tile, masonry and used bentonite.

Annex C

Tentative Schedules for  
Water Quality Impact  
Monitoring and Additional  
Marine Mammal  
Monitoring



**Black Point Gas Supply Project (First Phase)  
Tentative Water Quality Impact Monitoring Schedule - May 2012**

Impact-HK Monitoring: Water Quality Monitoring for Dredging and Jetting Activities in Hong Kong Waters.

Impact-PRC Monitoring: Water Quality Monitoring During Dredging Activities in PRC Waters within 2.5 km from HKSAR boundary.

Reference Tidal Station: Lok On Pai (Source: HK Observatory Department)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Public Holiday 1-May	2-May	3-May	4-May	5-May
6-May	7-May	8-May	9-May	10-May	11-May	12-May
	Mid-Flood; 0656hrs Mid-Ebb; 1343hrs <i>Impact-PRC Monitoring</i>		Mid-Flood; 0817hrs Mid-Ebb; 1520hrs <i>Impact-PRC Monitoring</i>	Mid-Flood; 0900hrs Mid-Ebb; 1609hrs <i>Impact-HK Monitoring</i>	Mid-Flood; 0948hrs Mid-Ebb; 1701hrs <i>Impact-PRC Monitoring</i>	Mid-Flood; 1049hrs Mid-Ebb; 1800hrs <i>Impact-HK Monitoring</i>
13-May	14-May	15-May	16-May	17-May	18-May	19-May
	Mid-Flood; 1355hrs Mid-Ebb; 2018hrs <i>Impact-PRC Monitoring</i>	Mid-Flood; 1517hrs Mid-Ebb; 0947hrs <i>Impact-HK Monitoring</i>	Mid-Flood; 1622hrs Mid-Ebb; 1031hrs <i>Impact-PRC Monitoring</i>	Mid-Flood; 1718hrs Mid-Ebb; 1109hrs <i>Impact-HK Monitoring</i>	Mid-Flood; 1807hrs Mid-Ebb; 1143hrs <i>Impact-PRC Monitoring</i>	Mid-Flood; 1851hrs Mid-Ebb; 1214hrs <i>Impact-HK Monitoring</i>
20-May	21-May	22-May	23-May	24-May	25-May	26-May
	Mid-Flood; 2011hrs Mid-Ebb; 1319hrs <i>Impact-PRC Monitoring</i>	Mid-Flood; 2049hrs Mid-Ebb; 1352hrs <i>Impact-HK Monitoring</i>	Mid-Flood; 0718hrs Mid-Ebb; 1425hrs <i>Impact-PRC Monitoring</i>		Mid-Flood; 0824hrs Mid-Ebb; 1538hrs <i>Impact-PRC Monitoring</i>	
27-May	28-May	29-May	30-May	31-May		
	Mid-Flood; 1049hrs Mid-Ebb; 1755hrs <i>Impact-PRC Monitoring</i>		Mid-Flood; 1408hrs Mid-Ebb; 2021hrs <i>Impact-PRC Monitoring</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.

**Black Point Gas Supply Project (First Phase)**  
**Tentative Schedule for Additional Marine Mammal Monitoring (Construction Phase) - May 2012**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Public Holiday 1-May	2-May	3-May	4-May	5-May
6-May	7-May	8-May	9-May	10-May	11-May	12-May
13-May	14-May	15-May	16-May	17-May	18-May	19-May
20-May	21-May	22-May	23-May	24-May	25-May	26-May
		Additional Marine Mammal Monitoring (Construction Phase)				
27-May	28-May	29-May	30-May	31-May		

The schedule will be revised after reviewing the progress of the construction works or due to adverse (safety, weather etc) conditions.

Annex D

# Technical Note on Water Quality Modelling for Grab Dredging Works

**Black Point Gas Supply Project (First Phase)  
Environmental Certification Sheet  
EP-391/2010/A**

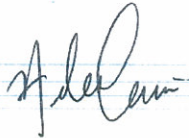
**Reference Document/Plan**

Document/ <del>Plan</del> to be Certified/ Verified:	Technical Note on Water Quality Modelling for Grab Dredging Works
Date of Report:	22 March 2012
Date prepared by ET:	22 March 2012
Date received by IEC:	22 March 2012

**ET Certification**

I hereby certify that the above referenced document/~~plan~~ complies with the General Conditions of EP-391/2010/A.

Dr Helen Chiu, Environmental  
Team Leader:



Date: 27 March 2012

**IEC Verification**

I hereby verify that the above referenced document/~~plan~~ complies with the General Conditions of EP-391/2010/A.

Dr Anne Kerr, Independent  
Environmental Checker:



Date: 27 March 2012

# 1 WATER QUALITY MODELLING FOR GRAB DREDGING WORKS

## 1.1 INTRODUCTION

CAPCO has been notified by PetroChina's contractor for the PRC sections of the First Phase submarine pipeline that a maximum of five (5) closed grab dredgers will be deployed for the dredging activities from HKSAR boundary to the western boundary of the Tonggu Fairway, i.e. in the PRC waters within a distance of about 2.5 km from the HKSAR Boundary. This arrangement is required to provide deeper dredging depth as requested by the Shenzhen authority. Details of the dredging activities are summarized in *Table 1.1* below.

**Table 1.1** *Details of the Dredging Activities in the PRC Waters within a Distance of about 2.5 km from the HKSAR Boundary*

Works Detail	Updated Programme	Presented in Approved EIA	Remarks
No. of dredgers	5	2	Includes 3 more dredgers
Type of dredgers	Closed grab dredger	Closed grab dredger	No change
Grab size	Minimum 8 m <sup>3</sup>	Minimum 8 m <sup>3</sup>	No change
Dredging hours per day	24 hours	24 hours	No change
Maximum Dredging rate	~ 8,000 m <sup>3</sup> per dredger per day	~ 8,000 m <sup>3</sup> per dredger per day	No change

## 1.2 PURPOSE OF THIS TECHNICAL NOTE

Quantitative computational modelling was undertaken to assess potential water quality impacts due to the dispersion of fine sediment in suspension during the dredging works along the above-mentioned PRC pipeline section. This *Technical Note* presents the results of the modelling works. Potential indirect impacts on marine ecology and fisheries are also discussed.

## 1.3 ASSESSMENT METHODOLOGY

The methodology employed to assess the impacts of grab dredging on water quality is the same as that adopted in the approved EIA. Impacts due to the dispersion of fine sediment in suspension during concurrent dredging works for the proposed submarine Pipeline 1 have been assessed using computational modelling. As with the approved EIA, mitigation measures

were assumed to be absent in the modelling so that worse case scenarios could be examined.

Details of the scenarios examined in this modelling works are described below. *Annex 6B* of the approved EIA Report provides snap shots of the simulated currents (vectors) at ebb and flood tides in both dry and wet seasons under the baseline conditions.

The water quality sensitive receivers shown in *Figure 6.4* of the approved EIA Report are also the water quality modelling output points. The locations of the marine works for the installation of different sections of the submarine pipeline are shown in *Figure 6.6* of the approved EIA Report.

Uncertainties in assessment methodology are described in *Section 6.6.2* of the approved EIA Report.

#### **1.4 GRAB DREDGING MODELLING SCENARIOS**

Scenario 1 presented in the approved EIA Report was re-run to assess water quality impacts associated with the concurrent dredging works for the First Phase submarine pipeline (*Table 1.1*).

Scenario 1 assesses impacts through concurrent dredging activities for pre-trenching for the installation of specific sections of Pipeline 1. This includes grab dredging works for pipeline sections 1 (Black Point Shore Approach) and 3 (across Urmston Road) in HKSAR waters and about 2.5 km of pipeline (from the HKSAR boundary) in PRC waters (*Table 1.2*). All dredging works have been modelled assuming the use of closed grab dredgers.

It is expected that for dredging of the two HKSAR pipeline sections, one dredger would be used for each section. A total of five dredgers would be used for dredging of the PRC pipeline section. The modelling assessment assumed that all five dredgers in the PRC pipeline section are working concurrently and are evenly spaced along the ~ 2.5 km pipeline section. Under this assumption the dredging operations in different pipeline sections in HKSAR and PRC waters will be concurrent.

