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HIGHWAYS DEPARTMENT

港珠澳大橋
香港工程管理處
Hong Kong-Zhuhai-Macao Bridge
Hong Kong Project Management Office

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Hong Kong-Zhuhai-Macao Bridge

Hong Kong Boundary Crossing Facilities — Investigation

Environmental Monitoring and Audit Manual (Rpt Ref: 061-01)

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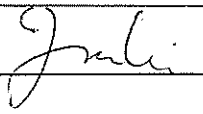
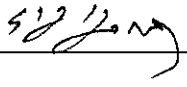
		Signature			
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1 INTRODUCTION

1.1 Background

1.1.1 As the Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Link Road (HKLR) and Hong Kong Boundary Crossing Facilities (HKBCF) are closely inter-related, they are presented together under the EIA Report of each, hence, the HKLR EIA Report will present descriptions and assessments not only on HKLR but also relevant aspects on HKBCF; similarly, the HKBCF EIA Report will present descriptions and assessment not only on HKBCF but also relevant aspects on HKLR.

Hong Kong Link Road

1.1.2 An application (No ESB-110/2003) for an Environmental Impact Assessment (EIA) Study Brief under Section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by Highways Department (the Project Proponent) on 3 Oct 2003 with a Project Profile (No. No. PP-201/2003) for the Hong Kong - Zhuhai - Macao Bridge Hong Kong Section and North Lantau Highway Connection (the Project). The Project has subsequently been renamed as Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (HKLR) from the interface between HK / Guangdong waters at the boundary of Hong Kong Special Administrative Region (HKSAR) to the Hong Kong - Zhuhai - Macao Bridge Hong Kong Boundary Crossing Facility (HKBCF). EPD issued an EIA Study Brief (No: ESB-110/2003) on Nov 2003 to the Project Proponent to carry out an EIA study.

1.1.3 Ove Arup & Partners Hong Kong Limited (Arup) has been commissioned by the Highways Department to carry out the investigation and preliminary design study for the Project as well as an EIA according to the EIAO for identification and evaluation of the environmental impacts and the mitigation measures required.

1.1.4 The Project would involve viaducts construction, some reclamation works, dredging operation etc. These are designated projects under Schedule 2 of the EIA Ordinance (Cap. 499) and hence Environment Permits (EPs) are required for their construction and operation. The alignment of HKLR is given in **Figure 1.**

Hong Kong Boundary Crossing Facilities

1.1.5 An application (No ESB-183/2008) for an Environmental Impact Assessment (EIA) Study Brief under Section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by Highways Department (the Project Proponent) on 12 March 2008 with a Project Profile (No. PP-346/2008) for the Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities (the Project). EPD issued an EIA Study Brief (No: ESB-183/2008) on April 2008 to the Project Proponent to carry out an EIA study.

1.1.6 Ove Arup & Partners Hong Kong Limited (Arup) has been commissioned by the Highways Department to carry out the investigation and preliminary design study for the Project as well as an EIA according to the EIAO for identification and evaluation of the environmental impacts and the mitigation measures required.

1.1.7 The Project would involve reclamation works, dredging operation, extension of Automated People Mover, and road bridges. These are designated projects under Schedule 2 of the EIA Ordinance (Cap. 499) and hence Environment Permits (EPs) are required for their construction and operation. The location of HKBCF is given in **Figure 1**.

1.2 Purposes of the Manual

1.2.1 The purposes of this Environmental Monitoring and Audit (EM&A) Manual are is to:

- Guide the set up of an EM&A programme to ensure compliance with the EIA recommendations;

- Specify the requirements for monitoring equipment;
- Propose environmental monitoring points, monitoring frequency etc.;
- Propose Action/Limit Level; and
- Propose Event/Action Plan.

1.2.2 This Manual outlines the monitoring and audit programme for the construction and operation of the proposed HKLR and HKBCF and provide systematic procedures for monitoring, auditing and minimising environmental impacts.

1.2.3 Hong Kong environmental regulations and the Hong Kong Planning Standards and Guidelines (HKPSG) have served as environmental standards and guidelines in the preparation of this Manual. In addition, this EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on the EIA Process (TM-EIAO).

1.2.4 This Manual contains the following information:

- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), Environmental Team (ET), and the Independent Environmental Checker (IEC) under the context of EM&A;
- Role of the Environmental Protection Office (ENPO);
- Project organisation for the EM&A works;
- The basis for, and description of the broad approach underlying the EM&A programme;
- Details of the methodologies to be adopted, including all laboratories and analytical procedures, and details on quality assurance and quality control programme;
- The rationale on which the environmental monitoring data will be evaluated and interpreted;
- Definition of Action and Limit levels;
- Establishment of Event and Action plans;
- Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints; and
- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures.

1.2.5 For the purpose of this manual, the ER shall refer to the Engineer as defined in the Construction Contract, in cases where the Engineer's powers have been delegated to the ER, in accordance with the Construction Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the environmental monitoring and audit requirements.

2 PROJECT DESCRIPTION

2.1 Project Description

Hong Kong Link Road

2.1.1 The proposed HKLR will comprise the following:

(i) A dual-3 carriageway with hard shoulder of about 12km in length between the HZMB Main Bridge at the HKSAR boundary and the HKBCF, which includes the following:

- about 7.3km of sea viaduct from the HKSAR boundary to the landing point on Airport Island near South Perimeter Road;
- about 2.1km of land viaduct from the landing point on Airport Island to the western tunnel portal at Scenic Hill;
- about 1.1km of tunnel from the western portal at Scenic Hill to the eastern portal on reclamation at eastern waters of the Airport Island;
- about 1.5km of at-grade road from the eastern tunnel portal to the HKBCF.

(ii) Some reclamation is required along the eastern coast of Airport Island to provide the land (about 23ha of area) required for the tunnel portal to daylight and the at-grade road.

Hong Kong Boundary Crossing Facilities

2.1.2 The proposed HKBCF will comprise the following:

(i) Dredging and reclamation at the northeast waters off the Airport Island to provide land platform (about 130ha of area) for the development of the HKBCF,

(ii) Cargo processing facilities including kiosks for clearance of goods vehicles, customs inspection platform, X-ray buildings and related supporting facilities;

(iii) Passenger related facilities including processing kiosks and examination facilities for private cars and coaches, passengers clearance building and halls and related supporting facilities;

(iv) Accommodation for and facilities of the Government departments providing services in connection with the HKBCF;

(v) Provision of transport and miscellaneous facilities inside the HKBCF including public transport interchange, transport drop-off and pick-up areas, vehicle holding areas, passenger queuing areas, road networks, footbridges, fencing, sewage and drainage systems, water supply system, utilities, electronic system, traffic control and information system and related supporting facilities;

(vi) Provision of road access for connection of the HKBCF to the HZMB HKLR, the TMCLKL and the Airport;

(vii) Reprovisioning of the affected Airport's facilities such as the existing FSD's East Sea Rescue Berth; and

(viii) Provision of other facilities for connection with the Airport such as an Automated People Mover system to connect the Airport Terminal with the HKBCF.

2.2 Implementation Programme

2.2.1 The HZMB is targeted to be commissioned by 2015. To meet this target:

(a) Construction of the HKLR will start in 2011, for completion in 2015, with a construction period of 4 years; (At this stage, there is still some flexibility on the exact timing within 2011 for starting the construction of HKLR. However, it is patently desirable to start construction earlier, say in Early 2011, so as to alleviate the acuteness of criticality of construction works.)

(b) Construction of the HKBCF will start in the 3rd quarter of 2010, for first phase completion by End 2015, and second (final) phase completion by End 2016. *[The construction of HKBCF will involve reclamation, including lengthy surcharge-periods, followed by land-works including buildings and infrastructures etc. It is anticipated that the overall construction period for HKBCF will be at least 6 years. Even if construction (reclamation work) can start as early as 2010 3rd quarter, overall completion of HKBCF cannot be achieved by 2015. The reclamation and the landworks for HKBCF will therefore need to be completed in phases, such that at least a part ie. the first-phase of HKBCF (the extent of which and the facilities within which are adequate to handle the initial stage of the commissioned HZMB) will be completed by End 2015.]*

2.2.2 **Appendix A** illustrates the tentative construction programme for the Project. All the key construction activities are shown with the tentative dates for commencement and completion.

2.2.3 Detailed EIA assessments have been conducted and presented in the EIA report. All necessary mitigation measures have also been identified and recommended. The Environmental Mitigation Implementation Schedule (EMIS) is given in **Appendix B**. It specifies the extent, locations, time frame and responsibilities for the implementation of the environmental mitigation measures identified.

2.3 Concurrent Projects During Construction Phase

2.3.1 The southern landfall reclamation of the TMCLKL forms an integrated part of the HKBCF reclamation and interfaces with the latter at a temporary seawall along its eastern edge. Reclamation works sequencing and programme have been planned to match those of the HKBCF in order to achieve its Phase 1 commissioning date target in 2015. HKLR is also scheduled to open in 2015 in matching the Phase 1 commissioning date of HKBCF.

2.3.2 The Main Bridge of the HZMB within the Guangdong water would also be concurrent with the construction of HKLR and HKBCF. The tentative commissioning date is also 2015.

2.3.3 Another concurrent project during the construction of HKLR and HKBCF is the 72 ha reclamation for LLP. This has been considered as a concurrent project in the EIA.

3 PROJECT ORGANISATION

3.1 Project Organisation

3.1.1 The proposed project organisation and lines of communication with respect to environmental protection works are shown in **Appendix C**.

3.1.2 The leader of the ET shall be an independent party from the Contractor and has relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the Engineer's Representative (ER) and EPD.

3.1.3 The responsibility of respective parties are:

3.1.3.1 The Contractor

- employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit;
- provide assistance to ET in carrying out monitoring and auditing;
- submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- implement measures to reduce impact where Action and Limit levels are exceeded; and
- adhere to the agreed procedures for carrying out complaint investigation.

3.1.3.2 Environmental Team

- set up all the required environmental monitoring stations;
- monitor various environmental parameters as required in the EM&A Manual;
- analyse the environmental monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- carry out site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and take proactive actions to pre-empt problems;
- audit and prepare audit reports on the environmental monitoring data and site environmental conditions;
- report on the environmental monitoring and audit results to the IEC, Contractor, the ER and EPD or its delegated representative;
- recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans; and
- undertake regular on-site audits/inspections and report to the Contractor and the ER of any potential non-compliance; and
- follow up and close out non-compliance actions.

3.1.3.3 Engineer or Engineer's Representative

- supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- employ an IEC to audit the results of the EM&A works carried out by the ET; and

- comply with the agreed Event Contingency Plan in the event of any exceedance.

3.1.3.4 Independent Environmental Checker

- review the EM&A works performed by the ET (at not less than monthly intervals);
- audit the monitoring activities and results (at not less than monthly intervals);
- report the audit results to the ER and EPD in parallel;
- review the EM&A reports (monthly and quarterly summary reports) submitted by the ET;
- review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- report the findings of site inspections and other environmental performance reviews to ER and EPD.

3.1.3.5 Environmental Protection Office (ENPO)

Notwithstanding the above, given that the TMCLKL, HKBCF and HKLR will be constructed concurrently, an Environmental Protection Office (ENPO) or equivalent to oversee the cumulative construction projects in North Lantau area will be established by the Project Proponent. The responsibility of the ENPO would be similar to that of the IEC but should also include:

- coordinate the monitoring and auditing works for all the on-going projects in the area in order to identify possible sources/causes of exceedances and recommend suitable remedial actions where appropriate;
- review cumulative impacts including possible sources/causes of exceedance and recommending suitable remedial actions;
- liaise with the mainland project teams for HZMB Main Section to identify and assess any cross-boundary cumulative impacts in order to establish suitable remedial actions where necessary; and
- coordinate the assessment and response to complaints/enquires from locals, green groups, district councils or the public at large.

The exact responsibilities and organisation of the ENPO will be defined during at a later stage.

3.1.4 Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.

3.1.5 The ET Leader shall have at least 7 years of experience in conducting EM&A for infrastructure projects. His qualification shall be vetted by the ER and the IEC.

4 ENVIRONMENTAL SUBMISSION

4.1 Introduction

4.1.1 The Contractor shall prepare the Environmental Management Plan (EMP) (including a Waste Management Plan), Construction Method Statement and obtain approval from ER, IEC, EPD and other relevant authorities to encompass the recommended environmental protection / mitigation measures with respect to their latest construction methodology and programme.

4.2 Environmental Management Plan

4.2.1 A systematic EMP shall be set up by the Contractor to ensure effective implementation of the mitigation measures, monitoring and remedial requirements presented in the EIA, EM&A and EMIS. The ER and the IEC will audit the implementation status against the EMP and advise the necessary remedial actions required. These remedial actions shall be enforced by the ER through contractual means.

4.2.2 The EMP will require the Contractor (together with its sub-contractors) to define in details how to implement the recommended mitigation measures in order to achieve the environmental performance defined in the Hong Kong environmental legislation and the EIA documentation.

4.2.3 The review of on-site environmental performance shall be undertaken by ER and IEC through a systematic checklist and audit once the construction commences. The environmental performance review programme comprises a regular assessment on the effectiveness of the EMP. Reference should be made to ETWBTC 19 / 2005 “Environmental Management on Construction Sites” or its latest versions, and any other relevant Technical Circulars.

4.3 Waste Management Plan

4.3.1 As part of the EMP, the Contractor shall include a WMP for the construction of the project and submit to the ER, IEC and EPD for approval. Where waste generation is unavoidable, the opportunities for recycling or reusing should be maximised. If wastes cannot be recycled, recommendations for appropriate disposal routes should be provided in the WMP. A method statement for stockpiling and transportation of the excavated materials and other construction wastes should also be included in the WMP and approved before the commencement of construction. All mitigation measures arising from the approved WMP shall be fully implemented.

4.3.2 For the purpose of enhancing the management of Construction and Demolition (C&D) materials including rock, and minimising its generation at source, construction would be undertaken in accordance with the Environment, Transport and Works Bureau Technical Circular (Works) No. 33/2002 - Management of Construction and Demolition Material Including Rock, or its latest versions. The management measures stipulated in the Technical Circular should be incorporated into the WMP.

4.4 Construction Method Statement

4.4.1 In case the Contractor would like to adopt alternative construction methods or implementation schedules, it is required to submit details of methodology and equipment to the ER for approval before the work commences. Any changes in construction method shall be reflected in a revised EMP or the Contractor will be required to demonstrate the manner in which the existing EMP should accommodate the proposed changes. The Contractor may need to apply for a Further Environmental Permit (FEP) from EPD before commencement of any construction activities.

5 AIR QUALITY

5.1 Air Quality Parameters

5.1.1 Monitoring and audit of the TSP levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.

5.1.2 One-hour and 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The 24-hour TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), **Appendix B**. Upon approval of the IEC, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

5.1.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and any other local atmospheric factors affecting or affected by site conditions, etc., shall be recorded down in detail. A sample data sheet is shown in **Appendix D**.

5.2 Monitoring Equipment

5.2.1 High volume samplers (HVSs) complying with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:

a) 0.6 - 1.7 m^3 per minute adjustable flow range;

b) equipped with a timing / control device with +/- 5 minutes accuracy for 24 hours operation;

c) installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;

d) capable of providing a minimum exposed area of 406 cm2;

e) flow control accuracy: +/- 2.5% deviation over 24-hour sampling period;

f) equipped with a shelter to protect the filter and sampler;

g) incorporated with an electronic mass flow rate controller or other equivalent devices;

h) equipped with a flow recorder for continuous monitoring;

i) provided with a peaked roof inlet;

j) incorporated with a manometer;

k) able to hold and seal the filter paper to the sampler housing at horizontal position;

l) easily changeable filter; and

m) capable of operating continuously for a 24-hour period.

5.2.2 The ET is responsible for the provision, installation, operation, maintenance, dismantle of the monitoring equipment. They shall ensure that sufficient number of HVSs with an appropriate calibration kit is available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled.

5.2.3 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The concern parties such as IEC shall properly document the calibration data for future reference. All the data should be converted into standard temperature and pressure condition.

5.2.4 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded in the data sheet as mentioned in **Appendix D**.

5.2.5 If the ET proposes to use a direct reading dust meter to measure 1-hour TSP levels, he shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result to the HVS. The instrument should also be calibrated regularly, and the 1-hour sampling shall be determined periodically by the HVS to check the validity and accuracy of the results measured by direct reading method.

5.2.6 Wind data monitoring equipment shall also be provided and set up set up for logging wind speed and wind direction near the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:

a) The wind sensors should be installed 10 m above ground so that they are clear of obstructions or turbulence caused by buildings.

b) The wind data should be captured by a data logger. The data shall be downloaded for analysis at least once a month.

c) The wind data monitoring equipment should be re-calibrated at least once every six months.

d) Wind direction should be divided into 16 sectors of 22.5 degrees each.

5.2.7 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.

5.3 Laboratory Measurement / Analysis

5.3.1 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.

5.3.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER and the measurement procedures shall be witnessed by the IEC. Any measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and IEC. IEC shall regularly audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), **Appendix B** for his reference.

5.3.3 Filter paper of size 8" x 10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.

5.3.4 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

5.3.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

5.4 Monitoring Locations

5.4.1 **Figure 2** shows the locations of the proposed dust monitoring station. The status and locations of dust sensitive receivers may change after issuing this manual. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from ER and agreement from the IEC.

Table 5.1 Construction Dust Monitoring Locations

ID	Location
AMS 1	Sha Lo Wan
AMS 2	Seaview Crescent
AMS 3	Ho Yu College
AMS 4	San Tau
AMS 5	Tung Chung
AMS 6	HKIA

5.4.2 When alternative monitoring locations are proposed, the proposed site should, as far as practicable:

a) be at the site boundary or such locations close to the major dust emission source;

b) be close to the sensitive receptors; and

c) take into account the prevailing meteorological conditions.

5.4.3 The ET shall agree with the ER in consultation with the IEC on the position of the HVS for the installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

a) a horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;

b) no two samplers should be placed less than 2 meters apart;

c) the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;

d) a minimum of 2 meters of separation from walls, parapets and penthouses is required for rooftop samplers;

e) a minimum of 2 meters separation from any supporting structure, measured horizontally is required;

f) no furnace or incinerator flue is nearby;

g) airflow around the sampler is unrestricted;

h) the sampler is more than 20 meters from the dripline;

i) any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;

j) permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and

k) a secured supply of electricity is needed to operate the samplers.

5.4.4 The ENPO may, depending on site conditions and monitoring results, decide whether additional monitoring locations shall be included or any monitoring locations could be removed/relocated during any stage of the construction phase.

5.5 Baseline Monitoring for Fugitive Dust

5.5.1 Baseline monitoring shall be carried out at all of the designated monitoring locations (see **Table 5.1**) for at least 14 consecutive days prior to the commissioning of major construction works to obtain daily 24-hour TSP samples. The selected baseline monitoring stations should reflect baseline conditions at the impact stations. One-hour sampling should also be done at least 3 times per day while the highest dust impact is expected.

5.5.2 During the baseline monitoring, there should not be any major construction or dust generation activities in the vicinity of the monitoring stations. Before commencing baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that, if required, the ER can conduct on-site audit to ensure accuracy of the baseline monitoring results.

5.5.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations, the ET Leader shall carry out the monitoring at alternative locations that can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with the IEC.

5.5.4 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.

5.5.5 Ambient conditions may vary seasonally and shall be reviewed once every three months. When the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with the IEC and EPD.

5.6 Impact Monitoring for Fugitive Dust

5.6.1 The ET shall carry out impact monitoring during the entire construction period. For regular impact monitoring, the sampling frequency of at least once in every 6 days, shall be strictly observed at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least 3 times in every 6 days should be undertaken when the highest dust impact occurs. Before commencing impact monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the monitoring results.

5.6.2 The specific time to start and stop the 24-hour TSP monitoring shall be clearly defined for each location and be strictly followed by the ET.

5.6.3 In case of non-compliance with the air quality criteria, more frequent monitoring, as specified in the Action Plan in the following section, shall be conducted within the specified timeframe after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified, and agreed with the ER and the IEC.

5.7 Action / Limit Levels

5.7.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP. **Table 5.2** shows the air quality criteria, namely Action and Limit levels to be used.

Table 5.2 Action / Limit Levels for Air Quality

Parameters	Action	Limit
24-hour TSP Level in mg m^{-3}	For baseline level $\leq$ 200 mg m^{-3}, Action level = (baseline level * 1.3 + Limit level)/2; For baseline level > 200 mg m^{-3} Action level = Limit level	260mg/m^3
1-hour TSP Level in mg m^{-3}	For baseline level $\leq$ 384 mg m^{-3}, Action level = (baseline level * 1.3 + Limit level)/2; For baseline level > 384 mg m^{-3}, Action level = Limit level	500mg/m^3

5.8 Event and Action Plan

5.8.1 Should non-compliance of the air quality criteria occur, actions in accordance with the Action Plan in **Table 5.3** shall be carried out.

Table 5.3 Event / Action Plan for Air Quality

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
1. Exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
2. Exceedance for two or more consecutive samples	1. Identify source; 2. Inform IEC and ER; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with IEC and ER; 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ET on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor;	1. Submit proposals for remedial to ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
LIMIT LEVEL				
1. Exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform ER, Contractor and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 1. Implement the agreed proposals; 4. Amend proposal if appropriate.
2. Exceedance for two or more consecutive samples	1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

5.9 Mitigation Measures

5.9.1 The EIA Report has recommended dust control measures including 8 times of watering per day. During the operation of the barging facilities, good site practices such as road surface paving, dust enclosures, wheels wash facilities would be implemented to reduce the generation of dust.

5.9.2 All the proposed mitigation measures are summarised in the Environmental Mitigation Implementation Schedule (EMIS) in **Appendix B**.

6 NOISE

6.1 Noise Quality Parameters

6.1.1 Construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq\ 30\ min}$ shall be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays. For all other time periods, $L_{eq\ 5\ min}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

6.1.2 As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference.

6.2 Monitoring Equipment

6.2.1 As referred to in the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB.

6.2.2 Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.

6.2.3 The ET is responsible for the provision, installation, operation, maintenance, dismantle of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled.

6.3 Monitoring Locations

6.3.1 The locations of construction noise monitoring stations are summarised in **Table 6.1** and shown in **Figure 2**.

Table 6.1 Proposed airborne construction noise monitoring locations

ID	Description
NMS1	Sha Lo Wan
NMS2	Seaview Crescent
NMS3	Ho Yu College
NMS4	San Tau
NMS5	Tung Chung

6.3.2 The ET shall select the monitoring location from the above table based on the locations of the construction activities and seek approval from ER and agreement from the IEC and EPD to the proposal. The monitoring locations should be chosen based on the following criteria:

- at locations close to the major site activities which are likely to have noise impacts;
- close to the most affected existing noise sensitive receivers; and

- for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

6.3.3 The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements. The ET shall agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

6.3.4 The ENPO may, depending on site conditions and monitoring results, decide whether additional monitoring locations shall be included or any monitoring locations could be removed/relocated during any stage of the construction phase.

6.4 Baseline Monitoring for Construction Noise

6.4.1 The ET shall carry out baseline noise monitoring prior to the commencement of the construction works. There shall not be any construction activities in the vicinity of the stations during the baseline monitoring. Continuous baseline noise monitoring for the A-weighted levels L_{eq}, L_{10} and L_{90} shall be carried out daily for a period of at least two weeks in a sample period of 5 minutes or 30 minutes between 0700 and 1900, and 5 minutes between 1900 and 0700. A schedule on the baseline monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

6.4.2 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to the ER for approval.

6.5 Impact Monitoring for Construction Noise

6.5.1 During normal construction working hour (0700-1900 Monday to Saturday), monitoring of $L_{eq, 30min}$ noise levels (as six consecutive $L_{eq, 5min}$ readings) shall be carried out at the agreed monitoring locations once every week in accordance with the methodology in the TM.

6.5.2 If a school exists near the construction activity, noise monitoring shall be carried out at the monitoring stations for the schools during the school examination periods. The ET Leader shall liaise with the school's personnel and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract.

6.5.3 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan, shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

6.5.4 A schedule on the compliance monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

6.6 Event and Action Plan for Construction Noise

6.6.1 The Action and Limit levels for construction noise are defined in **Table 6.2**. Should non-compliance of the criteria occur, action in accordance with the Action Plan shall be carried out.

Table 6.2 Action and Limit Levels for Construction Noise

Time Period	Action Level	Limit Level
0700 - 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A) *

Note : If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.
* Reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.