**Table 1.2** *Dredging Modelling Scenario Examined in this Technical Note*

Scenario ID	Tasks	Details of Construction Activities	Plant Type
<i>First Phase Construction</i>			
Scenario 1	Submarine Pipeline 1 (HKSAR & Sections)	Concurrent Grab Dredging at Black Point Shore Approach (KP4.89 – KP4.78), across Urmston Road (KP2.52 – KP0.73) and from HKSAR boundary to western boundary of the Tonggu Fairway (KP0 – SZ-KP2.5)	Grab Dredger

Notes:

- a. Grab dredger refers to a closed grab dredger with a minimum grab size of 8 m<sup>3</sup>.
- b. KP in the bracket denotes the distance point in kilometre.

## 1.5 ASSESSMENT RESULTS

### 1.5.1 Suspended Sediment Dispersion

The results have been presented as contours of maximum and mean SS concentrations above ambient at the surface, middle layer, bottom and depth-averaged (*Figures 1-8*). Data were extracted from the modelling results to determine the predicted levels of SS at each of the sensitive receivers in HKSAR waters. The maximum and mean elevations of SS at the relevant depth for the respective sensitive receivers are presented.

The determination of the acceptability of any elevation in SS levels has been based on the WQO or specific tolerance criteria, as described in the approved EIA Report. It should be noted that elevations in the SS level due to concurrent activities have been assessed as the maximum concentrations at relevant water depths over a full 15 day spring-neap tidal cycle in both the dry and wet season, as required by the EIA Study Brief (*ESB-208/2009*).

The modelling results of Scenario 1 (*Table 1.3*) show that compliances with the WQO for allowable SS elevations would be anticipated in either season at any sensitive receivers in HKSAR waters.

Contours of SS concentrations (*Figures 1-8*) demonstrate the plumes are generally confined to the bed layer, thereby not affecting the main body of the water column. It is concluded that the concurrent dredging works have short-term, transient and acceptable impacts on the water quality of the study area and sensitive receivers in HKSAR waters.

**Table 1.3 Predicted SS Elevation (mg L<sup>-1</sup>) in Scenario 1 (First Phase Construction – Concurrent Dredging)**

Sensitive Receiver	Name	ID	Relevant Depth <sup>(a)</sup>	WQO Allowable SS Increase (mg L <sup>-1</sup> )		Predicted SS Elevation (mg L <sup>-1</sup> )					
				Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
				Max <sup>(b)</sup>	Max <sup>(b)</sup>	Mean <sup>(c)</sup>	Mean <sup>(c)</sup>	90%-tile <sup>(e)</sup>	90%-tile <sup>(e)</sup>		
<i>Fisheries Sensitive Receivers</i>											
Oyster Production Area	Sheung Pak Nai	SR2	s	6.3	5.5	0.0	0.0	0.0	0.0	1.8	1.8
Recognised Spawning/ Nursery Grounds	Fisheries Spawning Ground in North Lantau	SR8	a	8.1	6.4	0.6	0.8	0.1	0.1	1.8	1.8
			b	14.0	15.3	0.9	1.0	0.1	0.1	1.8	1.8
Artificial Reef Deployment Area	Sha Chau and Lung Kwu Chau	SR6e	a	8.1	6.4	1.1	0.7	0.1	0.1	1.8	1.8
			b	14.0	15.3	1.5	0.9	0.1	0.1	1.8	1.8
<i>Marine Ecological Resources</i>											
Mangroves	Sheung Pak Nai	SR2	s	6.3	5.5	0.0	0.0	0.0	0.0	1.8	1.8
	Ngau Hom Shek	SR2a	s	6.3	5.5	0.0	0.0	0.0	0.0	1.8	1.8
Marine Park	Designated Sha Chau and Lung Kwu Chau	SR6a	a	8.1	6.4	3.6	3.3	0.6	0.5	2.1	2.1
		SR6c	a	8.1	6.4	1.1	1.0	0.2	0.1	1.8	1.8
Intertidal Mudflats	Ha Pak Nai	SR1	s	5.9	3.9	0.0	0.1	0.0	0.0	1.8	1.8
Seagrass Beds	Sheung Pak Nai	SR2	s	6.3	5.5	0.0	0.0	0.0	0.0	1.8	1.8
	Ha Pak Nai	SR1	s	5.9	3.9	0.0	0.1	0.0	0.0	1.8	1.8
Horseshoe Crab Nursery Grounds	Ha Pak Nai	SR1	a	9.9	5.6	0.1	0.1	0.0	0.0	1.8	1.8
	Ngau Hom Shek	SR2a	a	9.3	9.5	0.0	0.0	0.0	0.0	1.8	1.8
<i>Water Quality Sensitive Receivers</i>											
Non-gazetted Beaches	Lung Kwu Sheung Tan	SR5a	a	8.1	6.4	0.4	0.1	0.0	0.0	1.8	1.8
	Lung Kwu Tan	SR5b	a	8.1	6.4	0.6	0.2	0.0	0.0	1.8	1.8
Secondary Contact Recreation Subzone	NW WCZ	SR5b	a	8.1	6.4	0.6	0.2	0.0	0.0	1.8	1.8



Sensitive Receiver	Name	ID	Relevant Depth <sup>(a)</sup>	WQO Allowable SS Increase (mg L <sup>-1</sup> )		Predicted SS Elevation (mg L <sup>-1</sup> )					
				Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
						Max <sup>(b)</sup>	Max <sup>(b)</sup>	Mean <sup>(c)</sup>	Mean <sup>(c)</sup>	90%-tile <sup>(e)</sup>	90%-tile <sup>(e)</sup>
Seawater Intakes	Tuen Mun Area 38	SR7b	b	14.0	15.3	0.5	0.3	0.0	0.0	1.8	1.8
	Shiu Wing Steel Mill	SR7i	b	14.0	15.3	0.5	0.4	0.0	0.0	1.8	1.8
	Black Point Power Station	SR4	b	700 <sup>(d)</sup>	700 <sup>(d)</sup>	2.5	3.1	0.2	0.2	1.8	1.8
	Castle Peak Power Station	SR7a	b	700 <sup>(d)</sup>	700 <sup>(d)</sup>	0.6	0.5	0.1	0.1	1.8	1.8

**Notes:**

- s = surface, m = middle, b = bottom, a = depth-averaged
- “Max” denotes maximum values recorded at a relevant water depth at the sensitive receiver over a complete spring-neap cycle simulation.
- “Mean” denotes arithmetic mean values recorded at a relevant water depth at the sensitive receiver over a complete spring-neap cycle simulation.
- The tolerance assessment criterion of 700 mg L<sup>-1</sup> was adopted for these seawater intakes.
- The 90%-tile values are only reliable if average concentrations exceed approximately 5 – 10 mg L<sup>-1</sup> due to numerical limitation.
- Shaded cells indicate non-compliance with the WQOs.

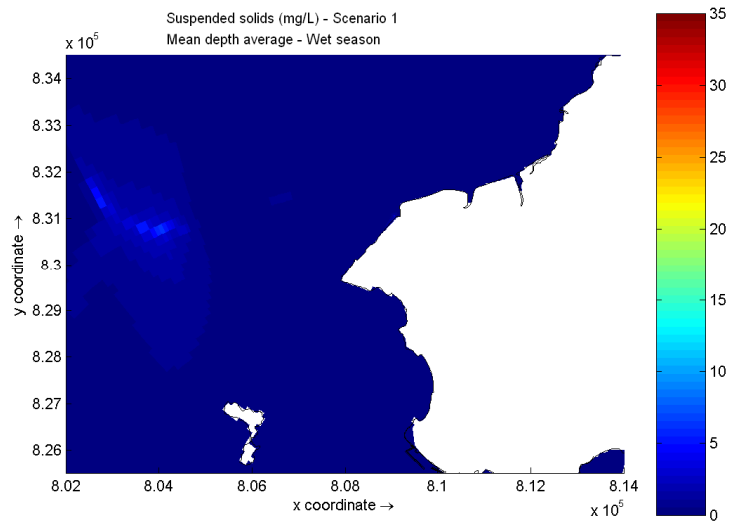
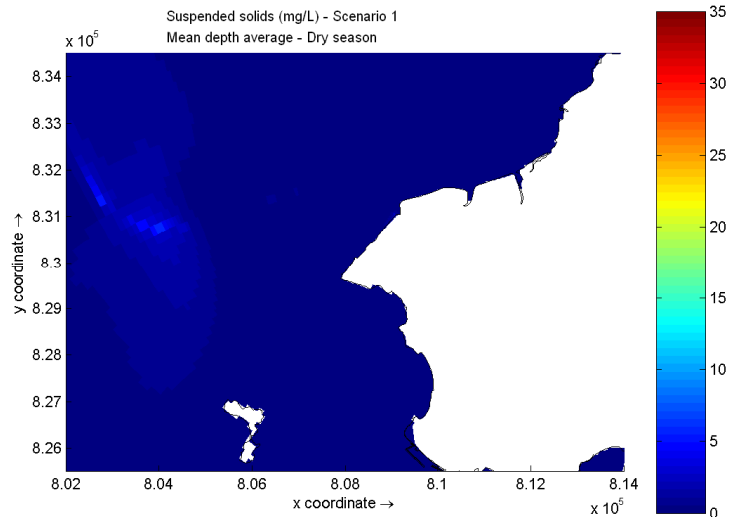


Figure 1: Scenario 1 – Depth averaged  
Suspended Solids (mg/L) – Mean over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

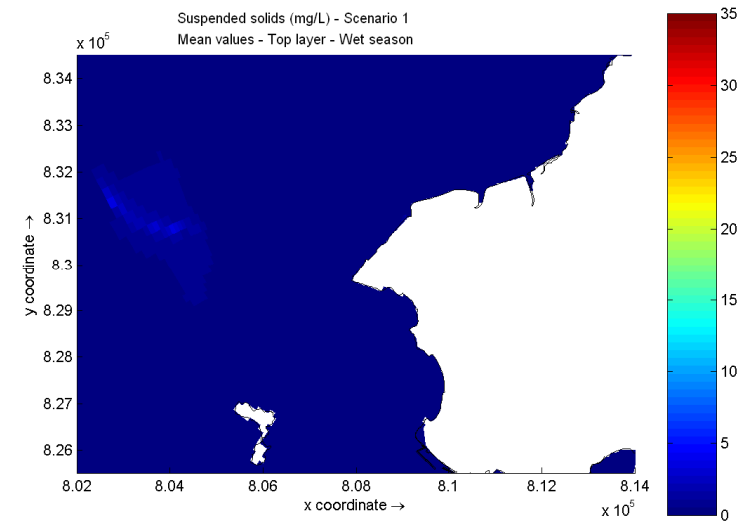
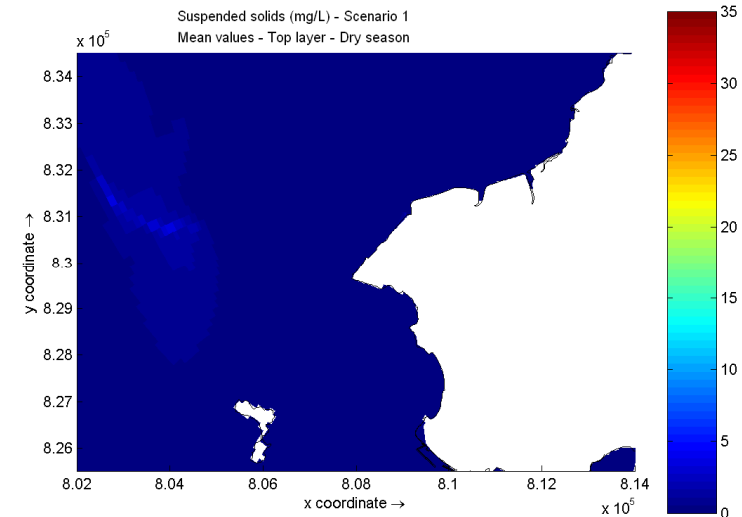


Figure 2: Scenario 1 – Top layer  
Suspended Solids (mg/L) – Mean over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

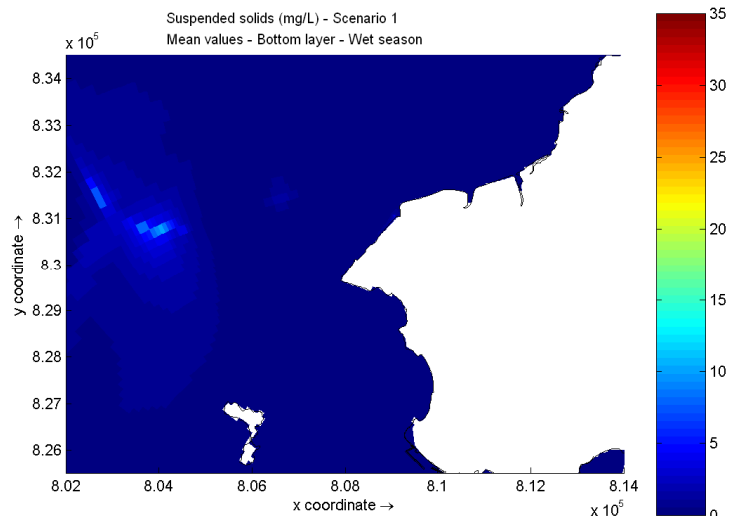
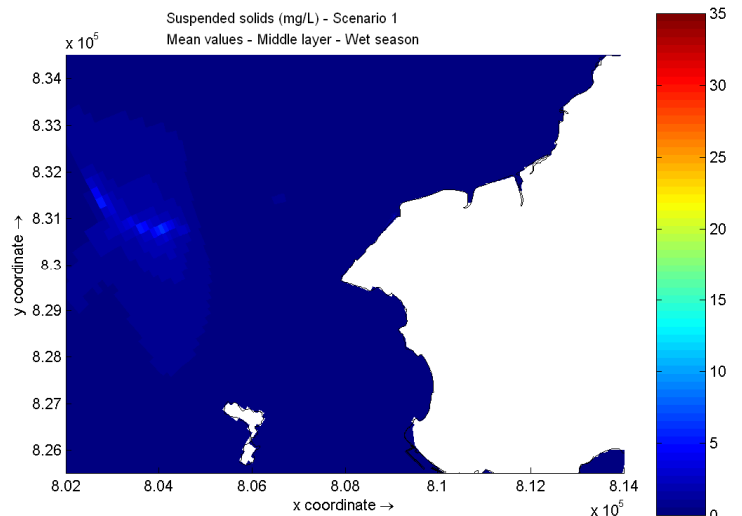
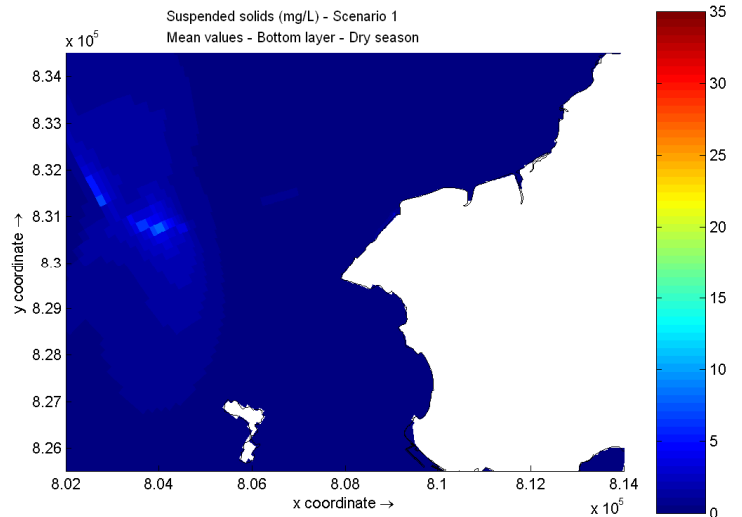
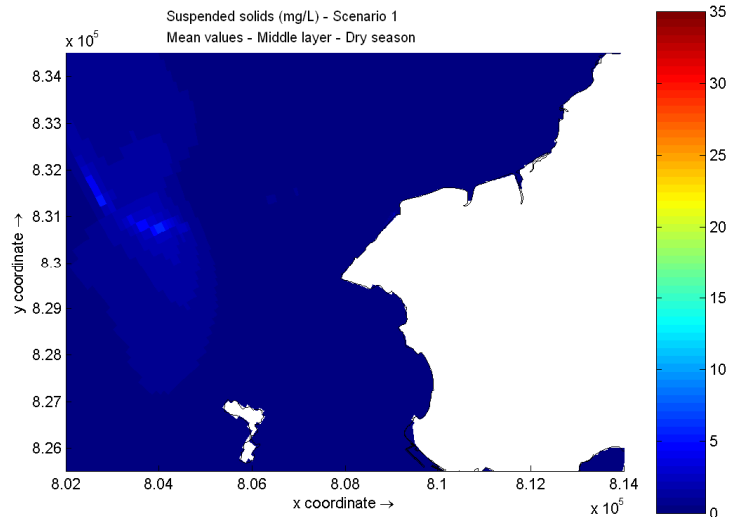