Table 6.3 Event / Action Plan for Construction Noise

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action Level	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Notify IEC and Contractor; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals.
Limit Level	1. Identify source; 2. Inform IEC, ER, EPD and Contractor; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

6.7 Mitigation Measures

6.7.1 The EIA Report has recommended construction noise control measures including the use of quiet plant and temporary noise barriers. All the proposed mitigation measures are summarised in the EMIS in **Appendix B**.

6.7.2 The ventilation building for the tunnel underneath Scenic Hill shall be installed with sufficient sound attenuators to control its sound power level emitting to the environment. Other mitigation measures are not required during the operation phase.

7 SEDIMENT QUALITY

7.1 Summary

7.1.1 The sediment quality data has been reviewed and the findings of the site investigation for sediment quality in relation to the current study area for HKBCF and HKLR is summarised in the EIA Report, there is no requirement on environmental monitoring and audit for sediment quality.

7.1.2 The requirements as recommended in ETWB TC 34/2002 Management of Dredged/Excavated Sediment shall be included in the Particular Specification as appropriate for sediment disposal.

8 WASTE MANAGEMENT

8.1 General

8.1.1 The quantity and timing for the generation of waste during the construction phase have been estimated. Measures including the opportunity for on-site sorting, reusing excavated materials for reclamation etc, are devised in the construction methodology to minimise the surplus materials to be disposed off-site. Proper disposal of chemical waste should be via a licensed waste collector.

8.1.2 All the proposed mitigation measures are stipulated in the EIA Report and summarised in the EMIS in **Appendix B**.

8.1.3 The types and quantities of waste that would be generated during the operational phase have been assessed. It is anticipated there would not be any insurmountable impacts during the operation phase. A trip-ticket system should be operated to monitor all movements of chemical wastes which will be collected by a licensed collector to a licensed facility for final treatment and disposal.

8.1.4 Recommendations have been made to ensure proper treatment and proper disposal of these wastes in the EIA Report and summarised in the EMIS in **Appendix B**.

8.1.5 EM&A requirements are required for waste management during the construction phase only and the effective management of waste arising during the construction phase will be monitored through the site audit programme. The aims of the waste audit are:

- to ensure the waste arising from the works are handled, stored, collected, transferred and disposed of in an environmentally acceptable manner; and
- to encourage the reuse and recycling of material.

8.2 Waste EM&A Requirements

8.2.1 The Contractor shall be required to pay attention to the environmental standard and guidelines and carry out appropriate waste management and obtain the relevant licence/permits for waste disposal. The ET shall ensure that the Contractor has obtained from the appropriate authorities the necessary waste disposal permits or licences including:

- Chemical Waste Permits/licenses under the Waste Disposal Ordinance (Cap 354);
- Public Dumping Licence under the Land (Miscellaneous Provisions) Ordinance (Cap 28);
- Marine Dumping Permit under the Dumping at Sea Ordinance (Cap 466); and
- Effluent Discharge Licence under the Water Pollution Control Ordinance.

8.2.2 The Contractor shall refer to the relevant booklets issued by the DEP when applying for the licence/permit and the ET shall refer to these booklets for auditing purposes.

8.2.3 During the site inspections and the document review procedures, the ET shall pay special attention to the issues relating to waste management and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong. In addition to the site inspections, the ET shall review the documentation procedures prepared by the Waste Coordinator once a week to ensure proper records are being maintained and procedures undertaken in accordance with the Waste Management Plan.

8.2.4 The Contractor's waste management practices should be audited with reference to the checklist detailed in Table 8.1 below:

Table 8.1 Waste Management Checklist

Activities	Timing	Monitoring Frequency	If non-compliance, Action Required
All necessary waste disposal permits or licences have been obtained.	Before the commencement of demolition works	Once	Apply for the necessary permits/ licences prior to disposal of the waste. The ET shall ensure that corrective action has been taken.
Only licensed waste haulier are used for waste collection.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the non-compliance. The ER shall instruct the Contractor to use a licensed waste haulier. The Contractor shall temporarily suspend waste collection of that particular waste until a licensed waste haulier is used. Corrective action shall be undertaken within 48 hours.
Records of quantities of wastes generated, recycled and disposed are properly kept. For demolition material/waste, the number of loads for each day shall be recorded (quantity of waste can then be estimated based on average truck load. Should landfill charging be implemented, the receipts of the charge could be used for estimating the quantity).	Throughout the works	Weekly	The Contractor shall estimate the missing data based on previous records and the activities carried out. The ET shall audit the results and forward to the ER and IEC for approval.
Wastes are removed from site in a timely manner. General refuse is collected on a daily basis.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the non-compliance. The ER shall instruct the Contractor to remove waste accordingly.
Waste storage areas are properly cleaned and do not cause windblown litter and dust nuisance.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the non-compliance. The ER shall instruct the Contractor to clean the storage area and/or cover the waste.
Different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the non-compliance. The ER shall instruct the Contractor to provide separate skips/ containers. The Contractor shall ensure the workers place the waste in the appropriate containers.
Chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes, published by the EPD.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the non-compliance. The ER shall instruct the Contractor to rectify the problems immediately. Warning shall be given to the Contractor if corrective actions are not taken within 24 hrs and the Waste Control Group of the EPD shall be identified.
Demolition material/waste in dump trucks are properly covered before leaving the site.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the non-compliance. The ER shall instruct the Contractor to comply. The Contractor shall prevent trucks shall leaving the site until the waste are properly covered.
Wastes are disposal of at licensed sites.	Throughout the works	Weekly	The ET shall inform the ER and IEC of the non-compliance. The ER shall warn the Contractor and instruct the Contractor to ensure the wastes are disposed of at the licensed sites. Should it involve chemical waste, the Waste Control Group of EPD shall be notified.

Note: ET – Environmental Team, IEC – Independent Environmental Checker, ER – Engineer's Representative

9 WATER QUALITY

9.1 Water Quality Parameters

9.1.1 The reclamation layout of HKBCF and HKLR are presented in Appendices E1 to 3. For HKBCF+TM-CLKL southern landfall, the layout of the two alternate construction sequences are presented in Appendix E1 (Sequence A) and Appendix E2 (Sequence B). The overall combined maximum daily production rates, the maximum number of plant (dredging and filling) trips and the number of active plants (dredging and filling) on sites for marine works below +2.5mPD are also appended in Appendix E1 for Sequence A and in Appendix E2 for Sequence B. The EIA Report has assessed the water quality impacts caused by the construction and operation stages. Mitigation measures have been recommended in the EIA to ensure compliance with the relevant legislative requirements. These mitigation measures are summarised below.

- A sheet piled wall shall be constructed to the north of the TM-CLKL southern landfall / HKBCF island, and also in the main HKBCF reclamation in order to allow the use of silt curtains during Phase 2 works before the re-deposition the Mf materials.
- Closed grabs should be used for sediment dredging to reduce sediment loss when lifting the grabs to the barges.
- The decks of dredging barges should be clean and tidy to avoid any sediment to be washed into the sea.
- Loading of the dredged sediments to the barges should be carried out carefully to minimise splashing of sediments.
- Overloading of barge is not allowed and sufficient freeboard should be maintained to ensure no spill over of the dredged sediments during lifting and transport.
- The moving speed of construction vessels in the dredging area should be reduced to prevent disturbance to the seabed generating sediment plumes.
- The cage-type silt-curtain is proposed to be installed to enclose local pollution caused by the grab dredging. The grab dredging work should be carried out within the cage-type silt-curtain. Apart from the cage-type silt-curtain, it is recommended to deploy the hanging-type silt-curtain around the site. Special arrangement to the silt-curtains shall be made when the silt-curtains are located at the areas where the current speed is higher than 0.5m/s. Measures to be provided include installation of temporary sheet pile wall near the northern edge of reclamation to protect the silt-curtain along the northern edge. In addition, special design of cage-type silt-curtain with steel enclosure is to be used for HKBCF reclamation when reclamation method of Sequence B is adopted. The proposed silt-curtains would be installed within the site area of HKBCF and HKLR as shown in Appendix E. The typical arrangement of the cage-type and the hanging type silt-curtain is shown in **Appendices E1 to E3**.
- During the initial months of dredging and filling work for HKBCF and HKLR, the silt-removal efficiency of the silt-curtains shall be verified by examining the results of water quality monitoring points. The water quality monitoring points to be selected for the above shall be those close to the locations of the initial period of dredging work. Details in this pilot study shall be determined by the ENPO and agreed by EPD before the commencement of monitoring,, taking account of the Contractor's proposed actual locations of his initial period of dredging work.
- **Appendices E1 to E3** illustrate different stages of the arrangement of silt-curtains and shows the typical seawall sections. The hanging-type silt-curtain should allow access of vessels to enter into or exit from the

reclamation area. The vessel access opening would be formed by two piece of silt-curtain with overlapping length of 150m minimum and a separation distance of about 50m. The indicative position and details of the above openings for HKBCF and HKLR are also shown in **Appendices E1 to E3**.

- The cage-type and hanging-type silt-curtains should be maintained in good condition to ensure the sediment plume generated from dredging and filling be confined effectively within the site boundary.

9.1.2 Prior to the commencement of the construction work, a detailed site drainage management plan should be submitted to EPD. The plan should cover measures to minimize all potential water quality impact arising from the surface runoffs of all the related constructions.

9.1.3 The guidelines outlined in the Practice Note for Professional Persons (ProPECC), Construction Site Drainage (PN 1/94) should be adopted to control construction site runoff. Mitigation measures to minimise water quality impacts from construction site runoff and wastewater and sewage generated from construction activities are:

- Provision of site drainage systems over the entire construction site with sediment control facilities. Regular inspection and maintenance of the site drainage systems are required to ensure proper and efficient operation at all times.
- Sedimentation tanks or package treatment systems are required to treat the large amount of sediment-laden wastewater generated from foundation construction work, wheel washing, site runoff. Any construction activities that generate wastewater with high concentrations of SS should also be collected to these facilities for proper treatment prior to disposal. Treated wastewater can be reused for vehicle washing, dust suppression and general cleaning. Bentonite slurry used in bore-pile construction should be reconditioned and reused to minimise the disposal volume of the used slurry.
- The construction programme should be properly planned to avoid soil excavation in rainy seasons. Exposed stockpiles of excavated soils or construction materials should be covered with tarpaulin or impervious sheets to avoid release of pollutants into the drainage channels.
- Sewage generated from site toilets and canteen should be collected using a temporary storage system. Chemical toilets should be provided at different locations for use by the workers on site. Licensed waste collectors should be employed for collection and disposal of the sewage. The drainage system for collection of wastewater generated from canteen, if any, should be equipped with grease trap capable of providing at least 20 minutes retention during peak flow.
- Wheel washing facilities should be installed at all site entrances/exits.
- An emergency plan should be developed by the contractors to deal with accidental spillage of chemicals.

9.1.4 Upon completion of the HKLR / HKBCF development, stormwater drainage systems would be completed to collect stormwater generated from the whole area including new roads. Sewage generated from the HKBCF development would be treated on site to fulfil effluent limit for discharge. Additional mitigation measures would not be required.

9.1.5 As identified in the EIA Report, key water quality issues during construction phase will be dredging and filling works for the reclamation, backfilling of Mf sediment within the reclamation sites (the locations of the proposed pits to receive Mf Sediment are shown in Appendix E4) and TSHD dredging overflow process for the construction of artificial islands within the mainland water boundary but so close to Hong Kong. Marine water quality monitoring shall be carried out during the

construction phase to ensure that any unacceptable increase in suspended solids / turbidity and decrease in dissolved oxygen due to dredging and filling activities could be readily detected and timely action be taken to rectify the situation.

9.1.6 Apart from dissolved oxygen (DO), turbidity (NTU), suspended solids (SS) and other general in situ parameters shall be monitored at all designated marine water quality monitoring stations during the whole construction period, nutrients and heavy metal parameters shall also be measured at the selected relevant locations during the baseline, backfilling of Mf sediment and post construction period.. DO and turbidity should be measured in-situ whereas SS, nutrients and heavy metals should be determined by an accredited laboratory.

9.1.7 Other relevant data shall also be recorded, including monitoring location / position, time, water depth, pH value, salinity, temperature, tidal stages, weather conditions and any special phenomena or work underway at the construction site.

9.1.8 According to the EIA report, there is low concentration for PAH, PCB, TBT, and chlorinated pesticides. Monitoring of these chemicals would not be required during the construction stage.

9.1.9 The proposed water quality monitoring schedule shall be submitted to EPD at least 2 weeks before the first day of the monitoring month. EPD shall also be notified immediately for any changes in schedule by fax.

9.2 Monitoring Equipment

Dissolved Oxygen and Temperature Measuring Equipment

9.2.1 The instrument should be a portable and weatherproof dissolved oxygen (DO) measuring instrument complete with cable and sensor, and use a DC power source. The equipment should be capable of measuring:

- a DO level in the range of 0 - 20 mg/ L and 0 - 200% saturation; and
- a temperature of 0 - 45 degree Celsius.

9.2.2 It should have a membrane electrode with automatic temperature compensation complete with a cable.

9.2.3 Should salinity compensation not be built-in to the DO equipment, in-situ salinity should be measured to calibrate the DO equipment prior to each DO measurement.

Turbidity Measurement Instrument

9.2.4 The instrument should be a portable and weatherproof turbidity measuring instrument using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example, Hach model 2100P or an approved similar instrument).

Sampler

9.2.5 A water sampler is required. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

Water Depth Detector

9.2.6 A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Salinity

9.2.7 A portable salinometer capable of measuring salinity in the range of 0 - 40 parts per thousand (ppt) should be provided for measuring salinity of the water at each monitoring location.

pH Measuring Equipment

9.2.8 A portable pH meter capable of measuring a range between 0.0 and 14.0 shall be provided to measure pH under the specified conditions (e.g., Orion Model 250A or an approved similar instrument).

Sample Containers and Storage

9.2.9 Water samples for SS, nutrient and heavy metals determinations should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and keep in dark during both on-site temporary storage and shipment to the testing laboratory. The samples shall be delivered to the laboratory within 24 hours of collection and be analysed as soon as possible after collection.

Monitoring Position Equipment

9.2.10 A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication and Radio Technical Commission for maritime (RTCM) Type 16 error message 'screen pop-up' facilities (for real-time auto-display of error messages and DGPS corrections from the Hong Kong Hydrographic Office), or other equipment instrument of similar accuracy, should be provided and used during marine water monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

Calibration of In-Situ Instruments

9.2.11 The pH meter, DO meter and turbidimeter shall be checked and calibrated before use. DO meter and turbidimeter shall be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.

Back-up Equipment and Vessels

9.2.12 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc. For the on site calibration of field equipment, the BS127:1993, "Guide to Field and on-site test methods for the analysis of waters" shall be observed.

9.2.13 The Water Quality Monitoring will involve a large number of monitoring stations and measurements should be conducted within the prescribed tidal conditions (within ± 1.75 hour of the predicted mid-ebb or mid-flood tides) in order to ensure the measurement/samples are representative. A multi-probe monitoring equipment set integrated with water sampler(s) is highly recommended to improve the monitoring efficiency. It is, also, likely that more than one field survey vessels will be required simultaneously to ensure the monitoring are conducted within the acceptable monitoring windows. The ET shall also consider the use of unattended automatic sampling/monitoring devices at fixed stations where monitoring are required throughout the construction period. The use of such unattended automatic devices, however, shall be subject to the approval of the ER, IEC and EPD.

9.3 Laboratory Measurement / Analysis

9.3.1 Duplicate samples from each independent sampling event are required for all the suspended solids, nutrient and heavy metals measurement, which shall be carried in a HOKLAS or other international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the laboratory measurement and analysis. The laboratory determination work shall start within 24 hours after collection of the water samples. The analysis for SS, nutrient and heavy metals are summarized in **Table 9.1**.

Table 9.1 Laboratory analysis for SS, nutrient and heavy metals

Parameters	Instrumentation	Analytical Method	Reporting Limit
Suspended Solid (SS)	Weighting	APHA 2540-D	0.1mg/L
Nutrient			
Ammonia as N	FIA	APHA 4500-NH_3 H	0.025mg/L
Unionised ammonia (NH_3) [1]	By calculation	By calculation	By calculation
Nitrite as N	FIA	APHA 4500-NO_3 I	0.025mg/L
Nitrate as N	FIA	APHA 4500-NO_3 I	0.025mg/L
TKN as N	Titration	APHA 4500-N_{org} + NH_3 H	1mg/L
Total Phosphorus	Colorimetric	APHA 4500-P B&E	0.1 mg/L
Reactive Phosphorus	FIA	APHA 4500-P G	0.1mg/L
Heavy Metals			
Cadmium (Cd)	ICP-MS	USEPA 6020A	0.2 µg/L
Chromium (Cr)	ICP-MS	USEPA 6020A	1 µg/L
Copper (Cu)	ICP-MS	USEPA 6020A	1 µg/L
Mercury (Hg)	ICP-MS	USEPA 6020A	0.1 µg/L
Nickel (Ni)	ICP-MS	USEPA 6020A	1 µg/L
Lead (Pb)	ICP-MS	USEPA 6020A	1 µg/L
Silver (Ag)	ICP-MS	USEPA 6020A	1 µg/L
Zinc (Zn)	ICP-MS	USEPA 6020A	4 µg/L
Arsenic (As)	ICP-MS	USEPA 6020A	10 µg/L

Note [1]: By calculation based on the laboratory result of ammonia nitrogen (NH_4-N) and *in-situ* measured pH, salinity and temperature.

9.3.2 If a site laboratory is set up or a non-HOKLAS and non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control shall be approved by EPD. All the analysis shall be witnessed by the ER. The ET Leader shall provide the ER with one copy of the relevant chapters of the "APHA Standard Methods for the Examination of Water and Wastewater" 19th edition and any other relevant document for his reference.

9.4 Monitoring Locations

9.4.1 The water quality monitoring stations, control stations and locations for during the construction and operation phase of HKBCF, TMCLKL and HKLR are shown in **Figure 3**. The demarcation of the monitoring stations for different projects will be further determined by the ENPO before the commencement of the construction. The selection of these stations are based on the following criteria:

(i) Impact stations (IS) within 250m – 500m envelope of the construction works (i.e. 20 impact locations).

(ii) Sensitive receiver stations (SR) near to key sensitive receivers (i.e.10 impact stations).

(iii) Control / far field stations (CS) at representative locations with less influence by the projects (i.e 6 Control / far field stations). Control stations should be located, as far as practicable, both upstream and downstream of the works area. The locations CS(Mf) also serve as the control stations for Mf deposition sites.

(iv) Stations for sensitivity test result (ST), which are located close to the HKSAR boundary (i.e 3 sensitivity test stations).

(v) Impact stations (IS(Mf)) around the on-site Mf deposition sites during the on-site disposal of Mf material.

9.4.2 The co-ordinates of the proposed monitoring stations during the construction and operation phase are listed in **Table 9.2**. As shown in **Figure 3**, the proposed locations for the sensitive receiver monitoring stations represent the typical sensitive receivers around the project works. .

Table 9.2 Water Quality Monitoring Stations (construction and post construction phases)

Station	Description	East	North	Parameters to be measured
IS1	Impact Station (Close to HKLR construction site)	803474	815060	DO, Turbidity, SS
IS2	Impact Station (Close to HKLR construction site)	804851	815715	DO, Turbidity, SS
IS3	Impact Station (Close to HKLR construction site)	806502	815743	DO, Turbidity, SS
IS4	Impact Station (Close to HKLR construction site)	807008	816986	DO, Turbidity, SS
IS5	Impact Station (Close to HKLR construction site)	811579	817106	DO, Turbidity, SS
IS(Mf)6 [1]	Impact Station (Close to HKLR construction site)	812101	817873	DO, Turbidity, SS, nutrient, heavy metals
IS7	Impact Station (Close to HKBCF construction site)	812244	818777	DO, Turbidity, SS
IS8	Impact Station (Close to HKBCF construction site)	814251	818412	DO, Turbidity, SS
IS(Mf)9 [1]	Impact Station (Close to HKBCF construction site)	813273	818850	DO, Turbidity, SS nutrient, heavy metals
IS10	Impact Station (Close to HKBCF construction site)	812577	820670	DO, Turbidity, SS
IS(Mf)11 [1]	Impact Station (Close to HKBCF construction site)	813562	820716	DO, Turbidity, SS, nutrient, heavy metals
IS12	Impact Station (Close to TMCLKL construction site)	813218	823681	DO, Turbidity, SS
IS13	Impact Station (Close to TMCLKL construction site)	813667	824325	DO, Turbidity, SS
IS14	Impact Station (Close to TMCLK construction site)	812592	824172	DO, Turbidity, SS
IS15	Impact Station (Close to TMCLK construction site)	813356	825008	DO, Turbidity, SS,
IS(Mf)16 [1]	Impact Station (Close to HKBCF construction site)	814328	819497	DO, Turbidity, SS, nutrient, heavy metals
IS17	Impact Station (Close to HKBCF construction site)	814539	820391	DO, Turbidity, SS

Station	Description	East	North	Parameters to be measured
IS(Mf)18 [1]	Impact Station (Close to the HKBCF Marine Fill – for reference only)	813564	820069	DO, Turbidity, SS, nutrient, heavy metals
IS(Mf)19 [1]	Impact Station (Close to the HKBCF Marine Fill – for reference only)	813564	819620	DO, Turbidity, SS, nutrient, heavy metals
IS(Mf)20 [1]	Impact Station (Close to the HKLR Marine Fill – for reference only)	811650	818097	DO, Turbidity, SS, nutrient, heavy metals
SR1	Sensitive receivers (Tai O)	803126	812379	DO, Turbidity, SS
SR2	Sensitive receivers (Sha Lo Wan)	807856	816953	DO, Turbidity, SS
SR3	Sensitive receivers (San Tau SSSI)	810525	816456	DO, Turbidity, SS
SR4	Sensitive receivers (Tai Ho Inlet)	814760	817867	DO, Turbidity, SS
SR5	Sensitive receivers (Artificial Reef in NE Airport)	811489	820455	DO, Turbidity, SS
SR6	Sensitive receivers (Sha Chau and Lung Kwu Chau Marine Park)	805837	821818	DO, Turbidity, SS
SR7	Sensitive receivers (Tai Mo Do)	814293	821431	DO, Turbidity, SS
SR8	Sensitive receivers (Gazettal beaches in Tuen Mun)	816306	825715	DO, Turbidity, SS
SR9	Sensitive receivers (Butterfly Beach)	813601	825858	DO, Turbidity, SS
SR10	Sensitive receivers (Ma Wan FCZ)	823741	823495	DO, Turbidity, SS
CS1	Control Station	801784	812711	DO, Turbidity, SS
CS2	Control Station	805849	818780	DO, Turbidity, SS
CS(Mf)3 [1]	Control Station	809989	821117	DO, Turbidity, SS, nutrient, heavy metals
CS4	Control Station	810025	824004	DO, Turbidity, SS
CS(Mf)5 [1]	Control Station	817990	821129	DO, Turbidity, SS, nutrient, heavy metals
CS6	Control Station	817028	823992	DO, Turbidity, SS
ST1	Locations for sensitivity test result (Close to Sha Chau and Lung Kwu Chau Marine Park)	802677	816006	DO, Turbidity, SS
ST2	Locations for sensitivity test result (Close to Chinese White Dolphin area near HKSAR boundary)	804055	818840	DO, Turbidity, SS
ST3	Locations for sensitivity test result (Close to Chinese White Dolphin area near HKSAR boundary)	800667	810126	DO, Turbidity, SS

Note [1]: The contractor should submit a detailed programme for the agreement with EPD. During the construction stage, the nutrients and metal parameters only have to be measured at the locations with "Mf" during period of Mf sediment backfilling. After the pit for Mf sediment is backfilled and capped for one month, monitoring at IS(Mf)18, IS(Mf)19 and IS(Mf)20 locations can be stopped.

Table 9.2b Proposed Water Quality Monitoring Stations (operation phase)

Station	Description	East	North	Parameters to be measured
SR2	Sensitive receivers (Sha Lo Wan)	807856	816953	DO, Turbidity, SS, pH, salinity, temperature
SR3	Sensitive receivers (San Tau SSSI)	810525	816456	DO, Turbidity, SS, pH, salinity, temperature
CS2	Control Station	805849	818780	DO, Turbidity, SS, pH, salinity, temperature
CS(Mf)5	Control Station	817990	821129	DO, Turbidity, SS, pH, salinity, temperature

9.4.3 Control stations (CS1, CS2, CS(Mf)3, CS4, CS(Mf)5 and CS6) are necessary to compare the water quality from potentially impacted sites with the ambient water quality. Control stations shall be located within the same body of water as the impact monitoring stations but should be outside the area of influence of the works and, as far as practicable, not affected by any other works. The control stations shown in **Figure 3** are indicative subject to further review before construction phase. During the review, the location of the impact stations for boundary of mixing zones will also be re-visited. If there are any changes on the monitoring location, that shall be submitted 4 weeks before commencement of baseline monitoring for EPD approval.