Figure 3: Scenario 1 – Middle layer  
Suspended Solids (mg/L) – Mean over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

Figure 4: Scenario 1 – Bottom layer  
Suspended Solids (mg/L) – Mean over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

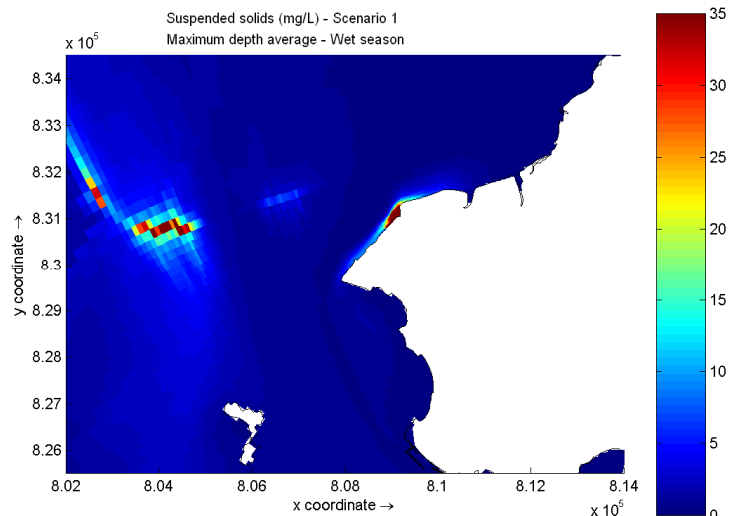
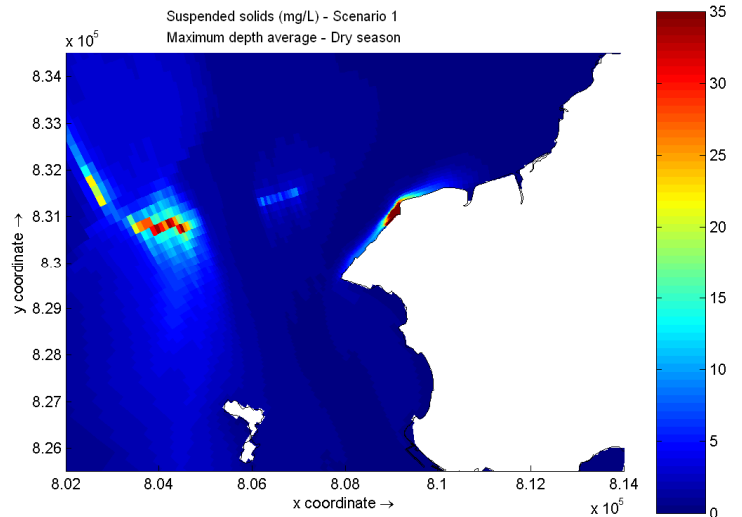


Figure 5: Scenario 1 – Depth averaged  
Suspended Solids (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

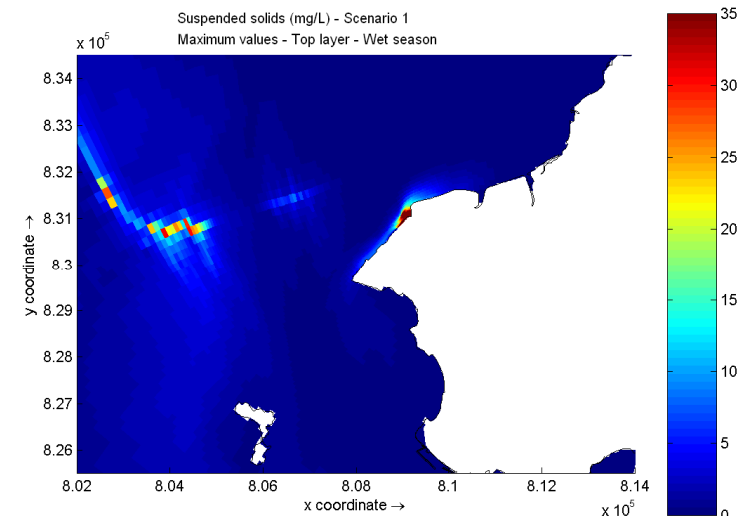
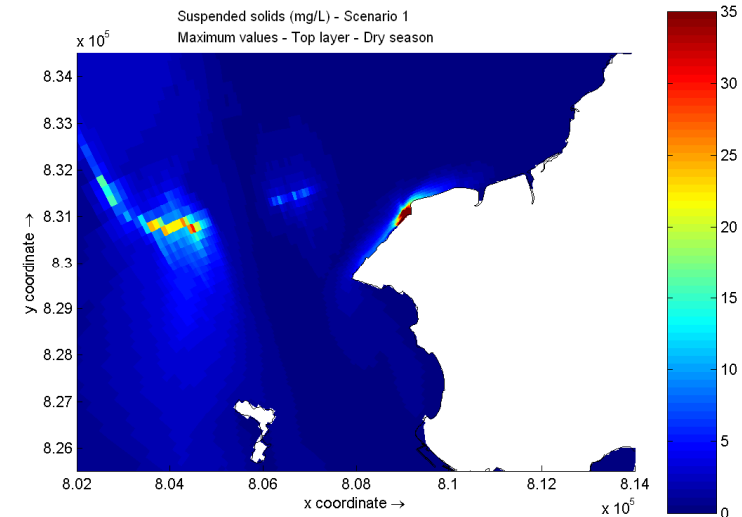


Figure 6: Scenario 1 – Top layer  
Suspended Solids (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

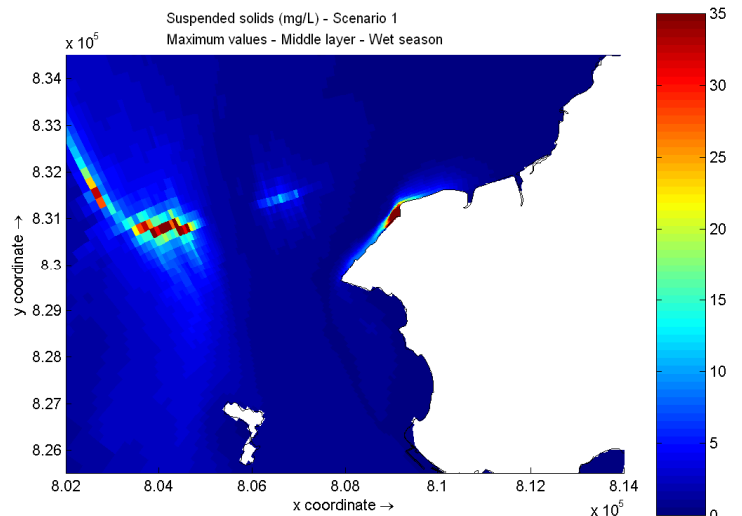
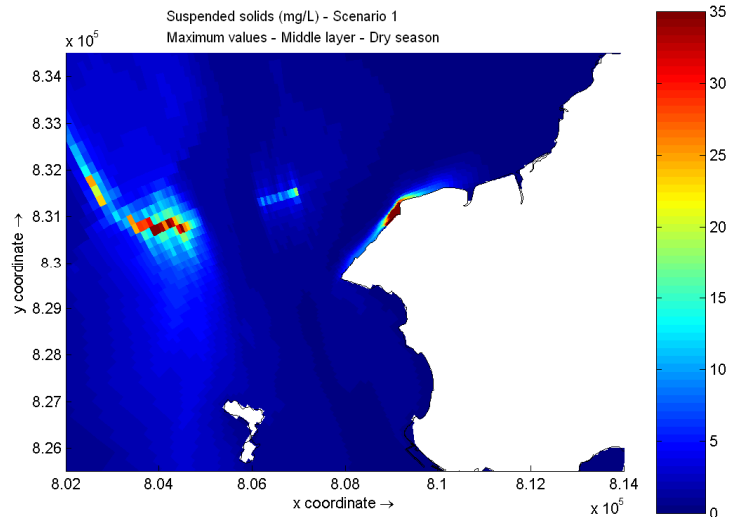


Figure 7: Scenario 1 – Middle layer  
Suspended Solids (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

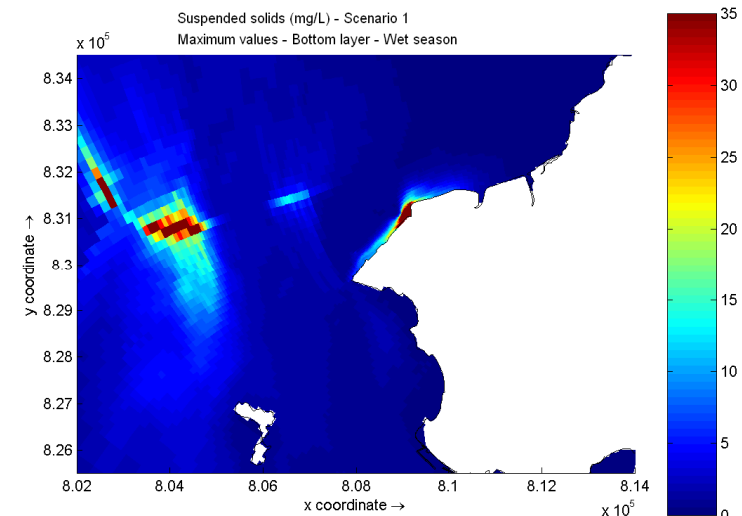
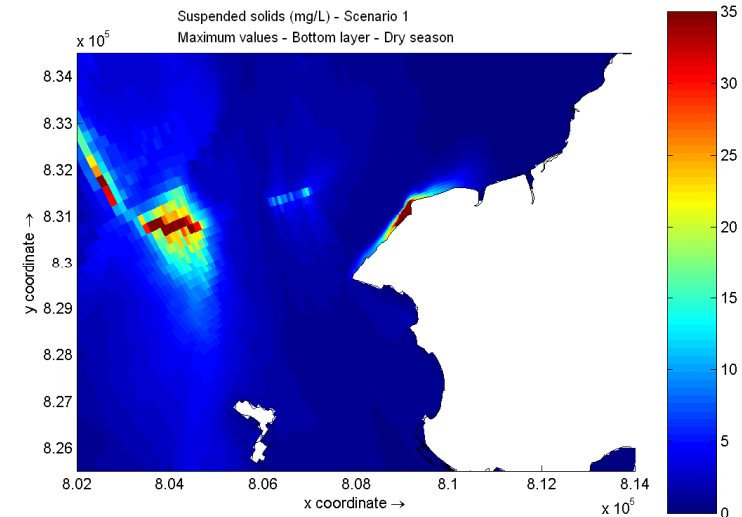


Figure 8: Scenario 1 – Bottom layer  
Suspended Solids (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

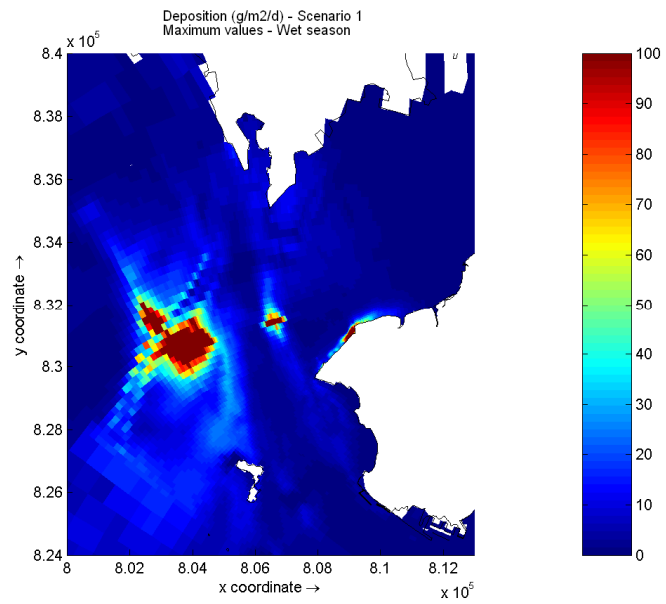
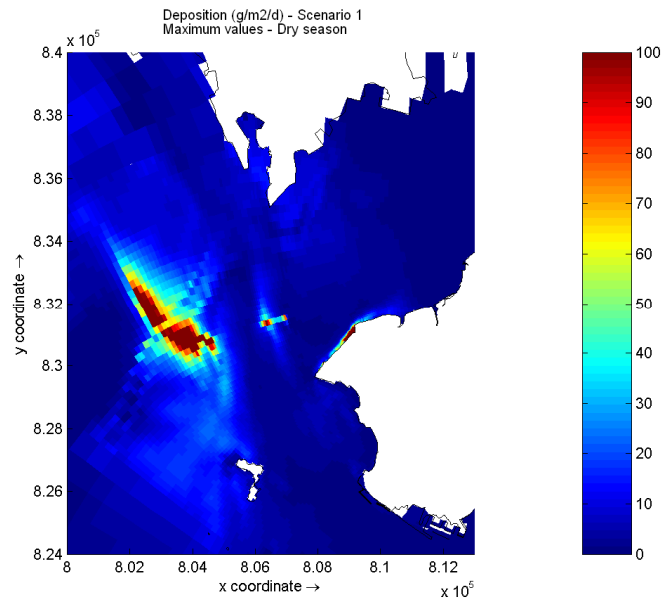


Figure 9: Scenario 1 – Maximum daily deposition at any time during the simulation over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

### 1.5.2 Sediment Deposition

The majority of SS elevations in water have been predicted to be temporary and to remain within relatively close proximity to the dredging works and, as such, the majority of sediment has been predicted to settle within relatively close proximity to the works areas.

The simulated deposition rates <sup>(1)</sup> at the artificial reefs (ARs), i.e., SR6e during the dry and wet seasons have been assessed for the concurrent dredging works (Figure 9). The predicted deposition rates at SR6e are negligible at < 4 g m<sup>-2</sup> day<sup>-1</sup> which is well below the assessment criterion of 200 g m<sup>-2</sup> day<sup>-1</sup> and will not cause any adverse impacts in HKSAR waters (Table 1.4).

**Table 1.4 Predicted Deposition Rate (g m<sup>-2</sup> day<sup>-1</sup>) for the Concurrent Dredging Works at the Artificial Reefs (SR6e)**

Scenario	Dry Season (g m <sup>-2</sup> day <sup>-1</sup> )	Wet Season (g m <sup>-2</sup> day <sup>-1</sup> )
<i>First Phase Construction</i>		
Scenario 1	4	3
<b>Assessment Criterion = 200 g m<sup>-2</sup> day<sup>-1</sup></b>		

### 1.5.3 Dissolved Oxygen Depletion

To further assess the impact of the release of SS during concurrent dredging works, the depletion of dissolved oxygen has been calculated. The same methodology presented in the approved EIA Report was used.

Maximum decreases in dissolved oxygen were found to be minimal at all sensitive receivers so breaches of the WQO would not occur for oxygen depletion (Table 1.5). Contour plots of maximum and mean DO depletion (Figures 10-17) show that the largest reduction in dissolved oxygen concentrations is in the immediate vicinity of the dredging works. The contour plots also illustrate that the plumes will not extend to the fisheries spawning ground in northwest Lantau or to high-value ecological resources in inner Deep Bay and hence no adverse water quality impacts on these sensitive receivers in HKSAR waters are expected.

It is concluded that the concurrent dredging works are unlikely to deteriorate the dissolved oxygen conditions in the receiving waters and will not affect the WSRs in HKSAR waters.

(1) The deposition rate is simulated as the maximum daily deposition at any time during the simulation. The total deposition for subsequent 24 hour periods has been calculated during the simulations (about 14 periods during a spring-neap cycle). Out of these values, the maximum value has been determined for every individual model grid cell, and these values are those have been plotted.