9.4.4 In-situ monitoring (DO, temperature, turbidity, pH, salinity) and water sample for SS, nutrients and heavy metals shall be taken at 3 water depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth is less than 6 m, in which case the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored. The status and locations of water sensitive receivers and the marine activities may change after issuing this Manual. If such cases exist, the ET Leader shall propose with justification for changes to monitoring locations or other requirements of the EM&A programme, and seek approval from the IEC and EPD.

9.4.5 The ENPO may, depending on site conditions and monitoring results, decides whether additional monitoring locations shall be included or any monitoring locations could be removed / relocated during any stage of the construction phase after getting approval from EPD.

9.5 Baseline Monitoring for Water Quality

9.5.1 Baseline conditions for marine water quality shall be established and agreed with EPD prior to the commencement of works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact and control monitoring stations. The baseline conditions shall normally be established by measuring the DO, temperature, turbidity, pH, salinity and SS at all designated locations, plus nutrients and heavy metals parameters at “Mf” locations specified in **Section 9.4** above. The measurements shall be taken at all designated monitoring stations including control stations, 3 days per week, at mid-flood (within ± 1.75 hour of the predicted time) and mid-ebb (within ± 1.75 hour of the predicted time) tides, for at least 4 weeks prior to the commencement of marine works. Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database.

9.5.2 Baseline monitoring programme may overlap with other reclamation activities.

The monitoring exercise should be scheduled as far as possible to avoid concurrent dredging / backfilling activities around the monitoring stations such that representative ambient data could be sampled.

9.5.3 Other relevant data shall also be recorded, such as monitoring location / position, time, water depth, tidal stages, weather conditions and any special phenomena underway near the monitoring station. There shall not be any marine construction activities in the vicinity of the stations during the baseline monitoring.

9.5.4 As this project will last for a few years, the ET Leader should seek approval from the IEC and EPD on an appropriate set of data to be used with the baseline data collected by this study to establish two set of AL levels respectively for the wet and dry season.

9.5.5 Baseline monitoring schedule shall be faxed to EPD 2 weeks prior to the commencement of baseline monitoring. The interval between two sets of monitoring shall not be less than 36 hours.

9.6 Efficiency of Silt Curtain and Cage Curtain

9.6.1 The ET shall be responsible for conducting tests to confirm that their silt curtain systems to be adopted would satisfy the requirements in the EIA Report.

9.6.2 A method statement shall be submitted by the ET Leader to seek approval from the IEC and EPD.

9.6.3 During the initial period of dredging and filling works for HKBCF and HKLR, the silt-removal efficiency of the silt-curtains shall be verified by examining the results of water quality monitoring points. The water quality monitoring points to be selected for the above shall be those close to the locations of the initial period of dredging work. The details for the pilot study shall be determined by the ENPO and agreed by EPD, taking account of the Contractor's proposed actual locations of his initial period of dredging work.

9.6.4 Pilot tests should be carried out during the early stage of construction to confirm whether the silt removal efficiency of the cage type silt curtain and the floating type silt curtains can achieve 80% and 45% silt removal efficiency for dredging and filling activities respectively when deployed separately, and a combined reduction of 95% and 61% when the two type of silt curtains are used jointly. Pilot tests for cage type silt curtain (with steel enclosure) should be carried out in a similar time frame should Sequence B be implemented to see if the cage type silt curtain (with steel enclosure) can achieve 80% reduction when applied singly under current above 0.5 m/s.

9.6.5 The pilot test shall include basic measurements such as turbidity and suspended solids as well as current speed and direction. Where testing of cage type silt curtain (with steel enclosure) to is to be conducted at relatively fast current, supplementary Acoustic Doppler Current Profiler (ADCP) measurement of the plumes shall be considered to provide a better characterization of instant suspended solids plumes. A method statement shall be submitted by the ET Leader to seek approval from the IEC and EPD.

9.6.6 Cage type silt curtains will be applied round all grab dredgers during the HKBCF, HKLR and TM-CLKL southern reclamation works. Cage type silt curtain (with steel enclosure) shall be used for grab dredgers working in the site of HKBCF and TM-CLKL southern reclamation.

9.6.7 Regardless of the measured efficiency of the silt curtain system, the event and action plan shall only be based on the monitoring results at the designed monitoring stations.

9.7 Impact Monitoring for Water Quality

Reclamation

9.7.1 Reclamation would require dredging and filling activities during the construction. During this period, silt curtains would be installed enclosing the whole project site to control sediment loss. **Appendices E1 to E3** show the arrangement of the silt curtains. During the construction period, monitoring shall be undertaken 3 days per week, at mid-flood (within ± 1.75 hour of the predicted time) and mid-ebb (within ± 1.75 hour of the predicted time) tides, with sampling / measurement at the designated monitoring stations. Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and / or Limit levels, in which case the monitoring frequency will be increased. Two consecutive measures of DO concentration, DO saturation, pH, salinity, temperature, turbidity and water samples for SS, nutrients and heavy metals will be taken in situ at 1 m below the surface, mid-depth and 1 m above the seabed at each location. If the water depth is less than 6 m, the mid-depth measurement may be omitted subject to the approval of the ER. If the depth is less than 3 m, only the mid-depth measurements need to be taken subject to the approval of the ER. The monitoring probes shall be retrieved out of water after the first measurement and then redeployed for the second measurement. Where the difference in value between the first and second readings of DO or turbidity parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings shall be taken. For the construction phase, the nutrients and metal parameters only have to be measured at the locations with "Mf" during period of Mf sediment backfilling. After the pit for Mf sediment is backfilled and capped for one month, monitoring at IS(Mf)18, IS9(Mf)19 and IS(Mf)20 locations can be stopped.

9.7.2 If the impact monitoring results indicate that dredging / filling works have caused adverse impacts on water quality at the monitoring stations, appropriate actions (including the lowering of production rates for dredging and filling) should be taken and additional mitigation measures should be implemented as necessary. Water quality monitoring frequency has to be increased to once per day when dredging / filling is undertaken. 24-hour monitoring of turbidity should be implemented as and when necessary. The monitoring results should be made available within a reasonable short period to be agreed with the EPD, ER and IEC.

Relocation of Mf Sediment with Reclamation Area

9.7.3 According to the current design, the Mf (ie. Category M Sediment which fails the biological test as per ETWB TC 34/2002) sediment within the dredging area would be relocated to area within the reclamation area. During this process, the ET is required to conduct near-field water quality measurements to ensure that the criteria for various water pollutants would be compiled. The monitoring shall be undertaken 3 days per week, at mid-flood (within ± 1.75 hour of the predicted time) and mid-ebb (within ± 1.75 hour of the predicted time) tides, with sampling / measurement at the designated monitoring stations to be agreed with EPD.

9.7.4 Before the commencement of the monitoring, the ET shall submit a proposal to EPD for agreement on the measurement methodology, locations, durations, parameters, detection limits, action and limit levels etc. The proposal shall be vetted by the IEC before submission to EPD for agreement. Key pollutant groups to be measured included SS, nutrients and heavy metals, as summarised in Table 9.2 above. For the construction phase, the nutrients and metal parameters only have to be measured at the locations with "Mf" during period of Mf sediment backfilling. After the pit for Mf sediment is backfilled and capped for one month, monitoring at IS(Mf)18, IS9(Mf)19 and IS(Mf)20 locations can be stopped.

Water Quality Monitoring along the Water Boundary of Hong Kong and Mainland

9.7.5 Stations for sensitivity test result shall be provided along the HKSAR Boundary to identify and assess any cross-boundary cumulative water quality impacts in order to establish suitable remedial actions where necessary.

9.8 Post-construction Monitoring

9.8.1 Upon completion of all marine-based construction activities, a post-project monitoring exercise on water quality shall be carried out for 4 weeks in the same manner as the Baseline monitoring. Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database. The measurement parameters for Post-construction monitoring shall include DO, temperature, turbidity, pH, salinity, and SS. In addition, nutrient and metals should be monitored at the "Mf" locations up until one month after the pits have been capped. The measurement shall be taken at all designated monitoring stations including control stations, 3 days per week, at mid-flood (within ± 1.75 hour of the predicted time) and mid-ebb (within ± 1.75 hour of the predicted time) tides, for at least 4 weeks. Since the southern and northern landfalls of TM-CLKL are distant from each other and based on the tentatively programme available during the EIA stage the two landfall has a different construction time frame, the Post-construction monitoring for each landfalls may conducted separately. The ET should review the actual implantation programme and recommend if a separate post-construction monitoring for each landfall is required.

9.9 Impact Operational Phase Monitoring

9.9.1 The marine water quality monitoring shall be performed monthly during the first year of Project operation at all designated monitoring stations including control stations. Each monthly monitoring event shall consist of one monitoring and sampling event during both mid-ebb (within ± 1.75 hour of the predicted time) and mid-flood (within ± 1.75 hour of the predicted time) tides of the same monitoring day. The operation phase monitoring shall be ceased after the first year of operation of the Project subject to the first year review. No marine construction activities should be conducted in the vicinity of the stations during the Operational Phase monitoring period.

9.9.2 Sampling shall be taken at three water depths, namely, 1m below water surface, mid-depth and 1m above sea bed, except where the water depth is less than 6m, in which case the mid-depth station may be omitted. If the water depth be less than 3m, only the mid-depth station will be monitored. In-situ measurements at DO, turbidity, SS, pH, salinity and temperature shall be taken at all the monitoring stations SR2, SR3, CS2 and CS(Mf)5. (refer to **Table 9.2b**). A full set of in duplicated situ measurement and water samples shall be collected during each of the mid-ebb (within ± 1.75 hour of the predicted time) and mid-flood (within ± 1.75 hour of the predicted time) tides.

9.10 Event and Action Plan

9.10.1 The Action and Limit levels for water quality are defined in **Table 9.3**. Should non-compliance of the criteria occur, action in accordance with the Action Plan in **Table 9.4** shall be carried out.

9.10.2 The ET shall propose Action and Limit Levels for water quality for the relocation of Mf sediment for agreement with EPD.

Table 9.3 Action and Limit Levels for Water Quality

Parameters	Action	Limit
DO in mg L^{-1} (Surface, Middle & Bottom)	Surface and Middle 5 percentile of baseline data for surface and middle layer Bottom 5 percentile of baseline data for bottom layer	Surface and Middle 4 mg L^{-1} except 5 mg/l for FCZ or 1%-ile of baseline data for surface and middle layer Bottom 2 mg L^{-1} or 1%-ile of baseline data for bottom layer
SS in mg L^{-1} (depth-averaged) at all monitoring stations and control stations	95 percentile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99 percentile of baseline or 130% of upstream control station's SS at the same tide of the same day and 10mg/L for WSD Seawater intakes
Turbidity in NTU (depth-averaged)	95 percentile of baseline data or 120% of upstream control station's Turbidity at the same tide of the same day	99 percentile of baseline or 130% of upstream control station's Turbidity at the same tide of the same day
Nutrient in mg L^{-1} (depth-averaged) at all monitoring stations (except for locations for sensitive test result) Mf monitoring and control stations	95 percentile of baseline data or 120% of upstream control station's nutrient level at the same tide of the same day	99 percentile of baseline or 130% of upstream control station's nutrient level at the same tide of the same day and 10mg/L for WSD Seawater intakes
Heavy metals in µg L^{-1} (depth averaged) (Cd, Cr, Cu, Hg, Ni , Pb, Ag, Zn, and As) at all monitoring stations(except for locations for sensitive result) Mf monitoring and control stations	95 percentile of baseline data or 120% of upstream control station's nutrient level at the same tide of the same day	Note [6]: Cd: 2.5µg/L; Cr: 15µg/L; Cu: 5µg/L; Hg: 0.3µg/L; Ni: 30µg/L; Pb: 25µg/L; Ag: 1.9µg/L; Zn: 40µg/L; As: 25µg/L;

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. For Mf locations, the action and limit levels will be determined separately and sought EPD agreement before the commencement of construction.
5. 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.
6. Limit values of most heavy metals (except Ag) are based on European Union Environmental Quality Standard (EQS) Values to Protect Marine Life. For Ag, the limit value is based on the Criteria Maximum Concentration (CMC) of the USEPA Water Quality Criteria (Saltwater).

Table 9.4 Event and Action Plan for Water Quality

Event	ET Leader	IEC	ER	Contractor
Action level being exceeded by one sampling day	Repeat *in situ* measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IEC, contractor and ER; Check monitoring data, all plant, equipment and Contractor's working methods.	Check monitoring data submitted by ET and Contractor's working methods.	Confirm receipt of notification of non-compliance in writing; Notify Contractor.	Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Amend working methods if appropriate.
Action level being exceeded by two or more consecutive sampling days	Repeat measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IEC, contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Action level;	Check monitoring data submitted by ET and Contractor's working method; Discuss with ET and Contractor on possible remedial actions; Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly; Supervise the implementation of mitigation measures.	Discuss with IEC on the proposed mitigation measures; Ensure mitigation measures are properly implemented; Assess the effectiveness of the implemented mitigation measures.	Inform the Engineer and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment and consider changes of working methods; Submit proposal of additional mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER; Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	Repeat measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IEC, contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, ER and Contractor;	Check monitoring data submitted by ET and Contractor's working method; Discuss with ET and Contractor on possible remedial actions; Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly.	Confirm receipt of notification of failure in writing; Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to review the working methods.	Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment and consider changes of working methods; Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER.

Event	ET Leader	IEC	ER	Contractor
Limit level being exceeded by two or more consecutive sampling days	Repeat measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IEC, contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, ER and Contractor; Ensure mitigation measures are implemented;	Check monitoring data submitted by ET and Contractor's working method; Discuss with ET and Contractor on possible remedial actions; Review the Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the ER accordingly; Supervise the implementation of mitigation measures.	Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Ensure mitigation measures are properly implemented; Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level.	Take immediate action to avoid further exceedance; Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IEC and ER; Implement the agreed mitigation measures; Resubmit proposals of mitigation measures if problem still not under control; As directed by the Engineer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.

9.11 Mitigation Measures

9.11.1 The EIA Report has recommended construction and operational phase mitigation measures. All the prepared mitigation measures are summarised in the EMIS in **Appendix B**.

10 ECOLOGY

10.1 Introduction

10.1.1 The EIA Report has assessed the ecologcial impacts caused by the construction and operation phases. Mitigation measures have been recommended in the EIA to ensure compliance with the relevant legislative requirements. The mitigation measures and ecological monitoring surveys are stated in this manual in the sections below. A detailed ecological monitoring plan with specification and detailed methodology will be prepared prior to the baseline monitoring, and submitted to AFCD and EPD for approval.

10.2 Ecological Mitigation Measures and Implementations

Marine Water Quality

10.2.1 Low disturbance construction method: Any significant changes in water quality or turbidity should be avoided. This could be mitigated through construction methods. Closed-grab dredges and silt curtains around the work areas (wherever feasible) should be used in all dredging activities.

10.2.2 Reduce dredging scale – The amount to be dredged has been minimized as far as practicable.

10.2.3 Limit the concurrent works front - The number of concurrent dredging/filling work fronts will be limited (maximum 35 pier sites in the open sea of HKLR, and 10 pier sites in Airport Channel). For the benefit of water quality protection, the minimum distance between any two pilecap construction sites will be kept as 180 m.

10.2.4 Good Site Practices: – The integrity and effectiveness of all silt curtains should be regularly inspected. Effluent monitoring should be incorporated to make sure that the discharged effluent from construction sites meets the relevant effluent discharge guidelines.

10.2.5 Strict enforcement on No-dumping – To avoid degrading the Chinese White Dolphin habitat, restrictions prohibiting dumping of rubbish, food, oil, or chemicals will be strictly enforced.

10.2.6 Site runoff control - For works on land, standard site runoff control measures will be established and strictly enforced to ensure that discharge of contaminated or silt-laden runoff into North Lantau waters is minimised.

10.2.7 Spill response plan – In the event of vessels operating in the works areas transporting oil or other hazardous chemicals, an oil-spill response plan, with specific provisions for protecting marine ecology and dolphins, will be formulated.

10.2.8 Replacement Artificial Reefs - The artificial reefs near the northeast corner of Airport Island within the Marine Exclusion Area is the nearest marine ecological sensitive receiver to the HKBCF reclamation. They are potentially subject to water quality impact from the reclamation. Even though water mitigation measures will be adopted during the dredging for seawall construction, the artificial reefs may still be potentially influenced by the works. These artificial reefs (ARs) near the HKBCF reclamation had been deployed there for eight years or more. It is considered that the relocation process would not keep the ARs intact once they are mechanically disturbed. As such, it would be more practicable to deploy replacement ARs to mitigate the potential disturbance on ARs by the HKBCF reclamation works. The replacement ARs should have the same volume as the existing ARs (i.e. 3,600 m^3).

Terrestrial Disturbance

10.2.9 The impact from this minor and short-term source can be reduced by good site practice, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time.

Sedimentation from Land-based works areas

10.2.10 Although the extent of earthwork will not affect habitats of Romer's Tree Frog, good site practices (e.g., watering to reduce dust generation, prevention of siltation of freshwater habitats) are still recommended to be implemented. Site runoff should be desilted, to reduce the potential for suspended sediments, organics and other contaminants to enter streams and standing freshwater (which are potential breeding habitats of Romer's Tree Frog). Caution must be taken to avoid runoff entering the area in which Romer's Tree Frog has been recorded.

Marine Noise and Disturbance

1) Bored piling

10.2.11 Avoidance of percussive piling – In view of its strong potential to cause serious noise impact upon the dolphins and porpoises, percussive piling will not be adopted.

10.2.12 Dolphin Exclusion Zone – Marine bored piling involves the installation of a temporary steel casing, excavation within the casing, concrete filling into the casing and removal of casing. Dolphin exclusion zone of 250m radius should be implemented in marine pier sites of HKLR located in the waters to the west of Airport during the installation of bored pile casing (i.e. the open sea part of the marine section of HKLR). Works will be suspended when any Chinese White Dolphin (CWD) is found within the exclusion zone. After the bored piling casing is installed, all the subsequent works will be conducted inside the casing (a small and completely confined area), and a dolphin exclusion zone is not required.

10.2.13 Temporal suspension of installation of bored pile casing at marine pier sites – Marine bored piling involves the installation of a temporary steel casing, excavation within the casing, concrete filling into the casing and removal of casing. The installation of the bored pile casing would be relatively disturbing as steel casing will be drilled into the rock below seabed. For the marine bored piles at HKLR Marine Section Open Sea Part, i.e. to the west of Airport Island, installation of steel casing into rock socket will be suspended during May and June (i.e. the peak months of the dolphin calving season).

2) Sheet piling

10.2.14 Vibratory piler for installation of sheet piling – Sheet piling into the soft seabed sediment (i.e. not requiring to drill onto rock surface) is required along the northern edge of HKBCF reclamation for protecting the reclamation site from water current. To minimize the acoustic disturbance to Chinese White Dolphin (CWD), sheet piles wall will be driven by using vibratory piler, which is a type of silence piling equipment and the noise generated is anticipated to be minimal.

10.2.15 Dolphin Exclusion Zone – dolphin exclusion zone of 250m radius should be implemented in the northern edge of HKBCF reclamation during the installation of the sheetpile wall. Works will be suspended when any Chinese White Dolphin (CWD) is found within the exclusion zone.

3) Reclamation and Works Vessels

10.2.16 Dolphin Exclusion Zone – dolphin exclusion zone of 250m radius should be implemented in the HKBCF and HKLR reclamation sites during the installation of the perimeter silt curtains and any re-deployment of the perimeter silt curtains. Works will be suspended when any Chinese White Dolphin (CWD) is found within the exclusion zone.

10.2.17 Dolphin Watching Plan - A dolphin watching plan for works areas will also be included in the EM&A programme. For reclamation sites, once the perimeter silt curtains are installed or re-deployed, the dredging and filling works would be conducted inside the silt curtains and a dolphin exclusion zone is not needed. Instead a dolphin watching plan will be performed. The plan would include regular inspection of the silt curtains, scanning of the waters surrounded by the curtains, and an action plan should be devised to cope with any unpredicted

incidents such as in case dolphins are found within the waters surrounded by the silt curtains. Similarly, at marine pier sites the dredging and concreting works could be conducted inside the bored pile casing after its installation. A dolphin watching plan will replace the dolphin exclusion zone after the casing is installed.

10.2.18 Acoustic decoupling of compressors and other equipment – Air compressors and other noisy equipment that must be mounted on construction vessels will be acoustically-decoupled to the greatest extent feasible, for instance by using rubber air-filled tires.

Marine Traffic

10.2.19 Vessel speed limit control – It is known that fast-moving vessels are a threat to dolphins and porpoises, a speed limit of 10 knots will be strictly enforced within the work areas. This speed limit for vessels within the boundaries of the Sha Chau/Lung Kwu Chau Marine Park appears to be effective in protecting the dolphins from vessel collisions.

10.2.20 Skipper training – Captains of construction vessels working in the West Lantau waters and near the Brothers Islands should undergo training to learn about local dolphins and porpoises. They should be trained to be aware of the protocol for "dolphin friendly" vessel operation (reference made to Code of Conduct for Dolphin Watching Activities available from AFCD).

10.2.21 Predefined and regular routes for working vessels – Captains of all working vessels should be required to use regular travel routes, in order to minimize the chance of vessel collision. And the routes would not go through the dolphin hotspot in Brothers Islands.

Road Surface Runoff

10.2.22 Silt-grease traps should be deployed to prevent a direct input of road surface runoff to the marine waters.

Chemical spillage

10.2.23 A Maritime Oil Spill Response Plan (MOSRP) has been developed by Marine Department to deal with oil spill and their potential hazard to the Hong Kong waters. The main objective of the MOSRP is to ensure a timely and effective response to oil spillages and/or their potential treats in the Hong Kong waters.

10.2.24 Similar to the Shenzhen Western Corridor project, a contingency plan will be formulated to deal with the accidental event of the serious spillage of oil or other harmful chemicals. A contingency plan in this regard will be primarily for safety issues and water quality, but could also help to safeguard the dolphin population. Following the example of Shenzhen Western Corridor, it will be specified in the contingency plan that AFCD must be alerted by the Hong Kong Police Force or Fire Service Department in case an accident of spillage of chemical or oil is reported.

Precautionary/Enhancement Measures

10.2.25 Pre-construction dive survey for corals – As a precautionary measure, a dive survey will be conducted (see **Figure 4**) at the marine pier sites nearest to intertidal zone (i.e. the pier sites to the west and to the east of the headland to be spanned over in Sha Lo Wan, and the pier site just offshore to the actual landing point on Airport Island) and along the shore of the HKLR reclamation site, prior to marine construction works in these three locations, to identify any coral colonies suitable for translocation, taking into account the conservation value, the health status and the translocation feasibility. A detailed translocation plan will be prepared if corals (including hard corals, soft corals and octocorals) of conservation importance, in good conditions, and feasible for translocation are identified during the survey.

10.2.26 Provision of Additional Artificial Reefs - In addition to the replacement Artificial Reefs mentioned above, additional Artificial Reefs will also be deployed at the same time as compensation to the marine habitat loss. Areas that currently are

protected or are restricted would be suitable for deploying the new ARs (both replacement ARs and additional ARs), such as the Sha Chau and Lung Kwu Chau Marine Park or the proposed potential marine park in Fan Lau after its designation, would be possible options for deploying the new ARs. While the replacement ARs would be of the same volume of the existing ARs (i.e. 3,600 m3), the additional ARs should have at least two times the volume as the existing ARs (i.e. 7,200 m^3).

10.2.27 Fish Fry Release in Artificial Reefs - Fish fry release will be conducted at the new ARs (both replacement ARs and additional ARs) as well as the existing ARs in Sha Chau and Lung Kwu Chau Marine Park, to enhance the fish resources in the Western Hong Kong waters. The frequency and quantities of the fish fry to be released will be proposed and agreed by AFCD.

10.3 Monitoring and Audit for Ecology

10.3.1 An ecological monitoring and audit programme would be needed for the Project HKLR and HKBCF developments. The monitoring programme will include monitoring of physical parameters such as air, noise and water quality, and ecological aspects such as CWD and mudflats. The ecological monitoring and audit programme will monitor potential impacts through construction and operation activities, and will verify the assessments which were made in the EIA report. The monitoring includes the following tasks:

10.3.2 Dolphin monitoring – A dolphin monitoring programme at North Lantau and West Lantau waters, in particular the dolphin sighting hotspots (e.g. Brothers Islands) and areas where juveniles have been sighted (e.g. West Lantau waters), should be set up to verify the predictions of impacts and to ensure that there are no unforeseen impacts on the dolphin population during construction phase. The monitoring period should cover the pre-construction phase (baseline conditions), the entire period of construction phase (tentatively 2010 – 2016), and at least one year after the completion of construction works.

10.3.3 Construction-phase underwater noise monitoring – The noise level of the bored piling is known to be much lower than that of the percussive piling. The underwater noise level of bored piling will be monitored during the implementation in Airport Channel for HKLR. This monitoring is to verify the assessment outcome and to collect field data of this construction activity.

10.3.4 Dolphin behaviour monitoring – The acoustic behaviour and movement near the bored piling sites of CWD should be monitored during bridge construction.

10.3.5 Land-based dolphin behaviour and movement monitoring – Land-based theodolite tracking to study dolphin behaviour near bored piling work site, and examine their north-south movement across the bridge alignment before, during and after bridge construction.

10.3.6 Mudflat monitoring – A monitoring programme on the intertidal soft shore habitats on north Lantau coastlines, in San Tau and Tung Chung Bay where horseshoe crab juveniles and seagrass beds have been sighted, should be set up to verify the predictions of impacts. The monitoring period should cover the pre-construction phase (baseline conditions), the entire period of construction phase, and after the completion of construction works. The monitoring should cover the water quality, sedimentation rate, horseshoe crab population, seagrass beds, and soft shore intertidal communities. The survey methodology should make reference to previous intertidal soft shore surveys/monitoring (e.g. the seagrass bed monitoring in Shenzhen Western Corridor, and the territory-wide horseshoe crab study by Shin *et al*. 2007. Conservation of Horseshoe Crabs in Hong Kong – Final Report (ECF Project 12/2003)).

10.3.7 Each of the above ecological monitoring surveys shall be undertaken by suitably qualified specialist(s), (i.e. dolphin specialist, bio-acoustician and intertidal ecologist), who shall have sufficient (at least 5-10 years) relevant post-graduate experience and publication in the respective aspects. Approval on the specialist(s)

responsible for each ecological monitoring survey shall be sought from AFCD and EPD.

10.4 Monitoring Locations

10.4.1 Dolphin monitoring – the dolphin monitoring should adopt line-transect vessel survey method, and cover the following line-transect survey areas as in AFCD annual marine mammal monitoring programme:

- Northeast Lantau survey area;
- Northwest Lantau survey area; and
- West Lantau survey area.

10.4.2 Construction-phase underwater noise monitoring –The actual underwater noise level of bored piling will be monitored during the pile construction in the waters to the west of the Airport for HKLR.

10.4.3 Land-based dolphin movement and behaviour monitoring – The behaviour near the bored piling sites and north-south movement across the bridge alignment of CWD should be monitored in the waters to the west of Airport.

10.4.4 Mudflat monitoring – the monitoring will be conducted on the intertidal soft shore habitats in San Tau and Tung Chung Bay where horseshoe crab juveniles and seagrass beds have been sighted.

10.4.5 Pre-construction dive survey for corals – the survey will be conducted for about 2 to 3 weeks at the following locations (see **Figure 10.4**) :

(a) the pier sites to the west and to the east of the headland to be spanned over in Sha Lo Wan;

(b) the pier site just offshore to the actual landing point on Airport Island); and

(c) along the shore of the HKLR reclamation site.

10.5 Baseline Monitoring for Ecology

10.5.1 Baseline for dolphin monitoring shall be established by two surveys per month in each survey area stated in Section 10.4.1 for a period of three months prior to the commencement of works and agreed with AFCD. The purpose of the baseline monitoring is to establish pre-construction conditions prior to the commencement of the works and to demonstrate the suitability of the proposed monitoring method.

10.5.2 Baseline for underwater noise shall be established prior to the commencement of works in the waters to the west of Airport, and agreed with AFCD.

10.5.3 Baseline for dolphin north-south movement across the bridge alignment shall be established prior to the commencement of works and agreed with AFCD.

10.5.4 Baseline for mudflat ecology shall be established prior to the commencement of works and agreed with AFCD.

10.5.5 As this project will last for a few years, the ET Leader should seek approval from the IEC, AFCD and EPD on an appropriate methodology and parameters to be recorded. A detailed ecological monitoring plan with specification and detailed methodology will be prepared prior to the baseline monitoring, and submitted to AFCD and EPD for approval.

10.6 Impact Monitoring for Ecology

10.6.1 Dolphin monitoring will be conducted twice a month in each survey area stated in Section 10.4.1 throughout the entire construction period.

10.6.2 Construction-phase underwater noise monitoring will be conducted for 10 days from the start of the bored piling activities for the first three pier sites during the bored piling process in the first three sites in the waters to the west of Airport.

10.6.3 Dolphin behaviour in response to bored piling and movement near the bored piling sites will be monitored at the three pier sites for 30 days from the start of bored piling activities in the waters to the west of Airport.

10.6.4 If the impact monitoring results indicate that the density or the distribution pattern of CWD has changed, the ET should inform AFCD and investigate the possible causes of the change. Appropriate actions should be recommended and additional mitigation measures should be implemented as necessary. The monitoring results should be made available within a reasonable short period to be agreed with the EPD, ER and IEC.

10.6.5 Mudflat monitoring will be conducted quarterly during the construction period. If the impact monitoring results indicate that the density or the distribution pattern of intertidal fauna and seagrasses has changed, the ET should inform AFCD and investigate the possible causes of the change. Appropriate actions should be recommended and additional mitigation measures should be implemented as necessary. The monitoring results should be made available within a reasonable short period to be agreed with the EPD, ER and IEC.

10.7 Post-construction Monitoring for Ecology

10.7.1 The dolphin monitoring and mudflat ecological monitoring will be conducted in the post-construction phase at least for 2 year after completion of construction.

10.8 Event and Action Plan

10.8.1 The Action and Limit levels and event-action plan for ecology are not determined in this manual but will be proposed by Ecologist or respective specialists of the Environmental Team based upon the baseline monitoring data, and agreed by AFCD and EPD.

11 FISHERIES

11.1 Summary

11.1.1 The EIA report identified and assessed the potential impacts related to fisheries and marine culture.

11.1.2 The water quality monitoring and audit requirements are included in ***Section 9 Water Quality***.

11.1.3 As mentioned in the EIA report, no further monitoring and audit for fisheries are required.

12 CULTURAL HERITAGE

12.1 Summary

12.1.1 The marine archaeology investigation has concluded that there is no underwater cultural heritage within the study area. No adverse impact on marine archaeological is anticipated. Hence, further investigation or mitigation measure is not required.

12.1.2 The HKBCF is located in the waters to be north-east of the Airport. It would not have any impacts on known built heritage and archaeological site. Mitigation measure is not required for built heritage and terrestrial archaeology.

13 HAZARD TO LIFE

13.1 Summary

13.1.1 The HKBCF is a newly reclaimed site, it is anticipated that blasting work will not be required during construction of the HKBCF. Therefore no explosives QRA is required and hence no mitigation measure is required.

14 LANDSCAPE & VISUAL IMPACT

14.1 Introduction

14.1.1 The EIA has recommended landscape and visual mitigation measures (refer to Section 14 of EIA Report) to be undertaken during both the construction and operation phases of the project. This section outlines the monitoring and audit of these measures.

14.2 Monitoring Details

14.2.1 The design, implementation and maintenance of landscape mitigation measures should be checked to ensure that any potential conflicts between the proposed landscape measures and any other works of the project would be resolved as early as practical without affecting the implementation of the mitigation measures.

Table 14.1 Monitoring Programme

Stage	Monitoring Task	Monitoring Report	Form of Approval	Frequency
Detailed Design	Checking of design works against the recommendations of the landscape and visual impact assessments within the EIA should be undertaken during detailed design phase, to ensure that they fulfil the intention of the mitigation measures. Any changes to the design, including design changes on site should also be checked.	Not Required	Not Required	At the end of the Detailed Design Phase
Construction	Checking of the contractor's operations during the construction period.	Report on Contractor's compliance, by ET*	Counter-signature of report by IEC	Bi-weekly
Establishment Works	Checking of the planting works during the 12-month Establishment Period after completion of the construction works.	Report on Contractor's compliance, by ET	Counter-signature of report by IEC	Every 2 months
Long Term Management (10 year)	Monitoring of the long-term management of the planting works in the period up to 10 years after completion of the construction works.	Report on compliance by ET or Maintenance Agency as appropriate	Counter-signature of report by Managemen t Agency	Annually

Notes:
- Environmental Team (ET) – employed by the Contractor;
- Environmental Permit (EP).

Detailed Design Phase

14.2.2 The mitigation measures, which are proposed in the EIA to mitigate the landscape and visual impacts, should be embodied into the detailed engineering design, landscape design drawings and contract documents. The Detailed Design should be checked to ensure that the measures are fully incorporated. Potential conflicts with civil engineering, geotechnical, structural, lighting, signage, drainage and underground utilities should resolved as early as practical.

14.2.3 The following mitigation measures are proposed to avoid and reduce the identified impacts.

- Minimize the footprint of project and that the quantity of landscape character units and landscape resources affected;
- Minimize temporary works areas for construction works;
- Undertaking good site practices by applying hydroseeding on temporary stockpiles and reclamation areas;
- Conservation of topsoil for reuse;
- Waste limitation by recycling of felled trees into woodchip mulch for use in landscaped areas.

14.2.4 The following design measures will be developed during detailed design stage to remedy and compensate unavoidable impacts:

- Roadside planting and planting along the edge of the reclamation is proposed;
- Transplanting of mature trees in good health and amenity value where appropriate and reinstatement of areas disturbed during construction by compensatory hydro-seeding and planting;
- Protection measures for the trees to be retained during construction activities;
- Optimizing the sizes and spacing of the bridge columns;
- Fine-tuning the location of the bridge columns to avoid visually-sensitive locations;
- Aesthetic design of the bridge form and its structural elements for HKLR, e.g. parapet, soffit, columns, lightings and so on;
- Considering the decorative urban design elements for HKLR, e.g. decorative road lightings;
- Maximizing new tree, shrub and other vegetation planting to compensate tree felled and vegetation removed;
- Providing planting area around peripheral of HKLR and HKBCF for tree planting screening effect;
- Providing salt-tolerant native trees along the planter strip at affected seawall and newly reclaimed coastline.
- For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonic atmosphere of the HKBCF.
- Fine-tuning the sizes of the structural members to minimize the bulkiness of buildings and adjustment of building arrangement to minimise disturbance to surrounding vegetation in the HKBCF.
- For HKLR, providing aesthetic design on the viaduct, tunnel portals, at-grade roads and reclamation (e.g. subtle colour tone and slim form for viaduct to minimize the bulkiness of the structure and to blend the viaduct better with the background environment, featured form of tunnel portals, roadside planting along at-grade roads and landscape berm on & planting along edge of reclamation area) to beautify the HKLR alignment (refer to Figure 14.4.3).

14.2.5 The following mitigation measures should be monitored during construction and operation phases:

	Description of Mitigation Measures
During Construction Phase	Mitigate both Landscape and Visual Impacts G1. Grass-hydroseed bare soil surface and stock pile areas. G2. Add planting strip and automatic irrigation system if appropriate at some portions of bridge or footbridge to screen bridge and traffic. G3. For HKLR, providing aesthetic design on the viaduct, tunnel portals, at-grade roads and reclamation (e.g. subtle colour tone and slim form for viaduct, featured form of tunnel portals, roadside planting along at-grade roads and landscape berm on & planting along edge of reclamation area) to beautify the HKLR alignment. G4. For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonic atmosphere of the HKBCF (see Figure 14.3.1 for example). G5. Vegetation reinstatement and upgrading to disturbed areas. G6. Maximize new tree, shrub and other vegetation planting to compensate tree felled and vegetation removed. G7. Provide planting area around peripheral of and within HKBCF and HKLR for tree screening buffer effect. G8. Plant salt tolerant native tree and shrubs etc along the planter strip at affected seawall. G9. Reserve of loose natural granite rocks for re-use. Provide new coastline to adopt "natural-look" by means of using armour rocks in the form of natural rock materials and planting strip area accommodating screen buffer to enhance "natural-look" of the new coastline (see Figure 14.4.2 for example).
	Mitigate Visual Impacts V1.Minimize time for construction activities during construction period. V2.Provide screen hoarding at the portion of the project site / works areas / storage areas near VSRs who have close low-level views to the Project during HKLR & HKBCF construction.
During Operation Phase	Mitigate both Landscape and Visual Impacts G10. Provide proper planting maintenance on the new planting areas to enhance the aesthetic degree. V3. Lighting design to minimize glare at night. Decorative road lighting to be considered during detailed design stage.

Note:
- Figure 14.3.1 – Landscape Master Plan showing the general arrangement of HKBCF with mitigation. This Plan is preliminary only and subject to further development in detailed design stage.
- Figure 14.4.2 – Details of mitigation measure – G9 for the new coastline.

14.2.6 An implementation programme will be prepared as required by TM-EIAO. Reference will be made to the *ETWB TC(W) No. 2/2004 on Maintenance of Vegetation and Hard Landscape Features* which defines the management and maintenance responsibilities for natural vegetation and landscape works, including both softworks and hardworks, and the authorities for tree preservation and felling. The format of the preliminary arrangement of implementation programme is listed below:

Table 14-17 Proposed format for Preliminary Funding, Implementation, Management and Maintenance Proposal

Mitigation items	Funding & Implementation unit (See Remark)	Maintenance unit (See Remark)
During Construction		
V1 and V2	Project Proponent (i.e. HyD)	The Contractor
G3 and G4	Project Proponent / Initiating Department (e.g. the relevant User Department of the building)	Project Proponent / Initiating Department (e.g. the relevant User Department of the building)
G1, G2, G3, G6, G7, G8 and G9	Project Proponent (i.e. HyD)	HyD / LCSD
During Operation		
V3	Project Proponent (i.e. HyD)	HyD
G10	Project Proponent (i.e. HyD)	HyD / LCSD

Note: The proposed mitigation measures and arrangements are tentative. The responsible parties are also tentative and subject to further agreements amongst the Government Departments.

Construction Phase & Establishment Period

14.2.7 The implementation of landscape construction works and subsequent maintenance operations during the 12-month Establishment Period must be supervised by qualified Landscape Resident Site Staff (Registered Landscape Architect or Professional Member of the Hong Kong Institute of Landscape Architects).

14.2.8 Measures to mitigate landscape and visual impacts during construction should be checked to ensure compliance with the intended aims of the measures.

14.2.9 The progress of the engineering works shall be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.

Long Term Management (10 Years)

14.2.10 The planting works shall be monitored during the first 10 years of the operation phase of the project. Any areas of vegetation which is failed to establish, should be corrected by the relevant maintenance parties at the earliest opportunity. The maintenance requirement of the planting works stated under the 10-Year Management Programme is included in the monitoring requirement.

14.3 Baseline Monitoring

14.3.1 A photographic record of the site at the time of the contractor's possession of the site shall be prepared by the Contractor and approved by the ER. The approved photographic record shall be submitted to the Project Proponent, ET, IEC and EPD for record.

14.4 Action Plan for Landscape and Visual Works

Table 14.2 Action Plan

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Conflicts occur	• Check Contractor's proposed remedial design conforms to the requirements of EP and prepare checking report(s)	• Check and endorse ET's report(s) • Check and certify Contractor's proposed remedial design	• Supervise the Contractor to carry out the proposed remediation work	• Propose remedial design and carry out the proposed work

15 SITE ENVIRONMENTAL AUDIT

15.1 Site Inspection

15.1.1 Site inspection provides a direct means to initiate and enforce specified environmental protection and pollution control measures. These shall be undertaken routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.

15.1.2 The ET Leader shall be responsible for formulating the environmental site inspection, the deficiency and action reporting system, and for carrying out the site inspection works. Within 21 days of the construction contract commencement, he shall submit a proposal for site inspection and deficiency and action reporting procedures to the Contractor for agreement, and to the ER for approval. The ET's proposal for rectification would be made known to the IEC.

15.1.3 Regular site inspections shall be carried out at least once per week. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situations outside the works area which is likely to be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the inspection:

(i) EIA recommendations on environmental protection and pollution control mitigation measures;

(ii) works progress and programme;

(iii) individual works methodology proposals (which shall include proposal on associated pollution control measures);

(iv) contract specifications on environmental protection;

(v) relevant environmental protection and pollution control laws; and

(vi) previous site inspection results.

15.1.4 The Contractor shall keep the ET Leader updated with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the IEC and the Contractor within 1 working day. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.

15.1.5 Ad-hoc site inspections shall also be carried out if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

15.2 Compliance with Legal and Contractual Requirements

15.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.

15.2.2 In order that the works comply with the contractual requirements, all works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to ensure sufficient environmental protection and pollution control measures have been included. The implementation schedule of mitigation measures is summarised in **Appendix B.**

15.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating laws can be prevented.

15.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licence / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary shall also be available for the ET Leader's inspection upon his request.

15.2.5 After reviewing the document, the ET Leader shall advise the IEC and Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence / permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and the ER accordingly.

15.2.6 Upon receipt of the advice, the Contractor shall undertake immediate actions to correct the situation. The ER shall follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

15.3 Environmental Complaints

15.3.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any complaint:

(i) log complaint and date of receipt onto the complaint database and inform the IEC immediately;

(ii) investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;

(iii) identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;

(iv) advise the Contractor if mitigation measures are required;

(v) review the Contractor's response to identified mitigation measures, and the updated situation;

(vi) if the complaint is transferred from the EPD, submit interim report to the EPD on status of the complaint investigation and follow-up action within the time frame assigned by the EPD;

(vii) undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;

(viii) report investigation results and subsequent actions to complainant (if the source of complaint is EPD, the results should be reported within the timeframe assigned by the EPD); and

(ix) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

16 REPORTING

16.1 General

16.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted on diskettes or other approved media. The formats for air quality, noise and water quality monitoring data to be submitted shall be separately agreed.

16.1.2 The ET is responsible for establishing and maintaining a dedicated website throughout the entire construction period for publishing the all the relevant environmental monitoring data (including but not limited to the baseline and impact monitoring). The ET shall propose the format and functionality of the website for agreement with the ER and IEC prior to publishing of data. Once the monitoring data are available (eg noise, dust, water quality etc) and vetted by the IEC, the ET is responsible to upload the relevant data to the dedicated website.

16.1.3 Types of reports that the ET Leader shall prepare and submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be made available to the Director of Environmental Protection.

16.2 Baseline Monitoring Report

16.2.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, the ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format shall be agreed with the EPD prior to submission.

16.2.2 The baseline monitoring report shall include at least the following:

(i) up to half a page executive summary;

(ii) brief project background information;

(iii) drawings showing locations of the baseline monitoring stations;

(iv) monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations;
- monitoring date, time, frequency and duration; and
- quality assurance (QA) / quality control (QC) results and detection limits;

(v) details of influencing factors, including:

- major activities, if any, being carried out on the site during the period;
- weather conditions during the period; and
- other factors which might affect results;

(vi) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if

there is any significant difference between control and impact stations for the parameters monitored;

(vii) revisions for inclusion in the EM&A Manual; and

(viii) comments, recommendations and conclusions.

16.3 Monthly EM&A Reports

16.3.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due the month after construction commences. Each monthly EM&A report shall be submitted to the following parties: the Contractor, the IEC, the ER and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

16.3.2 The ET leader shall review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

First Monthly EM&A Report

16.3.3 The first monthly EM&A report shall include at least the following:

(i) Executive summary (1-2 pages):

- breaches of Action and Limit levels;
- complaint log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

(ii) Basic project information:

- project organisation including key personnel contact names and telephone numbers;
- programme;
- management structure, and
- works undertaken during the month.

(iii) Environmental status:

- works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc); and
- drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).

(iv) A brief summary of EM&A requirements including:

- all monitoring parameters;
- environmental quality performance limits (Action and Limit levels);
- Event-Action Plans;
- environmental mitigation measures, as recommended in the project EIA study final report; and
- environmental requirements in contract documents.

(v) Implementation status:

- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA.

(vi) Monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations;
- monitoring date, time, frequency, and duration;
- weather conditions during the period;
- any other factors which might affect the monitoring results; and
- QA/QC results and detection limits.

(vii) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(viii) Others

- an account of the future key issues as reviewed from the works programme and work method statements;
- advice on the solid and liquid waste management status; and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

Subsequent EM&A Reports

16.3.4 Subsequent monthly EM&A reports shall include the following:

(i) Executive summary (1 - 2 pages):

- breaches of Action and Limit levels;
- complaints log;
- notifications of any summons and successful prosecutions;

- reporting changes; and
- future key issues.

(ii) Basic project information:

- project organisation including key personnel contact names and telephone numbers;
- programme;
- management structure; and
- work undertaken during the month.

(iii) Environmental status:

- works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(iv) Implementation status:

- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA.

(v) Monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations;
- monitoring date, time, frequency, and duration;
- weather conditions during the period;
- any other factors which might affect the monitoring results; and
- QA / QC results and detection limits.

(vi) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(vii) Others

- an account of the future key issues as reviewed from the works programme and work method statements;
- advice on the solid and liquid waste management status; and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

(viii) Appendices

- Action and Limit levels;
- graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
  a) major activities being carried out on site during the period;
  b) weather conditions during the period; and
  c) any other factors that might affect the monitoring results.
- monitoring schedule for the present and next reporting period;
- cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

16.4 Quarterly EM&A Summary Reports

16.4.1 A quarterly EM&A summary report of around 5 pages shall be produced and shall contain at least the following information:

(i) Executive summary (1 - 2 pages);

(ii) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;

(iii) A brief summary of EM&A requirements including:

- monitoring parameters;
- environmental quality performance limits (Action and Limit levels); and
- environmental mitigation measures, as recommended in the project EIA Final Report;

(iv) Advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Final Report, summarised in the updated implementation schedule;

(v) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(vi) Graphical plots of any trends in monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- the major activities being carried out on site during the period;
- weather conditions during the period; and
- any other factors which might affect the monitoring results;

(vii) Advice on the solid and liquid waste management status;

(viii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(ix) A brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;

(x) A summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance;

(xi) A summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

(xii) Comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and

(xiii) Project Proponent's contacts and any hotline telephone number for the public to make enquiries.

16.5 Final EM&A Review Reports

16.5.1 The final EM&A report should contain at least the following information:

(i) Executive summary (1 - 2 pages);

(ii) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(iii) Basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;

(iv) A brief summary of EM&A requirements including:

- environmental mitigation measures, as recommended in the project EIA Report;
- environmental impact hypotheses tested;
- environmental quality performance limits (Action and Limit levels);
- all monitoring parameters;
- Event-Action Plans;

(v) A summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Report, summarised in the updated implementation schedule;

(vi) Graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project, including the post-project monitoring for all monitoring stations annotated against:

- the major activities being carried out on site during the period;
- weather conditions during the period; and
- any other factors which might affect the monitoring results;

(vii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(viii) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;

(ix) A description of the actions taken in the event of non-compliance;

(x) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

(xi) A summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislation, locations and nature of the breaches, investigation follow-up actions taken and results;

(xii) A review of the validity of EIA predictions and identification of shortcomings in EIA recommendations;

(xiii) Comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme); and

(xiv) Recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

16.6 Data Keeping

16.6.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in magnetic media form, and the software copy must be available upon request. Data format shall be agreed with EPD. All documents and data shall be kept for at least one year following completion of the construction contract.