**Table 1.5 Predicted Dissolved Oxygen Depletion (mg L<sup>-1</sup>) due to SS Elevations (Scenario 1 for First Phase Construction)**

Sensitive Receiver	Name	ID	Relevant Depth (a)	WQO Allowable DO Depletion (mg L <sup>-1</sup> )		Predicted DO Depletion (mg L <sup>-1</sup> ) (Maximum) – Scenario 1	
				Dry	Wet	Dry	Wet
<i>Fisheries Sensitive Receivers</i>							
Oyster Production Area	Sheung Pak Nai	SR2	s	3.6	3.4	0.00	0.00
Recognised Spawning/ Nursery Grounds	Fisheries Spawning Ground in North Lantau	SR8	a	4.2	2.9	0.02	0.02
			b	6.0	4.3	0.02	0.03
Artificial Reef Deployment Area	Sha Chau and Lung Kwu Chau	SR6e	a	4.2	2.9	0.03	0.02
			b	6.0	4.3	0.04	0.02
<i>Marine Ecological Resources</i>							
Mangroves	Sheung Pak Nai	SR2	s	3.6	3.4	0.00	0.00
	Ngau Hom Shek	SR2a	s	3.6	3.4	0.00	0.00
Marine Park	Designated Sha Chau and Lung Kwu Chau	SR6a	a	4.2	2.9	0.10	0.09
		SR6c	a	4.2	2.9	0.03	0.03
Intertidal Mudflats	Ha Pak Nai	SR1	s	4.1	2.9	0.00	0.00
Seagrass Beds	Sheung Pak Nai	SR2	s	3.6	3.4	0.00	0.00
	Ha Pak Nai	SR1	s	4.1	2.9	0.00	0.00
Horseshoe Crab Nursery Grounds	Ha Pak Nai	SR1	a	3.8	2.6	0.00	0.00
	Ngau Hom Shek	SR2a	a	3.6	3.4	0.00	0.00
<i>Water Quality Sensitive Receivers</i>							
Non-gazetted Beaches	Lung Kwu Sheung Tan	SR5a	a	4.2	2.9	0.01	0.00
	Lung Kwu Tan	SR5b	a	4.2	2.9	0.01	0.01
Secondary Contact Recreation Subzone	NW WCZ	SR5b	a	4.2	2.9	0.01	0.01



Sensitive Receiver	Name	ID	Relevant Depth <sup>(a)</sup>	WQO Allowable DO Depletion (mg L <sup>-1</sup> )		Predicted DO Depletion (mg L <sup>-1</sup> ) (Maximum) – Scenario 1	
				Dry	Wet	Dry	Wet
				Seawater Intakes	Tuen Mun Area 38	SR7b	b
	Shiu Wing Steel Mill	SR7i	b	6.0	4.3	0.01	0.01
	Black Point Power Station	SR4	b	-- (b)	-- (b)	0.07	0.08
	Castle Peak Power Station	SR7a	b	-- (b)	-- (b)	0.02	0.01

**Notes:**

- a. s = surface, m = middle, b = bottom, a = depth-averaged
- b. There is no DO criterion for Black Point Power Station and Castle Peak Power Station intakes.
- c. Shaded cells indicate non-compliance with the WQOs.

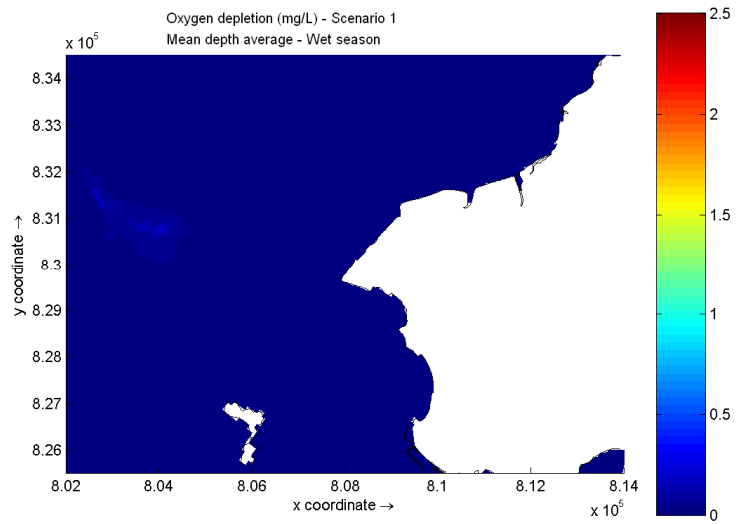
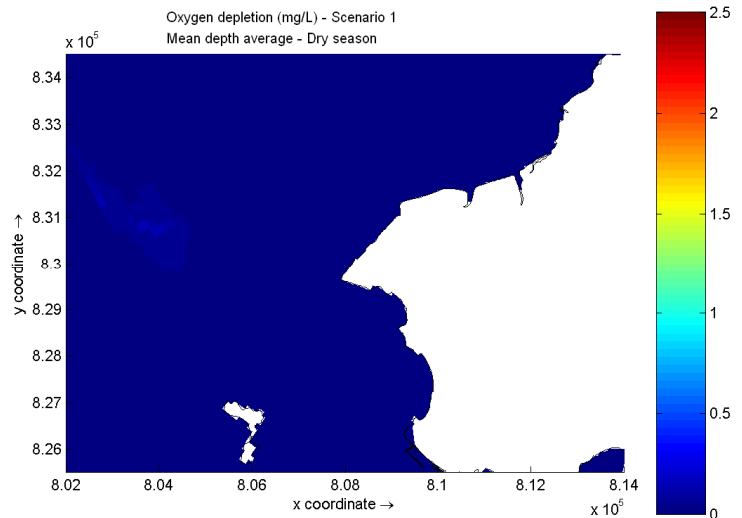


Figure 10: Scenario 1 – Depth averaged  
Dissolved Oxygen Depletion (mg/L) – Mean over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

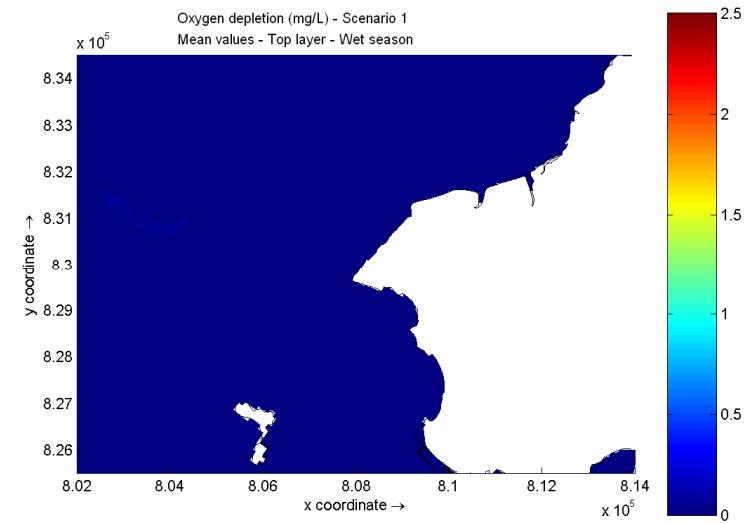
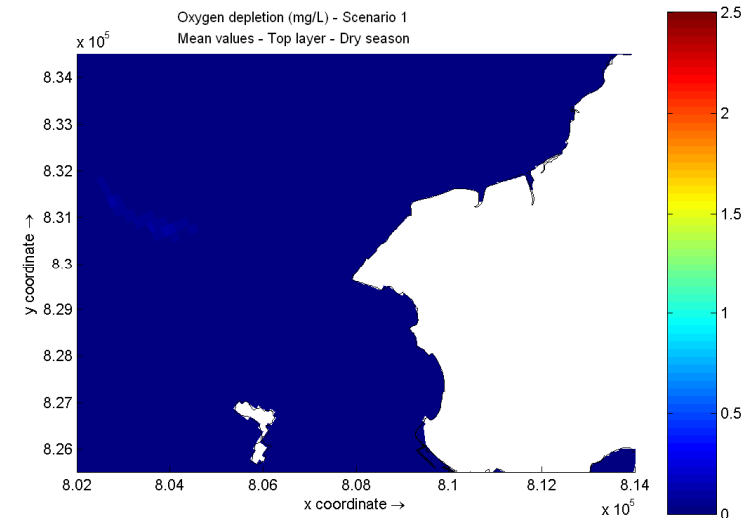


Figure 11: Scenario 1 – Top layer  
Dissolved Oxygen Depletion (mg/L) – Mean over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