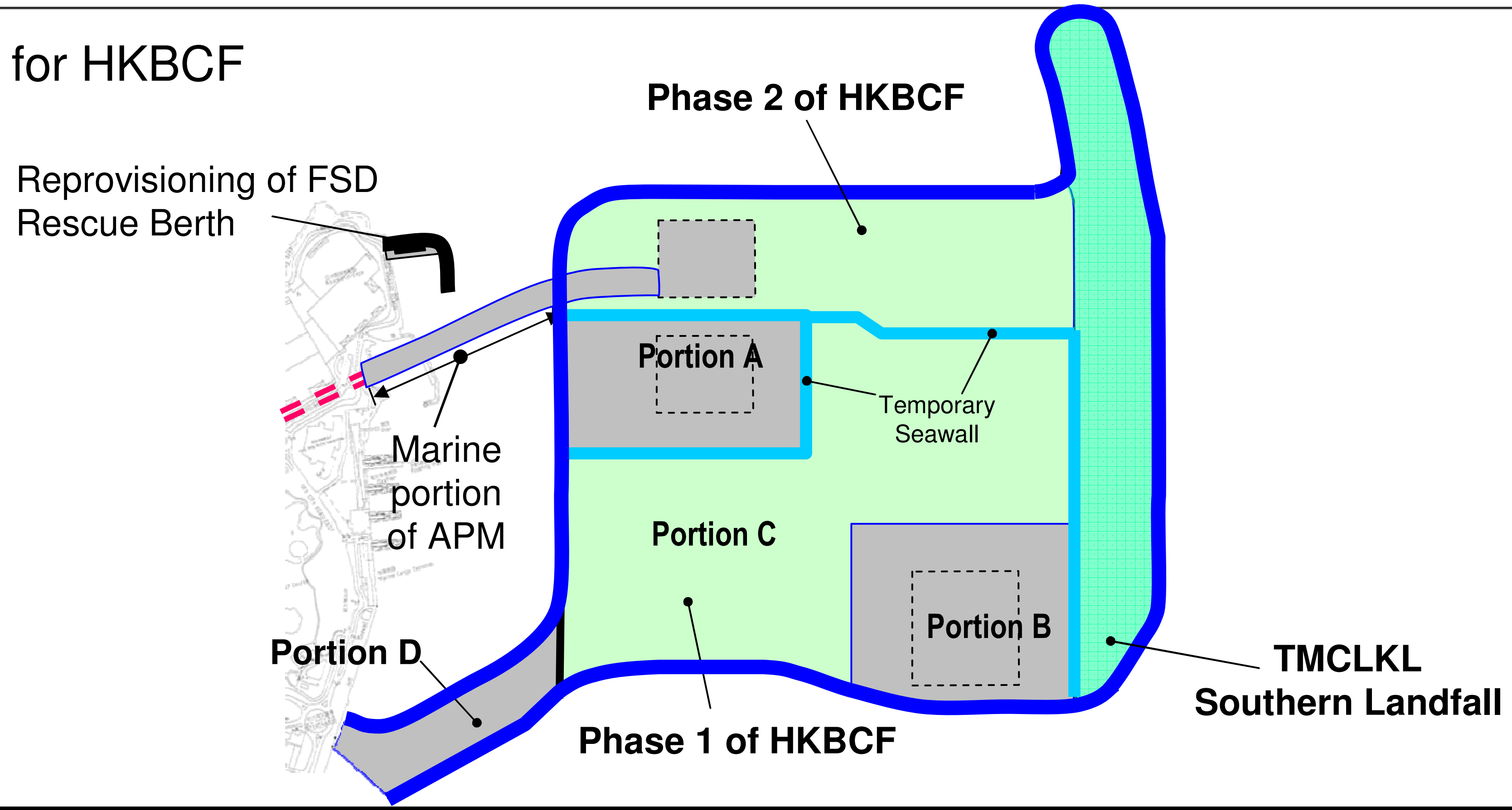
16.7 Interim Notifications of Environmental Quality Limit Exceedances

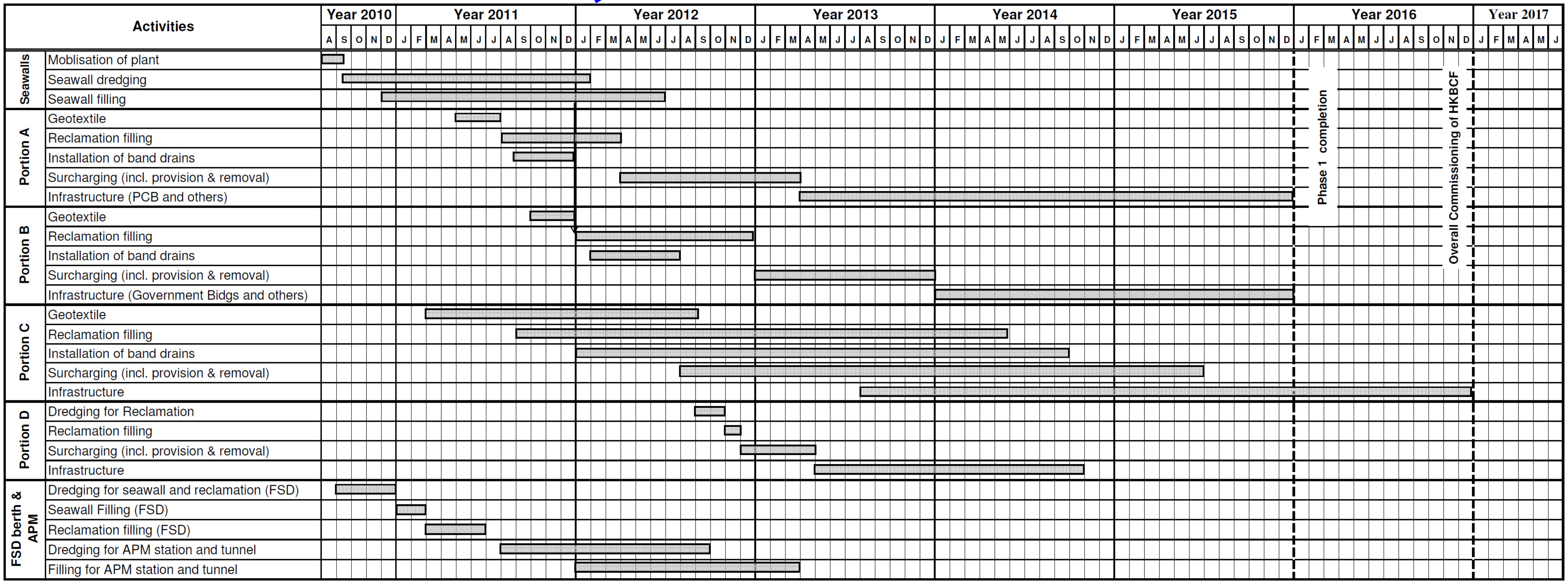
16.7.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IEC and EPD, as appropriate. The notification shall be followed up with advice to IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notifications is presented in **Appendix F.**

APPENDIX A

Tentative Construction Programme

Tentative Programme for HKBCF





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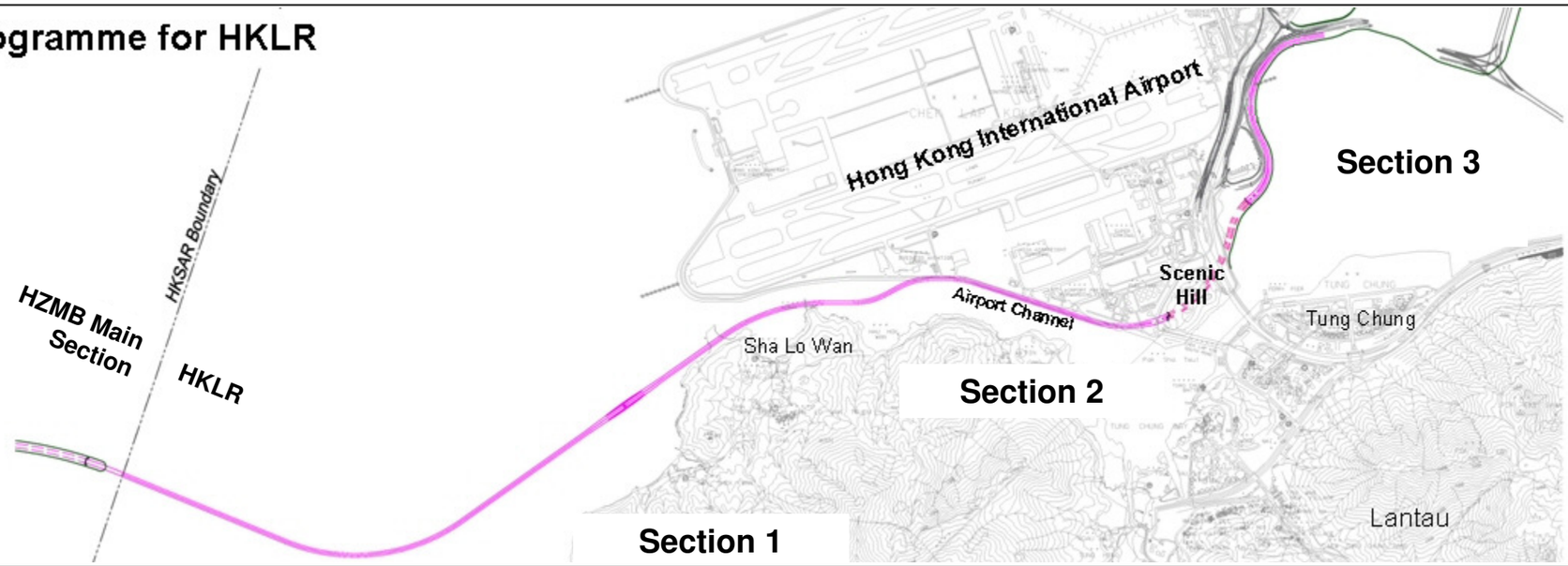
Hong Kong Project Management Office

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

Drawing Title
Tentative Programme for HKBCF

Drawing No.
Figure A1

Tentative Programme for HKLR



	Activities	Year 2010					Year 2011										Year 2012										Year 2013										Year 2014										Year 2015					
		A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Section 1	Design + GI works																																																				
	Pile foundation + pile cap																																																				
	Superstructure of viaduct																																																				
Section 2	Design + GI works																																																				
	Pile foundation + pile cap																																																				
	Superstructure of viaduct																																																				
Section 3	Design + GI works																																																				
	Dredging for seawall (Portion 1)																																																				
	Filling for seawall (Portion 1)																																																				
	Dredging for Reclamation (Portion 1)																																																				
	Geotextile (Portion 1)																																																				
	Installation of band drains (Portion 1)																																																				
	Filling for Reclamation (Sandfill - Portion 1)																																																				
	Filling for reclamation (Public fill - Portion 1)																																																				
	Surcharge (Fully-dredged area in Portion 1)																																																				
	Surcharge (Non-dredged area in Portion 1)																																																				
	Dredging for seawall & reclamation (Portions 2 & 3)																																																				
	Filling for seawall & reclamation (Portions 2 & 3)																																																				
	Filling for reclamation (Public fill - Portions 2 & 3)																																																				
	Surcharge (Portions 2 & 3)																																																				
	Tunnel construction (land portion)																																																				
	Tunnel construction (reclamation portion)																																																				
	Construction of at-grade road																																																				

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Drawing Title

Tentative Programme for HKLR

Drawing No.

Figure A2

APPENDIX B

Environmental Mitigation Implementation Schedule

Environmental Mitigation Implementation Schedule – HKBCF & HKLR

Note: Chapters 1 to 4 of the EIA report present the background information of the Project, identified concurrent projects, objectives and scope for various environmental aspects, and description on alternative options and construction description. Chapters 5 to 14 of the EIA report present the EIA findings and mitigation measures are described below with cross-reference to the EIA Report. Chapters 15 & 16 describe the environmental monitoring requirements and conclusion.

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Air Quality							
S5.5.6.1	A1	1) The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Good construction site practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.	Contractor	All construction sites	Construction stage	To control the dust impact to within the HKAQO and TM-EIA criteria (Ref. 1-hr and 24hr TSP levels are 500 μgm^{-3} and 260 μgm^{-3}, respectively)
S5.5.6.2	A2	2) Proper watering of exposed spoil should be undertaken throughout the construction phase: • Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading; • Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads; • A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones. • The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle; • Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;	Good construction site practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.	Contractor	All construction sites	Construction stage	To control the dust impact to within the HKAQO and TM-EIA criteria (Ref. 1-hr and 24hr TSP levels are 500 μgm^{-3} and 260 μgm^{-3}, respectively)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S5.5.6.2	A2	• When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period; • The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials; • Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously; • Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet; • Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding; • Any skip hoist for material transport should be totally enclosed by impervious sheeting; • Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;	Good construction site practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.	Contractor	All construction sites	Construction stage	To control the dust impact to within the HKAQO and TM-EIA criteria (Ref. 1-hr and 24hr TSP levels are 500 μgm^{-3} and 260 μgm^{-3}, respectively)

Environmental Mitigation Implementation Schedule – HKBCF & HKLR

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S5.5.6.2	A2	• Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed; • Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and • Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.	Good construction site practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.	Contractor	All construction sites	Construction stage	To control the dust impact to within the HKAQO and TM-EIA criteria (Ref. 1-hr and 24hr TSP levels are 500 μgm^{-3} and 260 μgm^{-3}, respectively)
S5.5.6.3	A3	3) The Contractor should undertake proper watering on all exposed spoil (with at least 8 times per day) throughout the construction phase.	Control construction dust	Contractor	All construction sites	Construction stage	To control the dust impact
S5.5.6.4	A4	4) Engineer to incorporate the controlled measures into the Particular Specification (PS) for the civil work. The PS should also draw the contractor's attention to the relevant latest Practice Notes issued by EPD.	Control construction dust	Engineer	All construction sites	Design Stage	Air Pollution Control (Construction Dust) Regulation
S5.5.6.4	A5	5) Implement regular dust monitoring under EM&A programme during the construction stage.	Monitor the 24 hr and 1hr TSP levels at the representative dust monitoring stations to ensure compliance with relevant criteria throughout the construction period.	Contractor	Selected representative dust monitoring station	Construction stage	• Air Pollution Control (Construction Dust) Regulation • To control the dust impact to within the HKAQO and TM-EIA criteria (Ref. 1-hr and 24hr TSP levels are 500 μgm^{-3} and 260 μgm^{-3}, respectively)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S5.5.7.1	A6	The following mitigation measures should be adopted to prevent fugitive dust emissions for concrete batching plant: • Loading, unloading, handling, transfer or storage of any dusty materials should be carried out in totally enclosed system; • All dust-laden air or waste gas generated by the process operations should be properly extracted and vented to fabric filtering system to meet the emission limits for TSP; • Vents for all silos and cement/pulverised fuel ash (PFA) weighing scale should be fitted with fabric filtering system; • The materials which may generate airborne dusty emissions should be wetted by water spray system; • All receiving hoppers should be enclosed on three sides up to 3m above unloading point; • All conveyor transfer points should be totally enclosed; • All access and route roads within the premises should be paved and wetted; and • Vehicle cleaning facilities should be provided and used by all concrete trucks before leaving the premises to wash off any dust on the wheels and/or body.	Monitor the 24 hr and 1hr TSP levels at the representative dust monitoring stations to ensure compliance with relevant criteria throughout the construction period.	Contractor	Selected representative dust monitoring station	Construction stage	• Air Pollution Control (Construction Dust) Regulation • To control the dust impact to within the HKAQO and TM-EIA criteria (Ref. 1-hr and 24hr TSP levels are 500 μgm^{-3} and 260 μgm^{-3}, respectively)
S5.5.2.7	A7	The following mitigation measures should be adopted to prevent fugitive dust emissions at barging point: • All road surface within the barging facilities will be paved; • Dust enclosures will be provided for the loading ramp; • Vehicles will be required to pass through designated wheels wash facilities; and • Continuous water spray at the loading points.	Control construction dust	Contractor	All construction sites	Construction stage	Air Pollution Control (Construction Dust) Regulation

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Construction Noise (Air borne)							
S6.4.10	N1	1) Use of good site practices to limit noise emissions by considering the following: • only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme; • machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs; • silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works; • mobile plant should be sited as far away from NSRs as possible and practicable; • material stockpiles, mobile container site officer and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.	Control construction airborne noise by means of good site practices	Contractor	All construction sites	Construction stage	Noise Control Ordinance
S6.4.11	N2	2) Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	Contractor	All construction sites	Construction stage	• Noise Control Ordinance • Annex 5, TM-EIA
S6.4.12	N3	3) Install movable noise barriers (typically density @14kg/m^2), acoustic mat or full enclosure close to noisy plants including air compressor, generators, saw.	Screen the noisy plant items to be used at all construction sites	Contractor	For plant items listed in Appendix 6D of the EIA report at all construction sites	Construction stage	• Noise Control Ordinance • Annex 5, TM-EIA • 75dB(A) for residential premises • The movable barrier should achieve at least 5dB(A) and the full enclosure should be designed to achieve 10dB(A)

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S6.4.13	N4	4) Select "Quiet plants" which comply with the BS 5228 Part 1 or TM standards.	Reduce the noise levels of plant items	Contractor	For plant items listed in Appendix 6D of the EIA report at all construction sites	Construction stage	• Noise Control Ordinance & its TM • Annex 5, TM-EIA
S6.4.14	N5	5) Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All construction sites where practicable	Construction stage	• Noise Control Ordinance • Annex 5, TM-EIA
	N6	6) Implement a noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Contractor	Selected representative noise monitoring station	Construction stage	• Noise Control Ordinance • Annex 5, TM-EIA • 75dB(A) for residential premises
Operational Noise							
S6.8.4	N7	1) The maximum allowable Sound Power Level (SWLs) for the following shall be compiled with during the selection of facility equipment. • Sewage Treatment Plant; • Electric Substation; • Seawater Intake; and • Ventilation Building for the Scenic Hill Tunnel.	Ensure the compliance of operational noise at the sensitive receivers	Engineer	Fixed noise sources	Design stage	• NCO and its TM • TM-EIA
	N8	2) The Engineer shall incorporate the requirements for noise commissioning of fixed plant noise sources in the Particular Specification.	Ensure compliance with relevant requirements	Engineer	Fixed noise sources	Design stage	• NCO and its TM • TM-EIA
Sediment							
S7.3	S1	1) The requirements as recommended in ETWB TC 34/2002 Management of Dredged/Excavated Sediment shall be included in the Particular Specification as appropriate.	Develop sediment disposal arrangement	Engineer	All construction sites	Design stage	• Waste Disposal Ordinance • ETWB TC 34/2002

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Waste Management (Construction Waste)							
S8.3.8	WM1	<u>*Construction and Demolition Material*</u> The following mitigation measures should be implemented in handling the waste: • Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement; • Carry out on-site sorting; • Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate; • Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible; • Implement a trip-ticket system for each works contract to ensure that the disposal of C&D materials are properly documented and verified; and • Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – "Environmental Management on Construction Sites" to encourage on-site sorting of C&D materials and to minimize their generation during the course of construction. • In addition, disposal of the C&D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TC 19/2005

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S8.3.9 - S8.3.11	WM2	*C&D Waste* • Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage. • The Contractor should recycle as much of the C&D materials as possible on-site. Public fill and C&D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different areas of the sites should be considered for such segregation and storage.	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	• Land (Miscellaneous Provisions) Ordinance • Waste Disposal Ordinance • ETWB TC 19/2005
S8.2.12 - S8.3.15	WM3	*Chemical Waste* • Chemical waste that is produced, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. • Containers used for the storage of chemical wastes should be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; have a capacity of less than 450 liters unless the specification has been approved by the EPD; and display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the regulation. • The storage area for chemical wastes should be clearly labelled and used solely for the storage of chemical waste; enclosed on at least 3 sides; have an impermeable floor and bunding of sufficient capacity to accommodate 110% of the volume of the largest container or 20 % of the total volume of waste stored in that area, whichever is the greatest; have adequate ventilation; covered to prevent rainfall entering; and arranged so that incompatible materials are adequately separated.	Control the chemical waste and ensure proper storage, handling and disposal.	Contractor	All construction sites	Construction stage	• Waste Disposal (Chemical Waste) General) Regulation • Code of Practice on the Packaging, Labelling and Storage of Chemical Waste

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
		• Disposal of chemical waste should be via a licensed waste collector; be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Centre which also offers a chemical waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.					
S8.3.16	WM4	*Sewage* • Adequate numbers of portable toilets should be provided for the workers. The portable toilets should be maintained in a state, which will not deter the workers from utilizing these portable toilets. Night soil should be collected by licensed collectors regularly.	Proper handling of sewage from worker to avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	Waste Disposal Ordinance
S8.3.17	WM5	*General Refuse* • General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes. • A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law. • Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible. • Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. In addition, waste separation facilities for paper, aluminum cans, plastic bottles etc., should be provided. • Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including reduction, reuse and recycling of wastes.	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	Waste Disposal Ordinance

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Waste Management (Operational Waste)							
S8.4.3	WM6	<u>*Chemical Waste*</u> The requirements given in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes should be followed in handling of these chemical wastes. A trip-ticket system should be operated in accordance with the Waste Disposal (Chemical Waste) (General) Regulation to monitor all movements of chemical wastes which will be collected by a licensed collector to a licensed facility for final treatment and disposal.	Minimize production of the waste	Operator	All logistic lots	Operational stage	Waste Disposal Ordinance
Water Quality (Construction Phase)							
S9.11.1 – S9.11.1.2	W1	• Mitigation during the marine works to reduce impacts to within acceptable levels have been recommended and will comprise a series of measures that restrict the method and sequencing of dredging/backfilling, as well as protection measures. Details of the measures are provided below and summarised in the Environmental Mitigation Implementation Schedule in EM&A Manual. • Construction of seawalls to be advanced by at least 100-200m before the main reclamation dredging and filling can commence. It should be noted that the protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 9.2 and detailed in Appendix 9D6 of the EIA Report. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TMCLKL northern reclamation; - TMCLKL southern reclamation (after formation of the nips); - Reclamation dredging and filling for Portion B of HKBCF; - Reclamation filling for Portion C of HKBCF;- Reclamation filling for Portion D of HKBCF; Reclamation filling for FSD berth of HKBCF; and - Reclamation dredging and filling for Portion 1 of HKLR;	To control construction water quality	Contractor	During seawall dredging and filling	Construction stage	TM-EIAO

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S9.11.1 – S9.11.1.2	W1	• Export for dredged spoils from NWWCZ avoiding exerting high demand on the disposal facilities in the NWWCZ and, hence, minimise potential cumulative impacts; • For the marine viaducts of HKLR, the bored piling will be undertaken within a metal casing; • A maximum of 30% public fill shall be used for all backfilling below -2.5mPD for the southern reclamation of TMCLKL, HKBCF and HKLR projects; • where public fill is proposed for filling below -2.5mPD, the fine content in the public fill will be controlled to 25%; • silt curtains (cage type) will be applied round all grab dredgers during the HKBCF, HKLR and TMCLKL southern reclamation works; • single layer silt curtains will be applied around all works; • when constructing Portion D of the HKBCF, one side of the seawall crossing the channel should be constructed first and prior to the other works. This would reduce the maximum flow speed across the channel and enhance the effectiveness of other mitigation measures such as silt curtain system; • during the first two months of dredging work for HKBCF and HKLR, the silt-removal efficiency of the silt-curtains shall be verified by examining the results of water quality monitoring points. The water quality monitoring points to be selected for the above shall be those close to the locations of the initial period of dredging work. Details in this regard shall be determined by the ENPO to be established, taking account of the Contractor's proposed actual locations of his initial period of dredging work. • a sheet piled wall shall be constructed north of the HKBCF island ,in order to allow the use of silt curtains during Phase 2 works; and • silt curtain shall be fully maintained throughout the works.	To control construction water quality	Contractor	During seawall dredging and filling	Construction stage	TM-EIAO

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S9.11.1 – S9.11.1.2	W1	In addition, dredging operations should be undertaken in such a manner as to minimise resuspension of sediments. Standard good dredging practice measures should, therefore, be implemented including the following requirements which should be written into the dredging contract. • trailer suction hopper dredgers shall not allow mud to overflow; • use of Lean Material Overboard (LMOB) systems shall be prohibited;	To control construction water quality	Contractor	During seawall dredging and filling	Construction stage	TM-EIAO
S9.11.1 – S9.11.1.2	W1	• mechanical grabs shall be designed and maintained to avoid spillage and should seal tightly while being lifted; • barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material; • any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes; • loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation; • excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved; • adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; • all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; and • the works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site.					