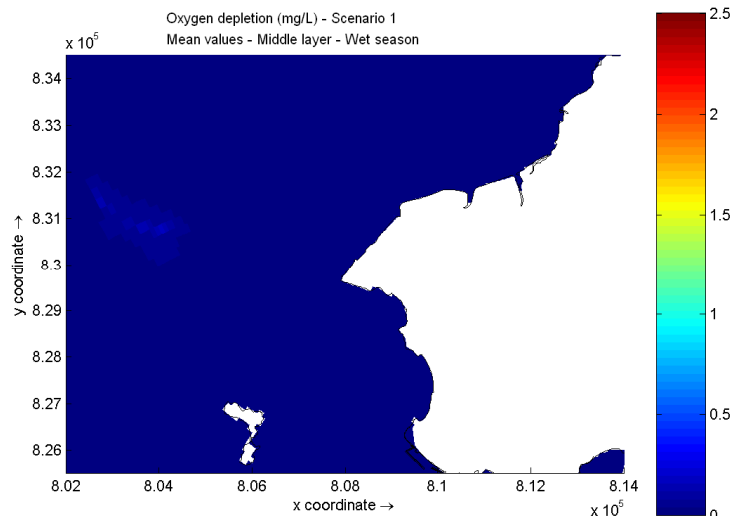
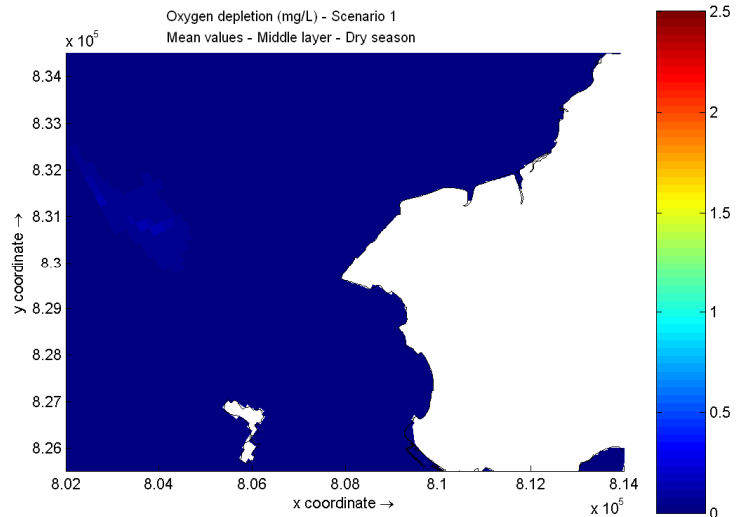


Figure 12: Scenario 1 – Middle layer  
 Dissolved Oxygen Depletion (mg/L) – Mean over a complete spring neap cycle  
 Upper plot: Dry Season ; Lower plot: Wet Season

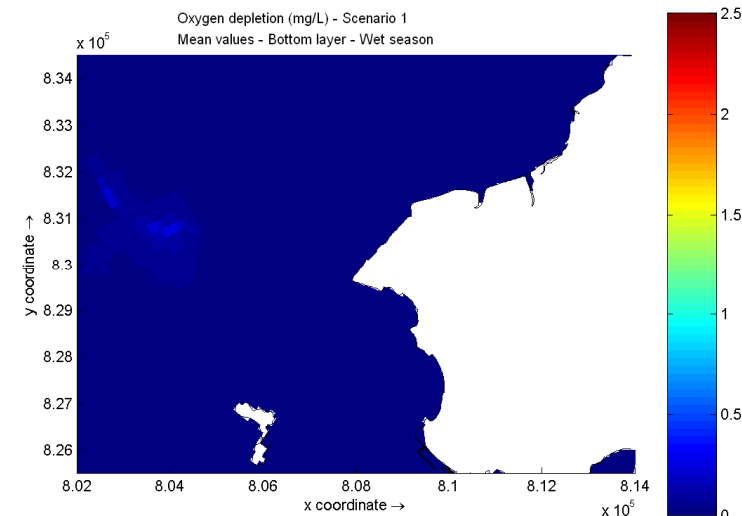
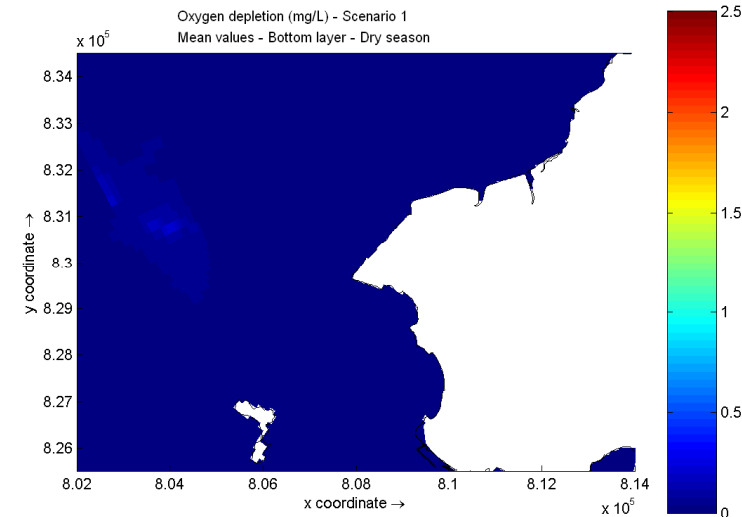


Figure 13: Scenario 1 – Bottom layer  
 Dissolved Oxygen Depletion (mg/L) – Mean over a complete spring neap cycle  
 Upper plot: Dry Season ; Lower plot: Wet Season

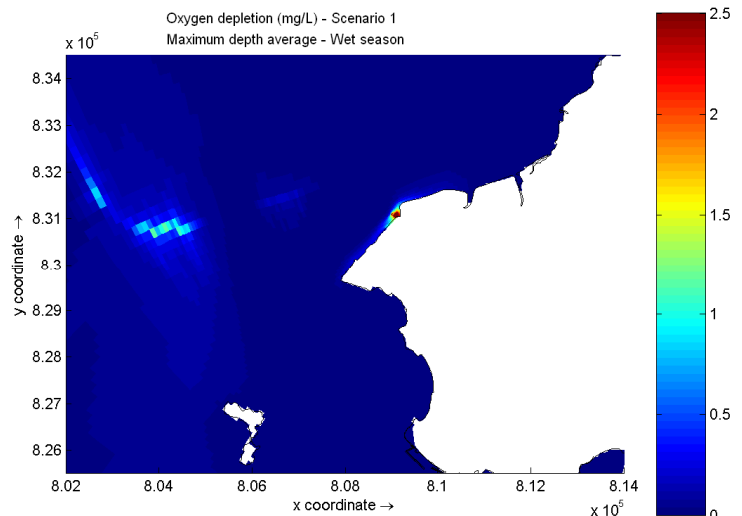
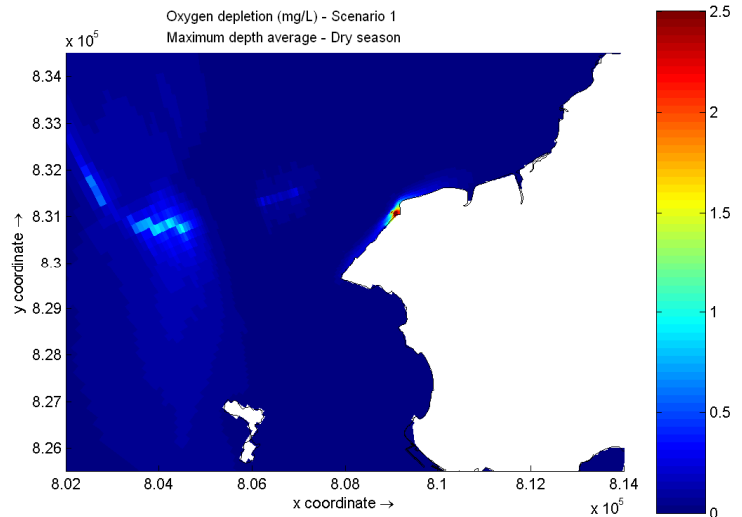


Figure 14: Scenario 1 – Depth averaged  
Dissolved Oxygen Depletion (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