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S9.11.1.3	W2	Land Works General construction activities on land should also be governed by standard good working practice. Specific measures to be written into the works contracts should include: • wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters; • sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided; • storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks; • silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm; • temporary access roads should be surfaced with crushed stone or gravel; • rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities; • measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system; • open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms; • manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers; • discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system;	To control construction water quality	Contractor	During seawall dredging and filling	Construction stage	TM-EIAO

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S9.11.1.3	W2	• all vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit; • wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain; • the section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel; • wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects; • vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for off site disposal; • the contractors shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately; • waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance; • all fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank; and • surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.	To control construction water quality	Contractor	During seawall dredging and filling	Construction stage	TM-EIAO
S9.14	W3	Implement a water quality monitoring programme	Control water quality	Contractor	At identified monitoring location	During construction period	• TM-water • Water Pollution Control Ordinance

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Water Quality (Operation Phase)							
S9.8.3.15	W4	Upon completion of the development, stormwater drainage systems would be completed to collect stormwater generated from the whole area including new roads. Sewage generated from the development would be collected by the sewerage systems for delivery to sewage treatment plant at HKBCF. Additional mitigation measures would not be required.	Control water quality	Scheme designers	Stormwater infrastructure	Operational Stage	• TM-water • Water Pollution Control Ordinance
Ecology (Construction Phase)							
S10.7	E1	• Good site practices to avoid runoff entering woodland habitats in Scenic Hill • Reinstate works areas in Scenic Hill • Avoid stream modification in Scenic Hill	Avoid potential disturbance on habitat of Romer's Tree Frog in Scenic Hill	Designer; Contractor	Scenic Hill	During construction	• TM-water • Water Pollution Control Ordinance
S10.7	E2	• Use closed grab in dredging works. • Install silt curtain during the construction. • Limit dredging and works fronts. • Construct seawall prior to reclamation filling where practicable. • Good site practices • Strict enforcement of no marine dumping. • Site runoff control • Spill response plan	Minimise marine water quality impacts	Contractor	Seawall, reclamation area	During construction	TM-Water
S10.7	E3	• Reprovision of replacement Artificial Reefs (of the same volume as the existing ARs inside Marine Exclusion Zone)	Mitigate water quality impacts on the existing ARs	Project proponent	To be determined	Construction phase or operation phase	
S10.7	E4	• Watering to reduce dust generation; prevention of siltation of freshwater habitats; Site runoff should be desilted, to reduce the potential for suspended sediments, organics and other contaminants to enter streams and standing freshwater	Prevent Sedimentation from Land-based works areas	Contractor	Land-based works areas	During construction	TM-Water
S10.7	E5	• Good site practices, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time	Prevent disturbance to terrestrial fauna and habitats	Contractor	Land-based works areas	During construction	

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S10.7	E6	• Dolphin Exclusion Zone; • Dolphin watching plan	Minimize temporary marine habitat loss impact to dolphins	Contractor	Marine works	During marine works	TM-EIAO
S10.7	E7	• Decouple compressors and other equipment on working vessels • Avoidance of percussive piling • Marine underwater noise monitoring • Temporal suspension of drilling bored pile casing in rock during peak dolphin calving season in May and June; • Handling with care for the installation of sheet piling for reclamation site	Minimise marine noise impacts on dolphins	Contractor	Marine works	During marine works	• TM-EIAO • Marine Park Regulations
S10.7	E8	• Control vessel speed • Skipper training. • Predefined and regular routes for working vessels; avoid Brothers Islands.	Minimise marine traffic disturbance on dolphins	Contractor	Marine traffic	During marine works	• Marine Park Regulations • Code of Conduct for dolphin watching activity
S10.10	E9	• Dolphin vessel monitoring • Mudflat ecological monitoring	Minimise marine traffic disturbance on dolphins	Contractor	North Lantau and West Lantau	Prior to construction, during construction, and 1 year after operation	

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Ecology (Operation Phase)							
S10.7	E10	● Preconstruction dive survey for corals	Minimise impacts on marine ecology	Contractor	The marine pier sites nearest to intertidal zone and along the shore of the HKLR reclamation site	Prior to marine construction works in these locations	
S10.7	E11	● Additional Artificial Reefs	Mitigate marine habitat loss	Project proponent	To be determined	Construction phase or operation phase	
S10.7	E12	● Fish fry release in Artificial Reefs	Mitigate marine habitat loss	Project proponent	To be determined	After deployment of the ARs	
S10.7	E13	● Install silt-grease trap in the drainage system collecting surface runoff	Minimise impacts on marine ecology	Designer	Reclamation area	During construction	TM-Water
S10.7	E14	● Maritime Oil Spill Response Plan (MOSRP); ● Contingency plan.	Minimise impacts on marine ecology	Management	HKLR and HKBCF	During operation	
Fisheries							
S11.7	F1	● Reprovision of replacement Artificial Reefs (of the same volume as the existing ARs inside Marine Exclusion Zone)	Mitigate water quality impacts on the existing ARs	Project proponent	To be determined	Construction phase or operation phase	
S11.7	F2	● Reduce re-suspension of sediments ● Limit dredging and works fronts. ● Good site practices ● Strict enforcement of no marine dumping. ● Spill response plan	Minimise marine water quality impacts	Contractor	Seawall, reclamation area	During construction	TM-Water

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S11.7	F3	● Install silt-grease trap in the drainage system collecting surface runoff	Minimise impacts on marine water quality impacts	Designer	Reclamation area	During construction	TM-Water
S11.7	F4	● Maritime Oil Spill Response Plan (MOSRP); ● Contingency plan.	Minimise impacts on marine water quality impacts	Management	HKLR and HKBCF	During operation	
Landscape & Visual (Detailed Design Phase)							
S14.3.3.1	LV1	General design measures include: • Roadside planting and planting along the edge of the reclamation is proposed; • Transplanting of mature trees in good health and amenity value where appropriate and reinstatement of areas disturbed during construction by compensatory hydro-seeding and planting; • Protection measures for the trees to be retained during construction activities; • Optimizing the sizes and spacing of the bridge columns; • Fine-tuning the location of the bridge columns to avoid visually-sensitive locations; • Aesthetic design of the bridge form and its structural elements for HKLR, e.g. parapet, soffit, columns, lightings and so on; • Considering the decorative urban design elements for HKLR, e.g. decorative road lightings; • Maximizing new tree, shrub and other vegetation planting to compensate tree felled and vegetation removed; • Providing planting area around peripheral of HKLR and HKBCF for tree planting screening effect; .	Minimise visual & landscape impact	Detailed designer	HKLR and HKBCF	Design Stage	

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
S14.3.3.1		• Providing salt-tolerant native trees along the planter strip at affected seawall and newly reclaimed coastline. • For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonic atmosphere of the HKBCF. • • Providing salt-tolerant native trees along the planter strip at affected seawall and newly reclaimed coastline. • For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonic atmosphere of the HKBCF. • Fine-tuning the sizes of the structural members to minimize the bulkiness of buildings and adjustment of building arrangement to minimise disturbance to surrounding vegetation in the HKBCF, • For HKLR, providing aesthetic design on the viaduct, tunnel portals, at-grade roads and reclamation (e.g. subtle colour tone and slim form for viaduct to minimize the bulkiness of the structure and to blend the viaduct better with the background environment, featured form of tunnel portals, roadside planting along at-grade roads and landscape berm on & planting along edge of reclamation area) to beautify the HKLR alignment (refer to Figure 14.4.3).	Minimise visual & landscape impact	Detailed designer	HKLR and HKBCF	Design Stage	

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Landscape & Visual (Construction Phase)							
S14.3.3.3	LV2	Mitigate both Landscape and Visual Impacts G1. Grass-hydroseed bare soil surface and stock pile areas. G2. Add planting strip and automatic irrigation system if appropriate at some portions of bridge or footbridge to screen bridge and traffic. G3. For HKLR, providing aesthetic design on the viaduct, tunnel portals, at-grade roads and reclamation (e.g. subtle colour tone and slim form for viaduct, featured form of tunnel portals, roadside planting along at-grade roads and landscape berm on & planting along edge of reclamation area) to beautify the HKLR alignment. G4. For HKBCF, providing aesthetic architectural design on the related buildings (e.g. similar materials for PCB building facade to Airport buildings, roof planting and subtle materials for other facilities buildings and so on), and the related infrastructure (e.g. parapet planting and transparent cover for elevated footbridges) to provide harmonic atmosphere of the HKBCF (see Figure 14.3.1 for example). G5. Vegetation reinstatement and upgrading to disturbed areas. G6. Maximize new tree, shrub and other vegetation planting to compensate tree felled and vegetation removed. G7. Provide planting area around peripheral of and within HKBCF and HKLR for tree screening buffer effect. G8. Plant salt tolerant native tree and shrubs etc along the planter strip at affected seawall. G9. Reserve of loose natural granite rocks for re-use. Provide new coastline to adopt “natural-look” by means of using armour rocks in the form of natural rock materials and planting strip area accommodating screen buffer to enhance “natural-look” of the new coastline (see Figure 14.4.2 for example).	Minimise visual & landscape impact	Contractor	HKLR and HKBCF	Construction stage	
S14.3.3.3	LV3	<u>Mitigate Visual Impacts</u> V1.Minimize time for construction activities during construction period. V2.Provide screen hoarding at the portion of the project site / works areas / storage areas near VSRs who have close low-level views to the Project during HKLR & HKBCF construction.					

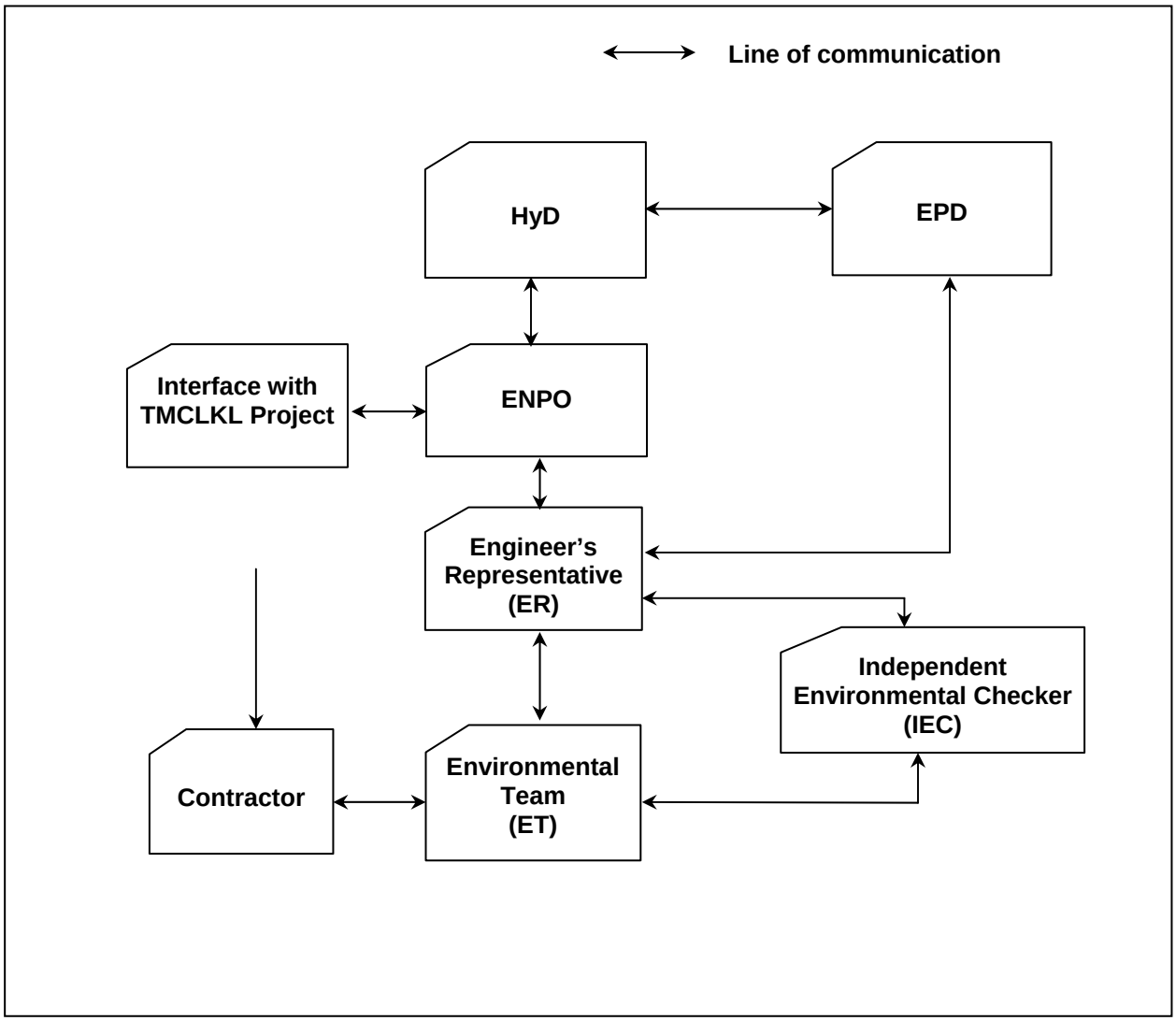
Environmental Mitigation Implementation Schedule – HKBCF & HKLR

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to implement the measures?	What requirements or standards for the measures to achieve?
Landscape & Visual (Operation Phase)							
S14.3.3.3	LV4	<u>Mitigate both Landscape and Visual Impacts</u> G10. Provide proper planting maintenance on the new planting areas to enhance the aesthetic degree.	Minimise visual & landscape impact	Project Proponent	HKLR and HKBCF	Operation stage	
		<u>Mitigate Visual Impacts</u> V3. Lighting design to minimize glare at night. Decorative road lighting to be considered during detailed design stage.					
EM&A							
S15.2.2	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	Control EM&A Performance	Project Proponent	All construction sites	Construction stage	• EIAO Guidance Note No.4/2002 • TM-EIAO
S15.5 - S15.6	EM2	1) An Environmental Team needs to be employed as per the EM&A Manual. 2) Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures. 3) An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&A Manual are fully complied with.	Perform environmental monitoring & auditing	Contractor	All construction sites	Construction stage	• EIAO Guidance Note No.4/2002 • TM-EIAO

APPENDIX C

Project Organisation for Environmental Works

Project Organisation for Environmental Works



APPENDIX D

Sample Data Sheet for Monitoring

Data Sheet for TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (C)	
	Hi (in.)	
	Qsi (Std. m^3)	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (C)	
	Hf (in.)	
	Qsf (Std. m^3)	
Average Flow Rate (Std. m^3)		
Total Volume (Std. m^3)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (µg/m^3)		

	Name & Designation	Signature	Date
Field Operator :			
Laboratory Staff :			
Checked by :			

Noise Monitoring Field Record Sheet

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length(min.)		
Noise Meter Model/Identification		
Calibrator Model/Identification		
Measurement Results	L_{90} (dB(A))	
	L_{10} (dB(A))	
	Leq (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

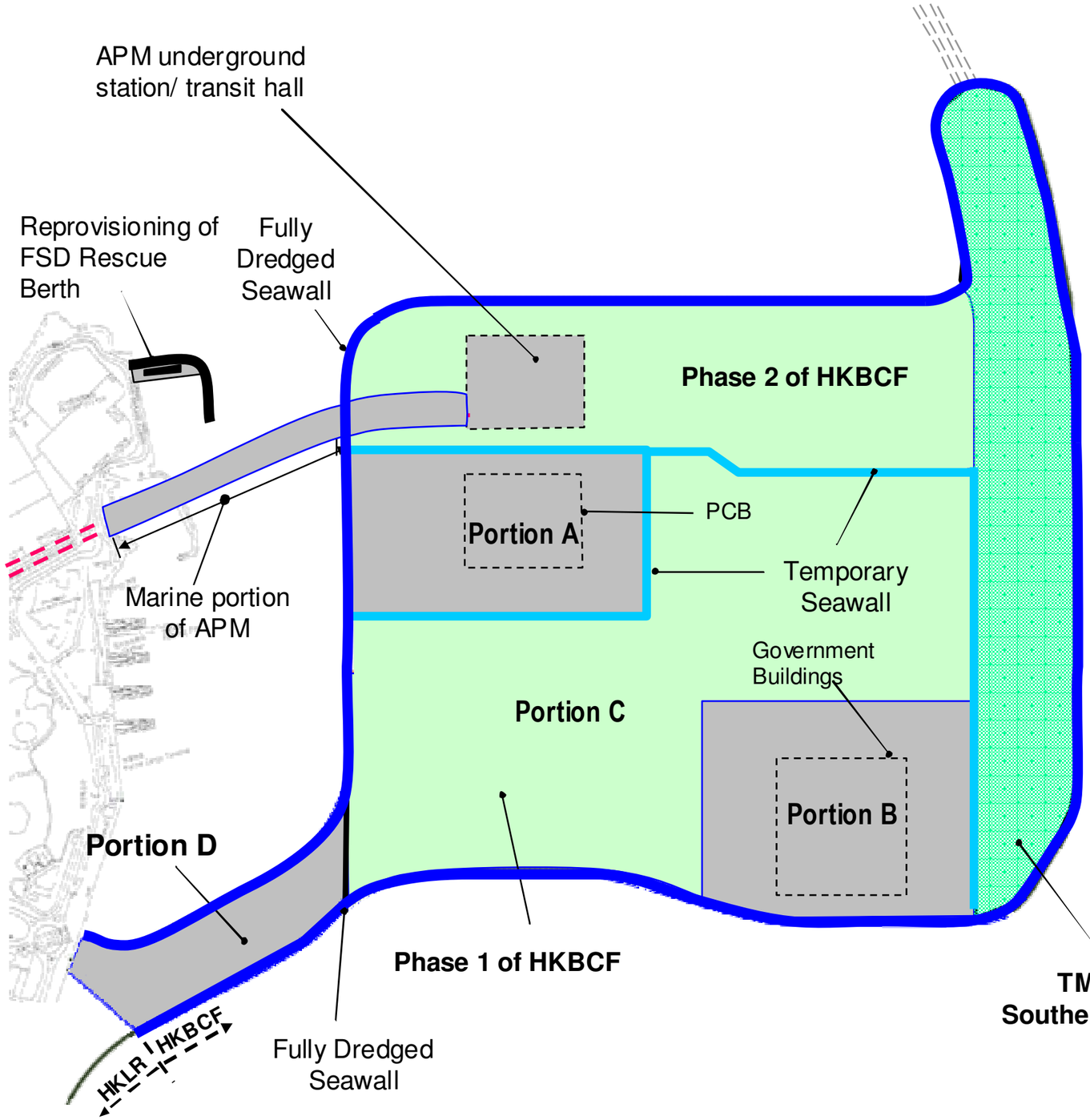
Name & Designation Signature Date

Recorded By :

Checked By :

APPENDIX E1

Typical Arrangement of HKBCF Sequence A



Fully dredged

Non-dredged (with Band Drains)

Fully dredged seawall

Temporary seawall

Phase 1 of HKBCF

Seawall – Fully dredged

Reclamation:
Portion A – Fully dredged
Portion B – Fully dredged
Portion C – Non-dredged (with band drains)
Portion D – Fully dredged
FSD Rescue Berth – Fully dredged

Phase 2 of HKBCF

Seawall – Fully dredged

Reclamation – Non-dredged (with band drains) except the areas at underground APM station and tunnel by fully dredged.

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

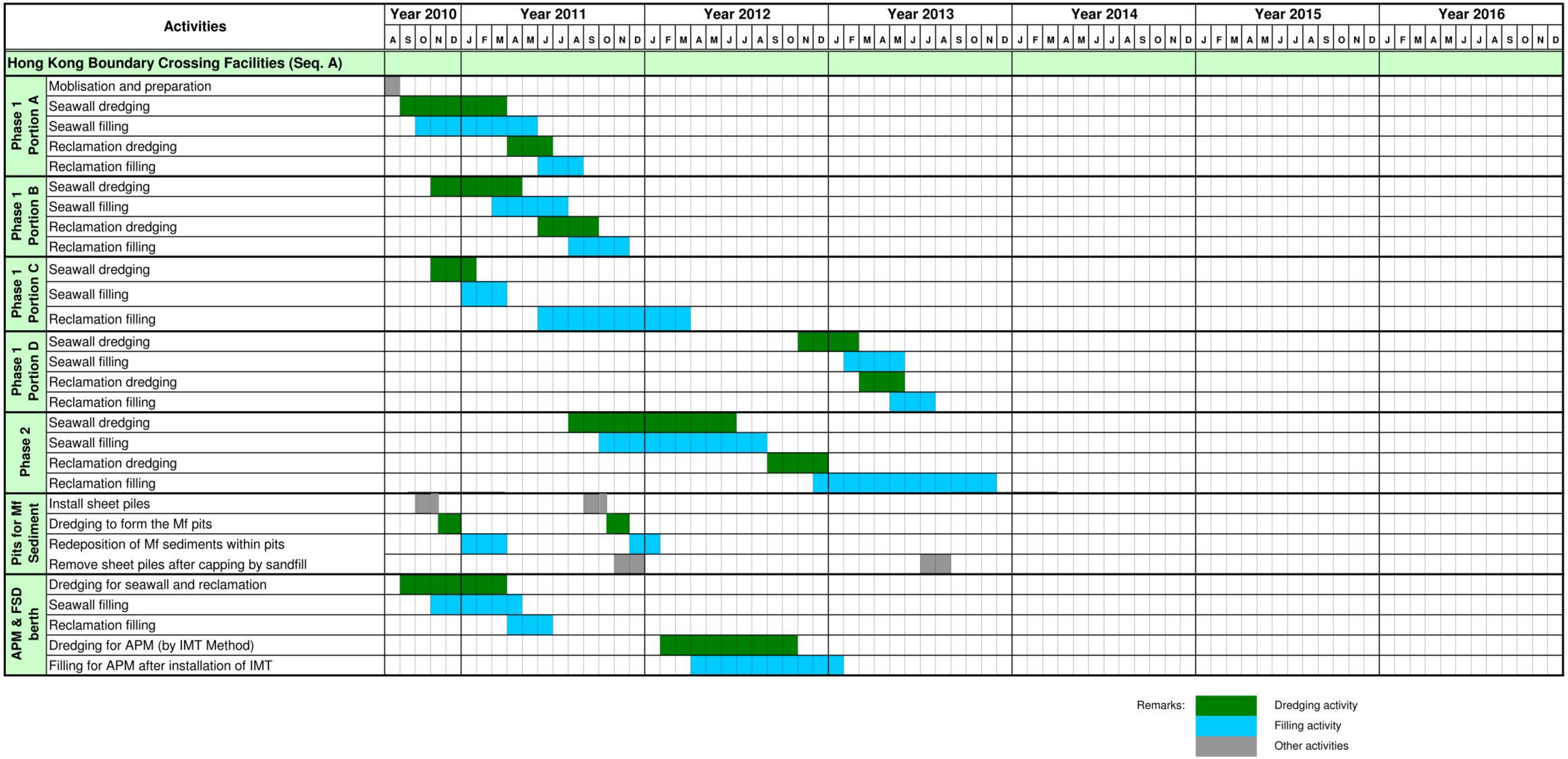
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

Drawing Title

Reclamation layout of HKBCF (Sequence A)

Drawing No.

Figure 9A1-1



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Hong Kong - Zhuhai - Macao Bridge
Hong Kong Project Management Office

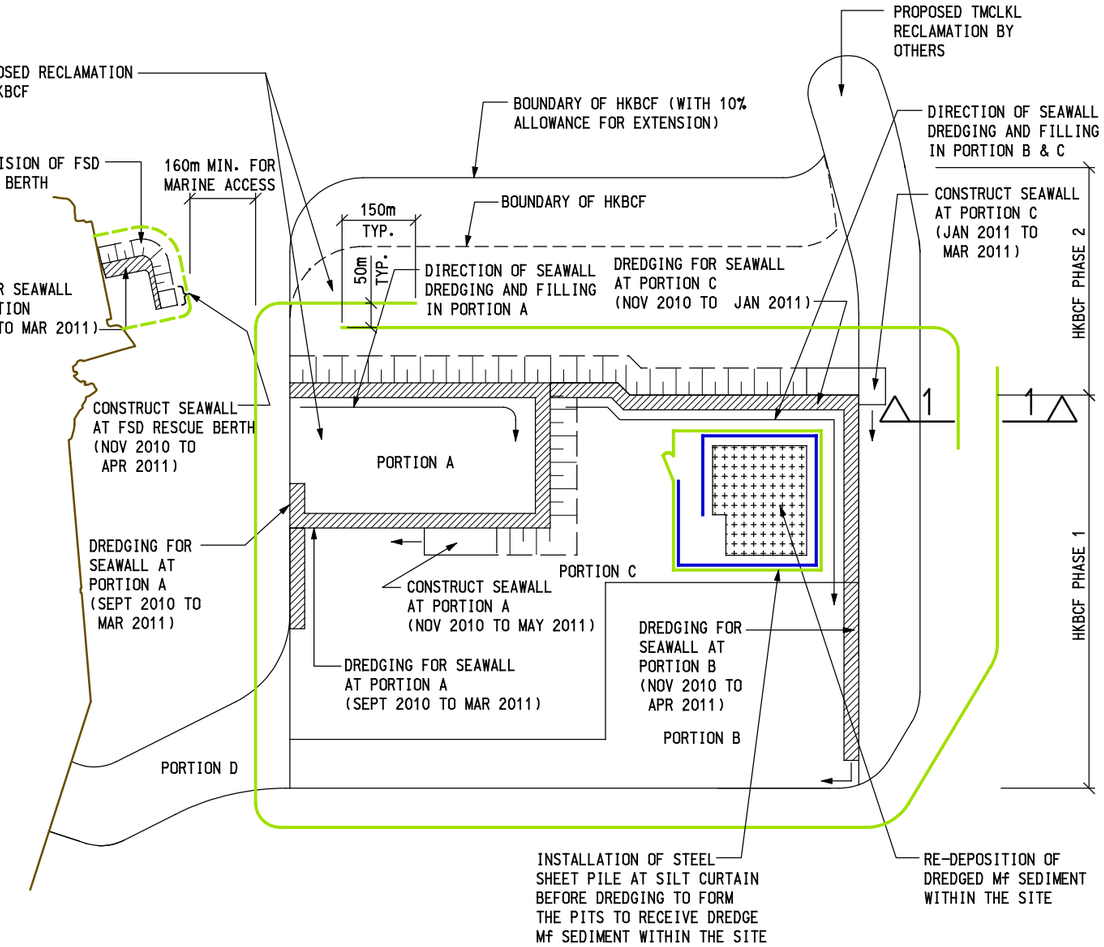
ARUP
奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

Drawing Title

Envisaged Program for HKBCF Reclamation (Sequence A)

Drawing No.

Figure 9A1-2



NOTE:

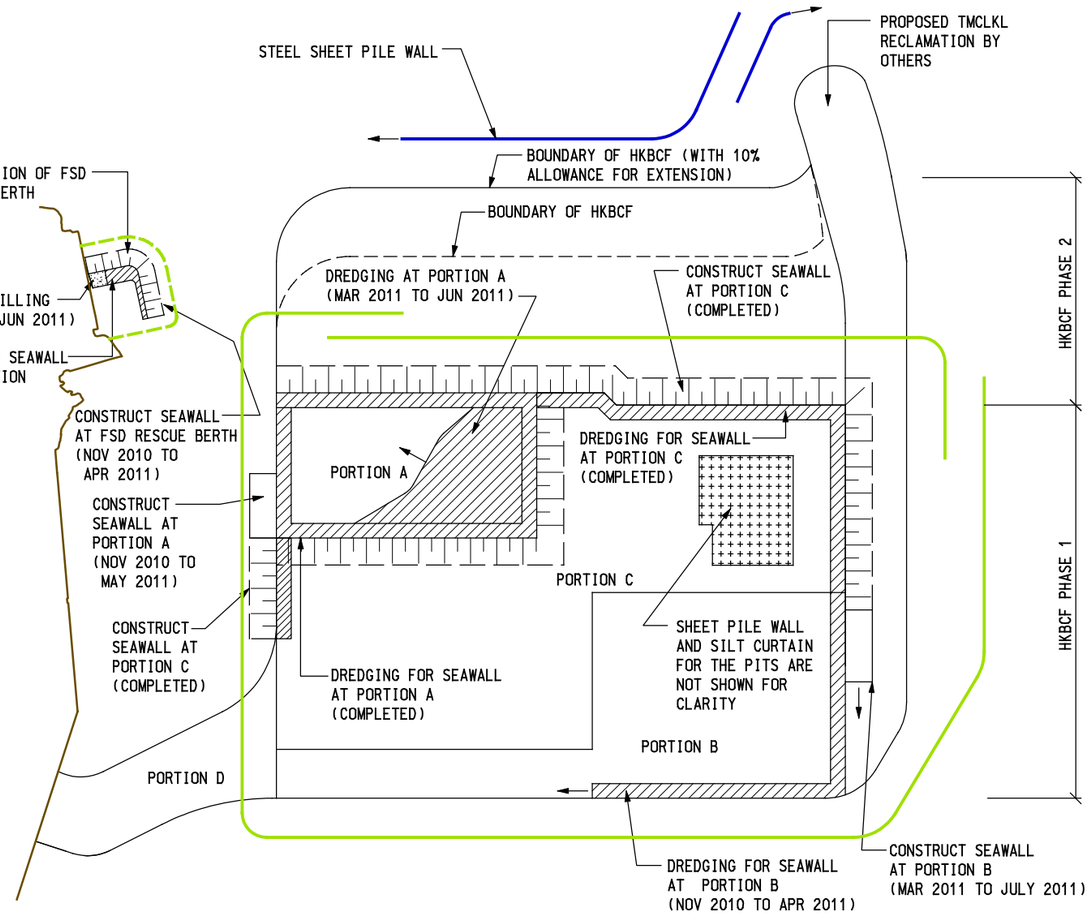
FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 1 (ON FEB 2011)



NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 2 (ON APRIL 2011)

Printed by : °o°
Filename : J:\25308\A\RUP\#CIVIL\#SKETCH\#Reclamation\25308-SK-41-301.dgn
29/7/2009

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Hong Kong Project Management Office

ARUP Ove Arup & Partners Hong Kong Limited

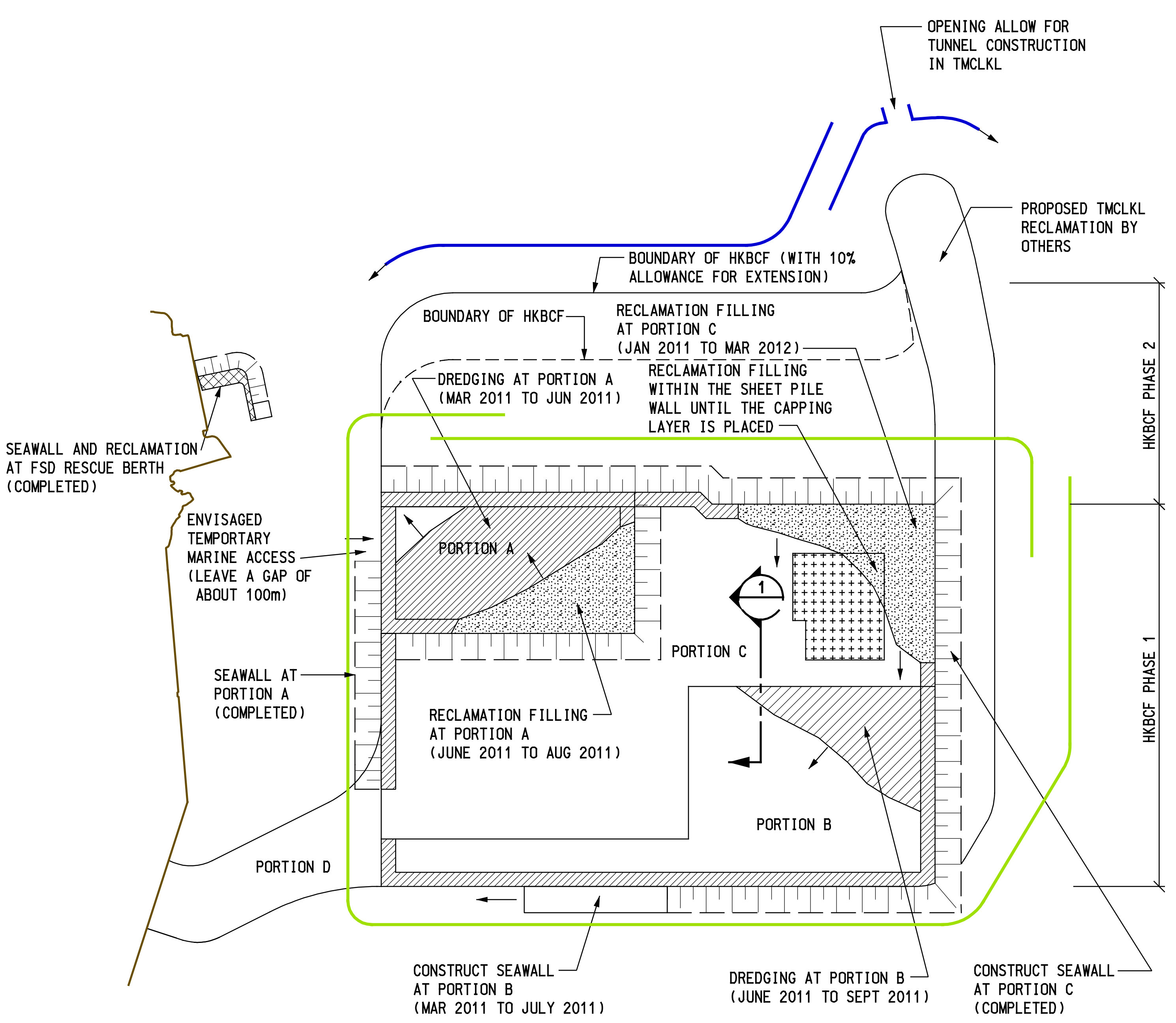
Job Title
Agreement No. CE 14/2008 (CE)
Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Investigation

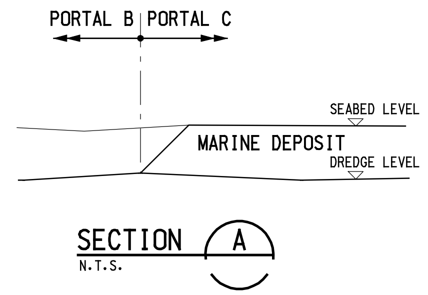
Drawing Title
ANTICIPATED CONSTRUCTION SEQUENCE OF HKBCF (SEQUENCE A)

Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn: CN	Date: 02/09
Checked: SK	Approved: AK
Scale: 1:12500 on A3	
Status: PRELIMINARY	Rev.: A

Drawing No. 25308/041/301





NOTE:

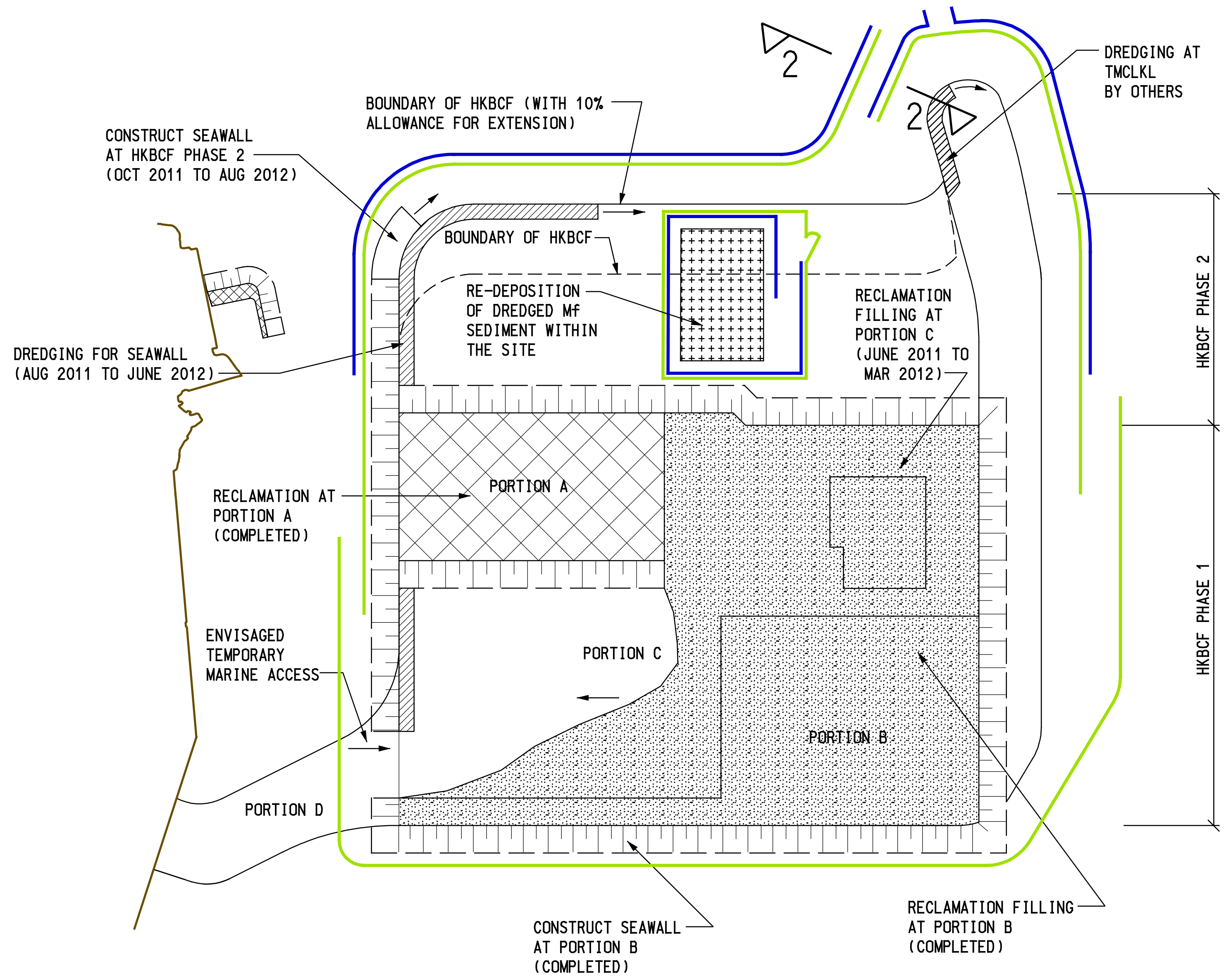
FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RECLAMATION WORKS COMPLETED
- RECLAMATION FILLING AREA
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 3 (ON JUNE 2011)



NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RECLAMATION WORKS COMPLETED
- RECLAMATION FILLING AREA
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 4 (ON DEC 2011)

Printed by : "o" 29/7/2009
Filename : J:\25308\ARUP\CIVIL\SKETCH\Reclamation\25308-SK-41-302.dgn

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

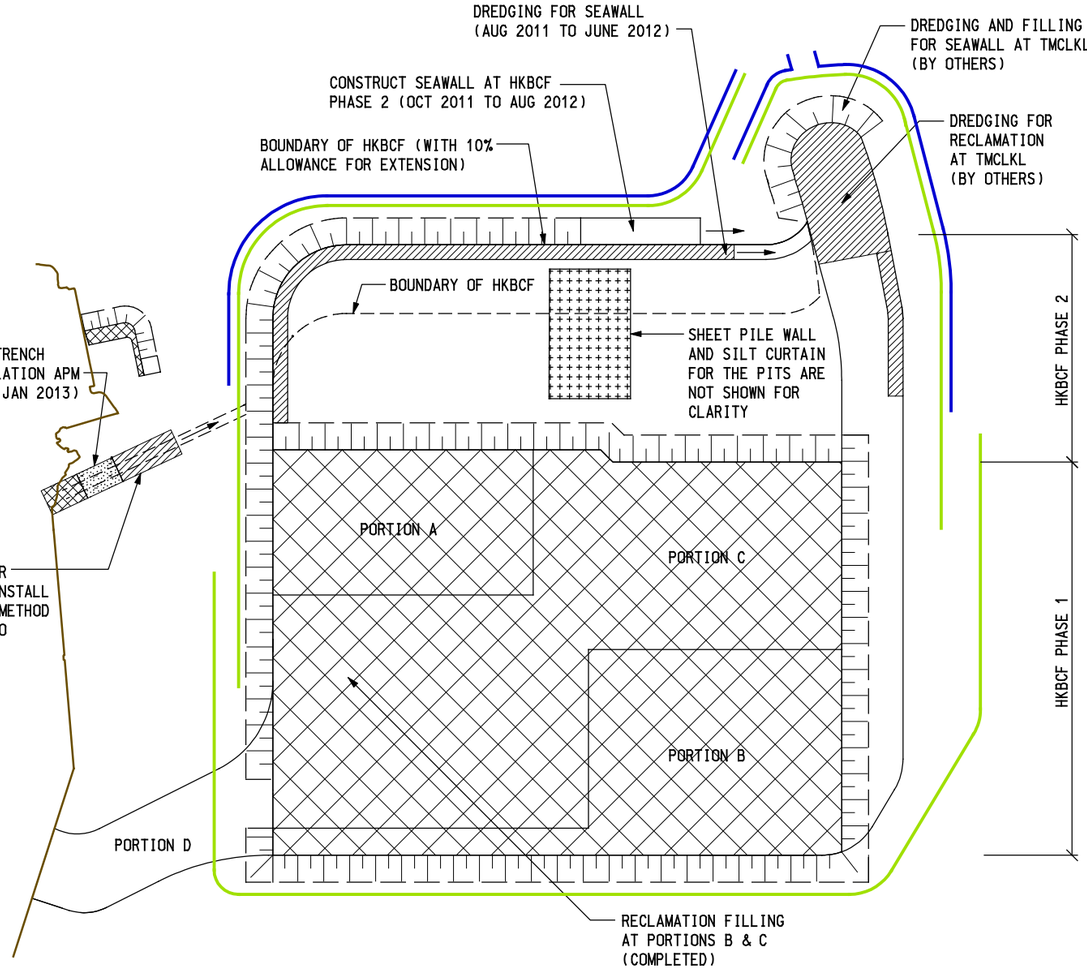
ARUP Ove Arup & Partners Hong Kong Limited

Job Title
Agreement No. CE 14/2008 (CE)
Hong Kong-Zhuhai-Macao Bridge Hong Kong
Boundary Crossing Facilities – Investigation

Drawing Title
ANTICIPATED CONSTRUCTION SEQUENCE OF HKBCF (SEQUENCE A)

Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn CN	Date 02/09	Drawing No. 25308/041/302
Checked SK	Approved AK	
Scale 1:12500 on A3		Status PRELIMINARY / Rev. A



NOTE:

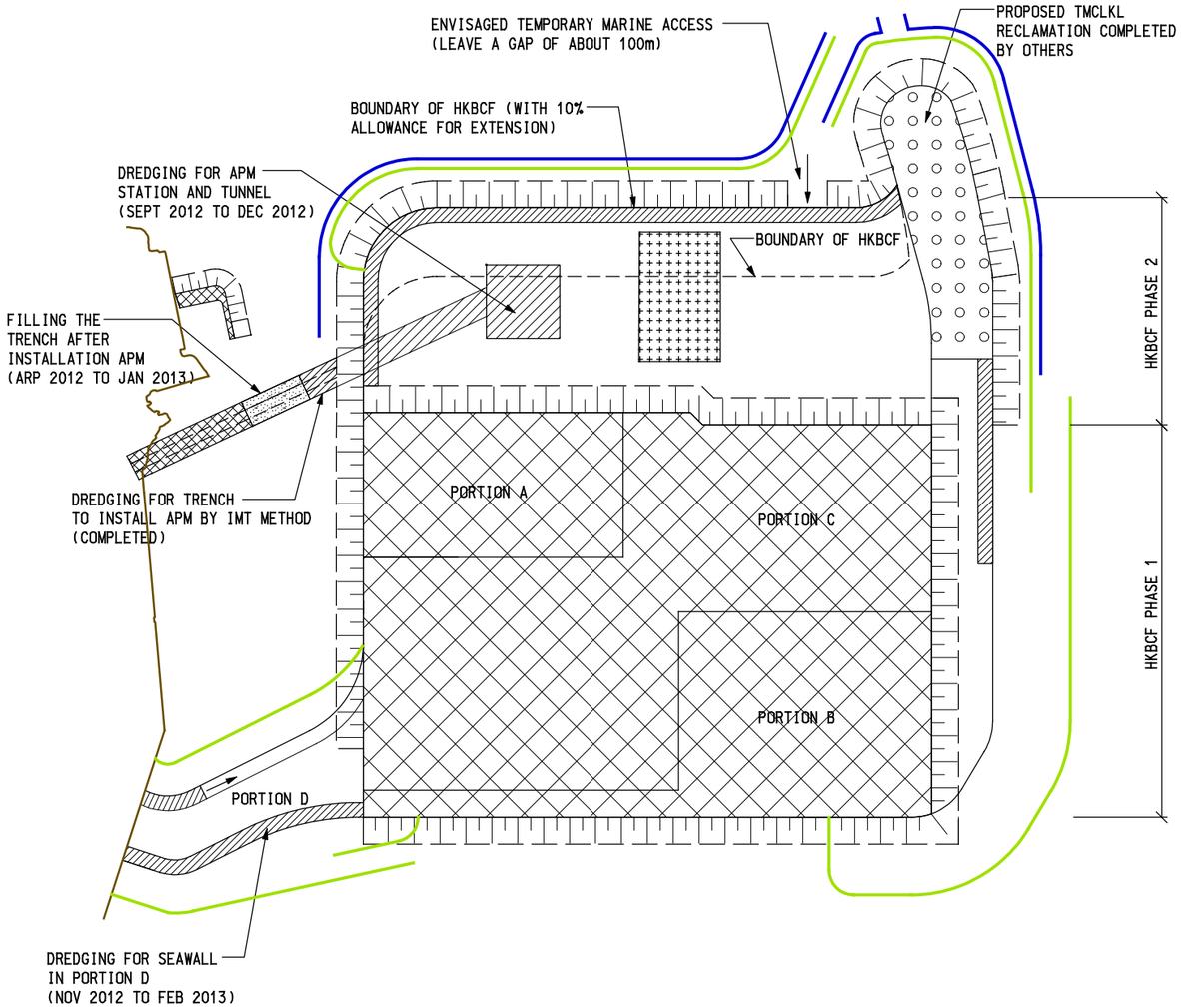
FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RECLAMATION WORKS COMPLETED
- RECLAMATION FILLING AREA
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 5 (ON APR 2012)



NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- COMPLETE TMCLKL RECLAMATION BY OTHERS
- RECLAMATION WORKS COMPLETED
- RECLAMATION FILLING AREA
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 6 (ON DEC 2012)

Printed by : "o" 29/7/2009
Filename : J:\25308\ARUP\CIVIL\SKETCH\Reclamation\25308-SK-41-303.dgn

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港珠澳大橋香港工程管理處
Hong Kong - Zhuhai - Macao Bridge
Hong Kong Project Management Office

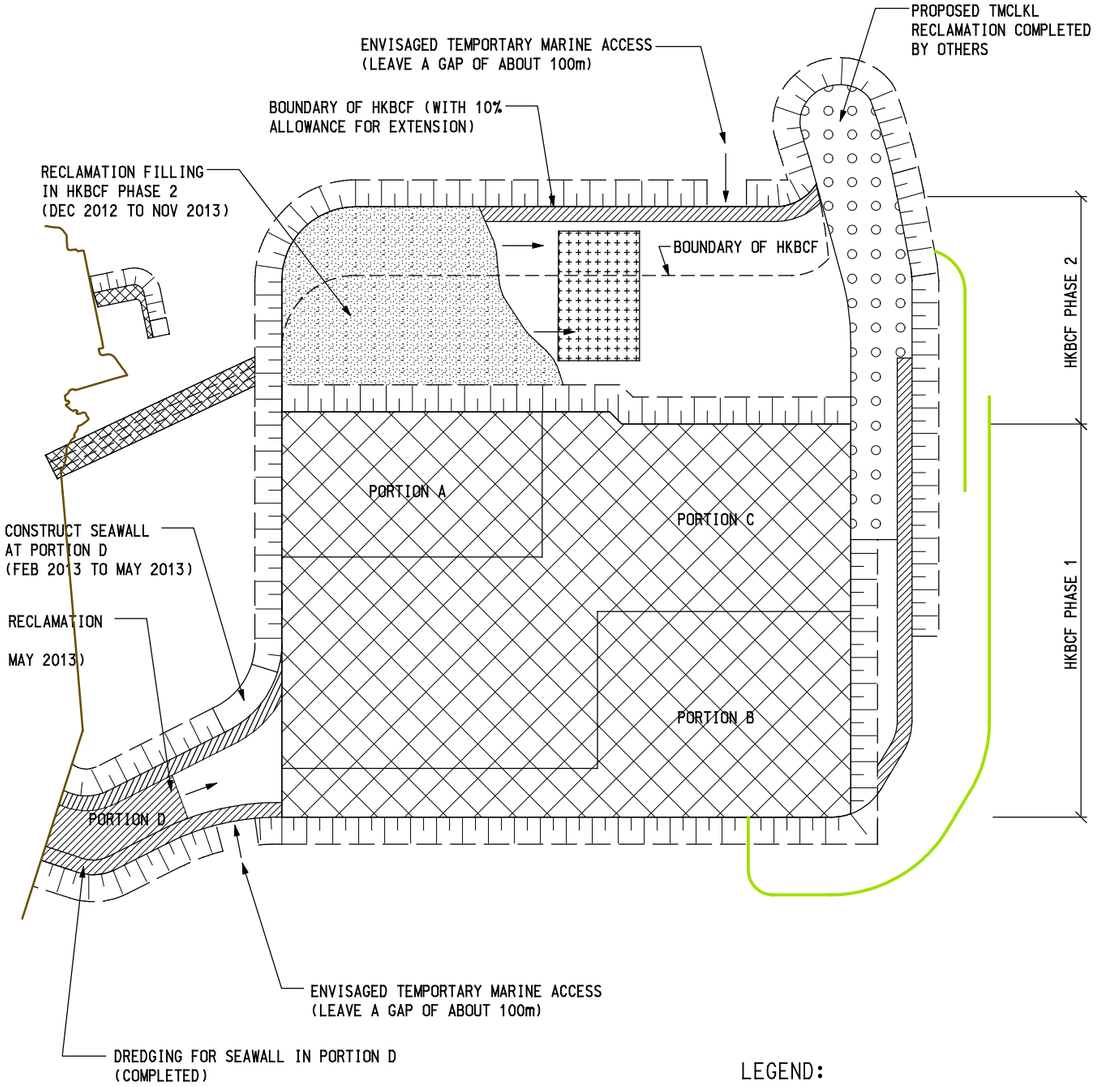
ARUP Ove Arup & Partners Hong Kong Limited