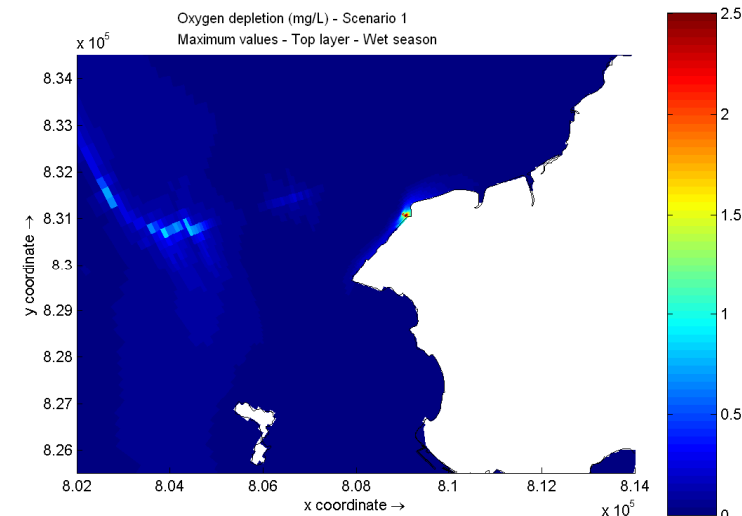
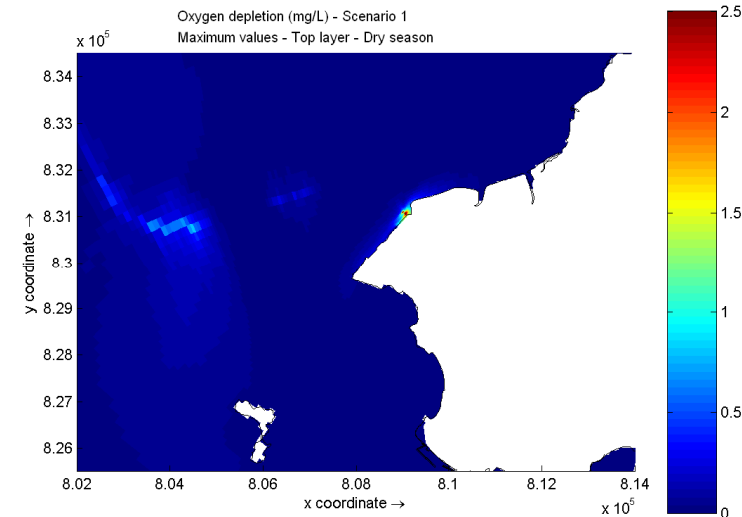


Figure 15: Scenario 1 – Top layer  
Dissolved Oxygen Depletion (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

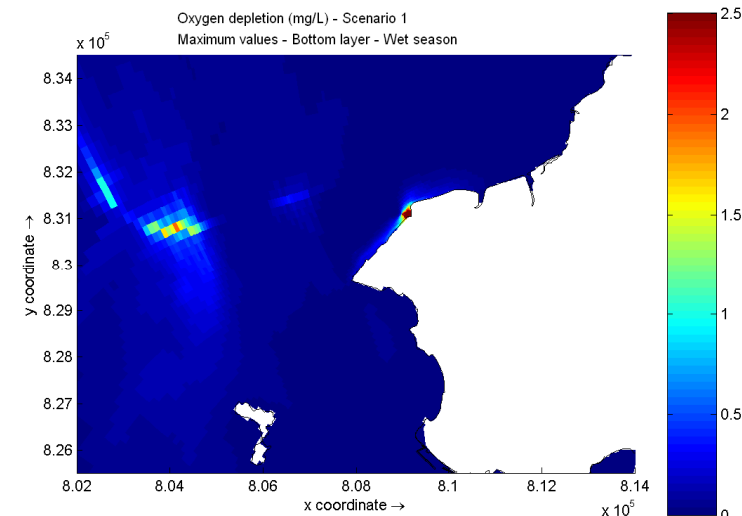
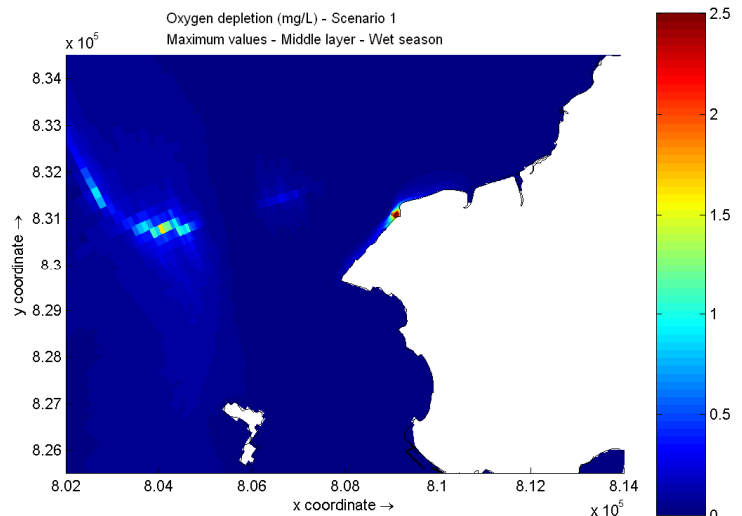
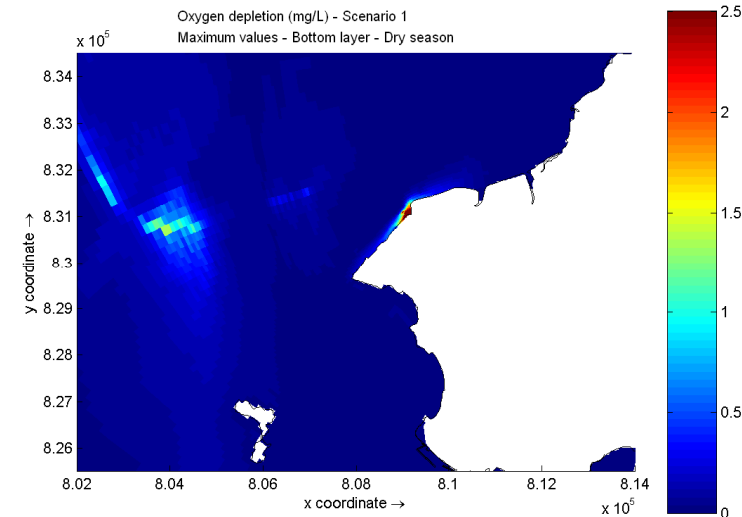
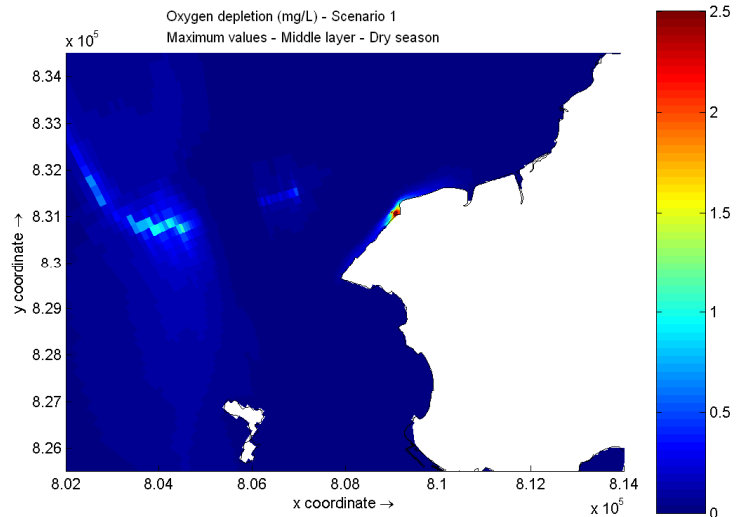


Figure 16: Scenario 1 – Middle layer  
Dissolved Oxygen Depletion (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

Figure 17: Scenario 1 – Bottom layer  
Dissolved Oxygen Depletion (mg/L) – Maximum over a complete spring neap cycle  
Upper plot: Dry Season ; Lower plot: Wet Season

#### 1.5.4

#### *Potential Indirect Impacts on Marine Ecology & Fisheries*

Results of the water quality assessment indicate that concurrent dredging works have short-term, transient impacts on the water quality of the study area and sensitive receivers in HKSAR waters, thus unacceptable impacts to water quality are unlikely to occur. It is, therefore, predicted that there will be no unacceptable indirect impacts to marine ecological resources (including marine mammals), fishing grounds or species of importance to the fisheries in HKSAR waters as a result of the concurrent dredging works in HKSAR and PRC waters.

With proper implementation of the mitigation measures recommended in the EIA Report and the EP, the proposed variations are not expected to cause unacceptable impacts to marine ecology and fisheries. The EM&A requirements recommended in the EIA Report and the EM&A Manual will also be followed.

#### 1.6

#### *CONCLUSION*

Results of the water quality modelling confirmed that potential water quality impacts (impacts of suspended sediment dispersion, sediment deposition, dissolved oxygen depletion, nutrients, heavy metals and micro-organic pollutants) associated with concurrent dredging in HKSAR and PRC waters are anticipated to be in compliance with the relevant WQOs and assessment criteria at the point specific sensitive receivers in HKSAR waters in both wet and dry seasons. Based on the modelling results, no unacceptable impacts to water quality of HKSAR waters have been predicted to occur. No unacceptable indirect impacts to marine ecology and fisheries are anticipated.

Standard site practices and the mitigation measures recommended in the EIA Report and the EP will be properly implemented. The environmental monitoring and audit (EM&A) requirements recommended in the EIA Report and the EM&A Manual will also be followed.