Job Title
Agreement No. CE 14/2008 (CE)
Hong Kong-Zhuhai-Macao Bridge Hong Kong
Boundary Crossing Facilities – Investigation

Drawing Title
ANTICIPATED CONSTRUCTION SEQUENCE OF HKBCF (SEQUENCE A)

Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn: CN	Date: 02/09
Checked: SK	Approved: AK
Scale: 1:12500 on A3	
Drawing No.: 25308/041/303	
Status: PRELIMINARY	Rev.: A



LEGEND:

- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- COMPLETE TMCLKL RECLAMATION BY OTHERS
- RECLAMATION WORKS COMPLETED
- RECLAMATION FILLING AREA
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

STAGE 7 (ON APR 2013)

Printed by : "o" 29/7/2009
Filename : J:\#25308\#ARUP\#CIVIL\#SKETCH\#Reclamation\#25308-SK-41-304.dgn

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港珠澳大橋香港工程管理處
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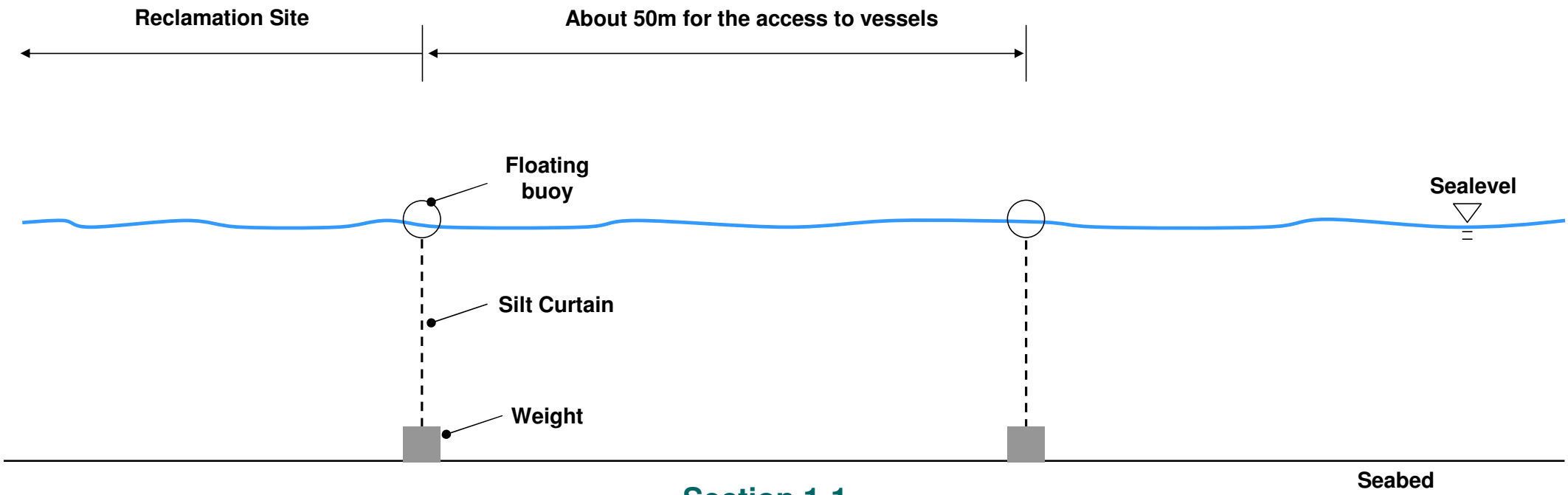
Job Title
Agreement No. CE 14/2008 (CE)
Hong Kong-Zhuhai-Macao Bridge Hong Kong
Boundary Crossing Facilities – Investigation

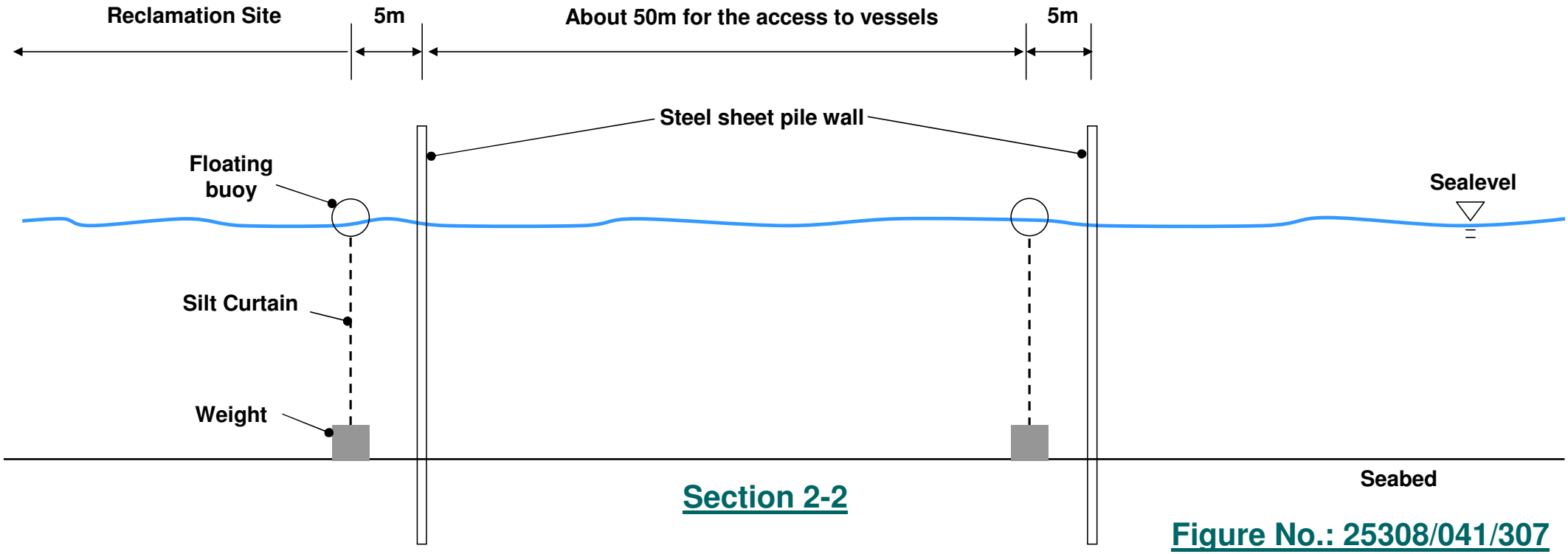
Drawing Title
ANTICIPATED CONSTRUCTION SEQUENCE OF HKBCF (SEQUENCE A)

Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn: CN	Date: 02/09
Checked: SK	Approved: AK
Scale: 1:12500 on A3	
Drawing No.: 25308/041/304	
Status: PRELIMINARY	Rev.: A

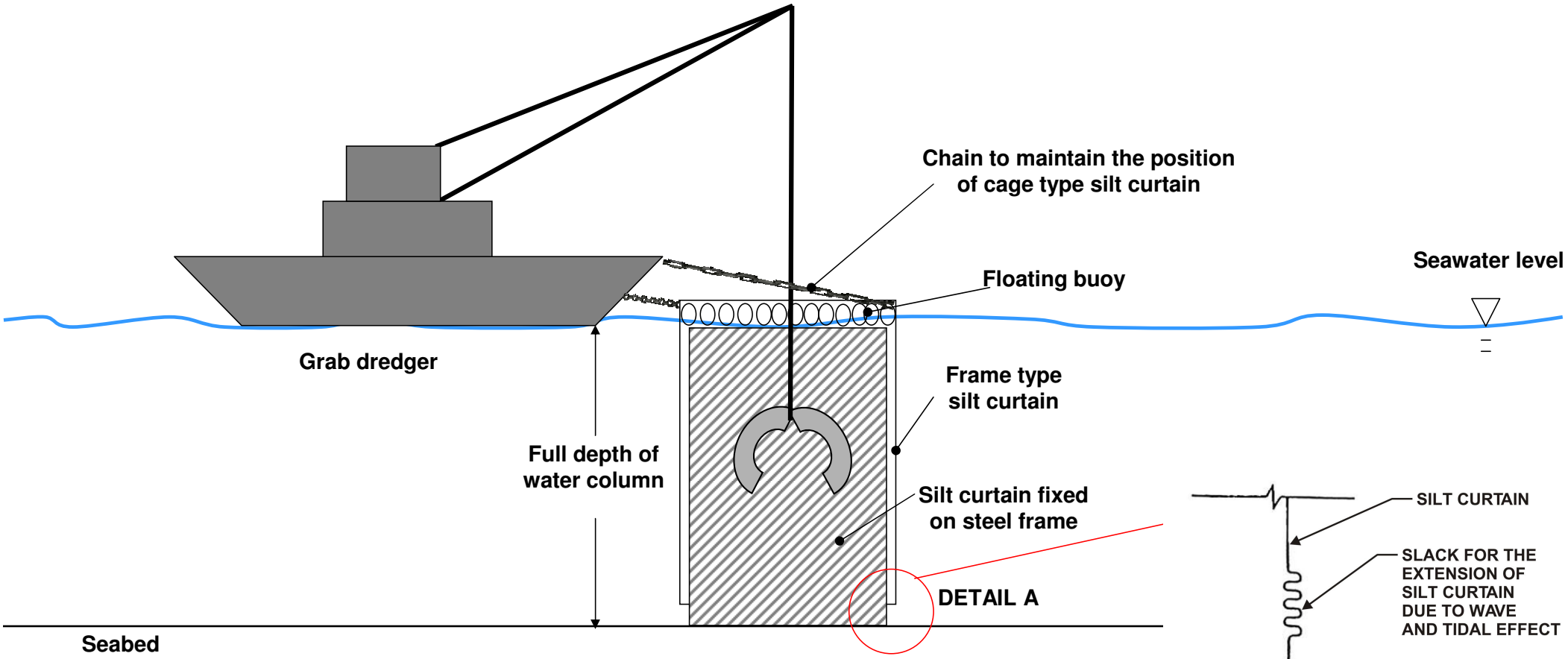


Section 1-1



Section 2-2

Figure No.: 25308/041/307



Additional Cage Type Silt Curtain for Grab Dredgers

Figure No.: 25308/041/308

Sequence A

A. TM-CLKL Northern Reclamation

ID	Area	Works	Item	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
				08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02
	Portion N-c	Mobilisation and preparation																																											
1		Seawall dredging and reclamation	DN1															DN1	7,200	7,200	7,200	7,200	DN1																								
2		Seawall filling (50% rock, 50% PF)	FN1															FN1	4,000	4,000	4,000	4,000	4,000	FN1																							
		Construct seawall																																												
3		Reclamation filling (PF)	FN2																			FN2	12,000	12,000	12,000	FN2 (behind seawall: partial)																					
		Reclamation filling (above +2.5mPD)																								0																					
	Portion N-a and N-b	Mobilisation and preparation																																												
5		Seawall dredging	DN2																		DN2		7,200	7,200	7,200	7,200	DN2																					
6		Seawall filling (50% rock, 50% PF)	FN3																		linked activities with ID1, same rate				FN3	4,000	4,000	4,000	4,000	4,000	FN3																		
		Construct seawall																																												
		Reclamation dredging - not required																																												
7		Reclamation filling (PF)	FN4																												FN4	12,000	12,000	12,000	12,000	12,000	12,000	FN4 (behind seawall: partial -> full)								
		Reclamation filling (above +2.5mPD)																																					0	0						
		Total Daily Production Rate																	11,200	11,200	11,200	11,200	23,200	19,200	19,200	11,200	4,000	4,000	4,000	4,000	0	0	12,000	12,000	12,000	12,000	12,000	12,000	0	0							

B. TM-CLKL Southern Reclamation

	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Portion S-a	Mobilisation and preparation																																												
8		Seawall dredging and reclamation	DS1															DS1	14,400	14,400	14,400	14,400	14,400	DS1																								
9		Seawall filling (50% rock, 50% PF)	FS1																FS1	6,000	6,000	6,000	6,000	6,000	6,000	6,000	FS1																					
		Construct seawall																																												
10		Reclamation filling (70% sand, 30 % PF)	FS2																				FS2	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	FS2 (behind seawall: partial)														
		Reclamation filling (above +2.5mPD)																															0	0													
	Portion S-b	Plant mobilisation																																												
11		Seawall dredging	DS2																							DS2	14,400	14,400	14,400	14,400	14,400	14,400	DS2														
12		Seawall filling (50% rock, 50% PF)	FS3																								FS3	4,000	4,000	4,000	4,000	4,000	4,000	FS3												
		Construct seawall																																												
		Reclamation dredging - not required																																												
13		Reclamation filling (70% sand, 30 % PF)	FS4																												FS4	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	FS4 (behind seawall: partial)		
		Reclamation filling (above +2.5mPD)																																										0	0	0
	Portion S-c	Mobilisation and preparation																																												
14		Dredging for seawall	DS3																															DS3	7,200	7,200	7,200	DS3								
15		Seawall filling (50% rock, 50% PF)	FS5																																FS5	,000	4,000	4,000	4,000	FS5						
		Construct seawall																																												
		Reclamation dredging - not required																																												
16		Reclamation filling (70% sand, 30 % PF)	FS6																																				FS6	4,000	4,000	4,000	6,000	6,000	6,000		
		Reclamation filling (above +2.5mPD)																																											0		
17	Viaduct	Piling & Pile Cap Construction	P																	p	432	432	432	432	432	432	432	432	432	432	432	432	432	432	p												
		Total Daily Production Rate																	14,400	20,400	20,832	20,832	20,832	12,432	12,432	6,432	20,832	24,832	24,832	24,832	24,832	30,832	10,432	10,432	13,200	17,200	17,200	10,000	14,000	10,000	10,000	12,000	12,000	12,000	0	0

C. HKBCF

	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Phase 1 - Portion A	Mobilisation and preparation																																											
18		Seawall dredging (Portion A)	1	1	50,400	50,400	50,400	50,400	50,400	50,400	50,400	1																																		
19		Seawall filling (Portion A)	a			a	88,000	88,000	88,000	88,000	88,000	88,000	Rock Fill	a																																		
20		Reclamation dredging (Portion A)	1							1		50,400	50,400	50,400	1	[No seawall assumed!]																																	
21		Reclamation filling (Portion A)	a						linked activities, higher rate (ID18) assumed					a	88,000	88,000	c	(behind seawall: full, temporary)																																
22	Phase 1 - Portion B	Seawall dredging (Portion B)	7/2			'7/2 -> 7	45,450	45,450	45,450		90,900	90,900	90,900	7																																		
25		Seawall filling (Portion B)	f							f	132,000	132,000	132,000	132,000	Rock Fill	1																																	
28		Reclamation dredging (Portion B)	2										2	82,100	82,100	82,100	82,100	2	(behind seawall: partial)																														
29		Reclamation filling (Portion B)	b												b	88,000	88,000	88,000	88,000	b	(behind seawall: full)																														
23	Phase 1 - Portion C	Seawall dredging (Portion C)	7/2			'7/2	45,450	45,450	45,450	7																																				
26		Seawall filling (Portion C)	f					f	132,000	132,000	Rock Fill	1																																					
		Reclamation dredging (Portion C) - not required																																												
30		Reclamation filling (Portion C)	a										a	88,000	88,000	88,000	88,000	88,000	88,000	44,000	44,000	44,000	44,000	a	(behind seawall: partial -> full)																														
24	Phase 1 - Portion D	Seawall dredging (Portion D)	3																											3	6,000	36,000	36,000	36,000	3												
27		Seawall filling (Portion D)	b																														b	8,000	88,000	88,000	Rock Fill	b								
31		Reclamation dredging (Portion D)	3																														3	6,000	36,000	36,000	3	[No seawall assumed]							
32		Reclamation filling (Portion D)	b																																	b	8,000	88,000	Rock Fill	b	(behind seawall: partial)						
33	Phase 2	Seawall dredging	4												4	28,800	28,800	28,800	28,800	28,800	28,800	28,800	28,800	28,800	4																									
34		Seawall filling	c														c	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	Rock Fill	c																					
37		Reclamation dredging	5																									5	,600	21,600	21,600	21,600	5	(behind seawall: full)												
38		Reclamation filling	d																												d	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	34,000	d		
33	Pits for Mf sediment	Install sheet piles																																												
34		Dredging to form the Mf pits																																												
35		Redeposition of Mf sediments within the pits																																												
36		Remove sheet pile after capping by sandfill																																												
37																																													
38																																													
39	APM & FSD berth	Dredging for seawall and reclamation (FSD)	6	6	14,400	14,400	14,400	14,400	14,400	14,400	14,400	6									6	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	6														
40		Seawall filling (FSD)	e			e	22,000	22,000	22,000	22,000	22,000	Rock Fill	e																																		
41		Reclamation filling (FSD)	e								e	22,000	22,000	22,000	e	(behind seawall: partial)																																	
42		Dredging for APM (by IMT method)	6																																												
43		Filling for APM after installation fo IMT	e																				e	12,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	e														
		Total Daily Production Rate		0	64,800	64,800	265,700	265,700	397,700	397,700	397,700	383,300	204,400	442,500	238,100	354,900	266,900	244,800	244,800	112,800	112,800	127,200	127,200	105,200	105,200	105,200	76,400	36,400	58,000	58,000	79,600	113,600	92,000	158,000	158,000	158,000	158,000	122,000	34,000	34,000	34,000	34,000	34,000				

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

D. HKLR

	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Portion 1	Mobilisation and preparation																																												
44		Seawall dredging	1						1	21,600	21,600	21,600	21,600	21,600	21,600	1																																
45		Seawall filling	a											a		28,000	28,000	28,000	28,000	a				linked activities, higher rate (ID48) assumed																					
46		Reclamation dredging	1											linked activities, higher rate (ID44)assumed				1		21,600	21,600	21,600		1	(behind seawall: full)assumed																					
47		Reclamation filling	b													linked activities, higher rate (ID45) assumed						b	28,000	28,000	28,000	28,000	28,000	b		(behind seawall: full)																		
48	Portion 2 & 3	Dredging for seawall and reclamation	1																			1	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	1																	
49		Filling for seawall and reclamation	a -> b																								a	28,000	28,000	28,000	28,000	28,000	a -> b														
50	Viaduct in western open sea	Piling & Pile Cap Construction (Portion A)	p1											p1	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	p1																							
51		Piling & Pile Cap Construction (Portion B)	p1																						p1	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	p1												
52		Piling & Pile Cap Construction (Portion C)	p1																															p1	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	p1	
	Pits for Mf sediment	Install sheet piles																																												
		Dredging to form the Mf pits																																												
		Redeposition of Mf sediments within the pits																																												
		Remove sheet pile after capping by sandfill																																												
53	Viaduct at Airport Channel	Piling & Pile Cap Construction (Portion 1)	p2											p2	287	287	287	287	287	287	p2																									
54		Piling & Pile Cap Construction (Portion 2)	p2																	p2	287	287	287	287	287	287	p2																					
55		Piling & Pile Cap Construction (Portion 3) (No marine works)	p3																							p3	1	0	0	0	0	0	p3													
56		Piling & Pile Cap Construction (Portion 4) (No marine works)	p3																													p3	1	0	0	0	0	0	p3						
57		Piling & Pile Cap Construction (Portion 5) (No marine works)	p3																																			p3	1	0	0	0	0	0	p3		
		Superstructure, roadworks & E&M works																																												
		Total Daily Production Rate								21,600	21,600	21,600	21,600	21,600	22,890	29,290	29,290	29,290	29,290	22,890	22,890	22,890	50,890	50,890	50,890	50,890	50,603	78,603	50,603	50,603	29,003	29,003	29,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003		

	E. Project Summary		Time	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
		TM-CLKL North	TM-CLKL North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,200	11,200	11,200	11,200	23,200	19,200	19,200	11,200	4,000	4,000	4,000	4,000	-	-	12,000	12,000	12,000	12,000	12,000	12,000	-	-	-	-	-	-	-	-
		TM-CLKL South	TM-CLKL South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14,400	20,400	20,832	20,832	20,832	12,432	12,432	6,432	20,832	24,832	24,832	24,832	24,832	30,832	10,432	10,432	13,200	17,200	17,200	10,000	14,000	10,000	10,000	12,000	12,000	12,000	-	-
		HKBCF	HKBCF	-	64,800	64,800	265,700	265,700	397,700	397,700	397,700	383,300	204,400	442,500	238,100	354,900	266,900	244,800	244,800	112,800	112,800	127,200	127,200	105,200	105,200	105,200	76,400	36,400	58,000	58,000	79,600	113,600	92,000	158,000	158,000	158,000	158,000	122,000	34,000	34,000	34,000	34,000	34,000	-	-
		HKLR	HKLR	-	-	-	-	-	-	21,600	21,600	21,600	21,600	21,600	22,890	29,290	29,290	29,290	29,290	22,890	22,890	22,890	50,890	50,890	50,890	50,890	50,603	78,603	50,603	50,603	29,003	29,003	29,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	-	-
		All 3 Prjs	All 3 Prjs	-	64,800	64,800	265,700	265,700	397,700	419,300	419,300	404,900	226,000	464,100	260,990	384,190	296,190	274,090	299,690	167,290	167,722	182,122	222,122	187,722	187,722	173,722	151,835	143,835	137,435	137,435	133,435	173,435	143,435	181,435	184,203	188,203	188,203	145,003	49,003	45,003	45,003	47,003	47,003	13,003	-	-

	Dredging	Filling
	Dredging behind partially full seawall / pilling	Filling behind partially full seawall
	Dredging behind full seawall	Filling behind full seawall, or Above +2.5 mPD, or Rock Fill

Partial Seawall = Substantially Completed Seawall with 100-200m leading edge.
Full Seawall = Substantially Completed Seawall with 50-100m opening for marine access.

	F. Summary of Project Activities		Max rate	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
	TM-CLKL North	Dreding	7,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,200	7,200	7,200	7,200	7,200	7,200	7,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Filling	16,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,000	4,000	4,000	4,000	4,000	16,000	12,000	4,000	4,000	4,000	4,000	-	-	12,000	12,000	12,000	12,000	12,000	12,000	-	-	-	-	-	-	-	-
	TM-CLKL South	Dreding	14,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14,400	14,400	14,400	14,400	14,400	-	-	-	14,400	14,400	14,400	14,400	14,400	14,400	-	-	7,200	7,200	7,200	-	-	-	-	-	-	-	-	-
		Filling	16,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,000	6,000	6,000	6,000	12,000	12,000	6,000	6,000	10,000	10,000	10,000	16,000	10,000	10,000	6,000	10,000	10,000	10,000	10,000	14,000	10,000	12,000	12,000	12,000	12,000	-	-
	HKBCF	Dreding	155,700	-	64,800	64,800	155,700	155,700	155,700	155,700	155,700	141,300	50,400	112,500	62,100	90,900	90,900	28,800	28,800	28,800	28,800	43,200	43,200	43,200	43,200	43,200	14,400	14,400	36,000	36,000	57,600	57,600	36,000	36,000	36,000	36,000	36,000	-	-	-	-	-	-	-	-
		Filling	330,000	-	-	-	110,000	110,000	242,000	242,000	242,000	242,000	154,000	330,000	176,000	264,000	176,000	216,000	84,000	84,000	84,000	84,000	84,000	62,000	62,000	62,000	62,000	22,000	22,000	22,000	22,000	56,000	56,000	122,000	122,000	122,000	122,000	34,000	34,000	34,000	34,000	34,000	-	-	-
	HKLR	Dreding	21,600	-	-	-	-	-	-	21,600	21,600	21,600	21,600	21,600	21,600	-	-	-	-	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Filling	56,000	-	-	-	-	-	-	-	-	-	-	-	-	28,000	28,000	28,000	28,000	-	-	-	28,000	28,000	28,000	28,000	28,000	56,000	28,000	28,000	28,000	28,000	28,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Remark: Works items (2) and (7) include a TSHD; Table F exclude the quantity for viaduct bored piling works.

Overall Programme for TM-CLKL + HKBCF + HKLR - Maximum Daily Production Rate (bulked volume, m3/day) (Sequence A)

Figure 7b

Sequence A

ID	Area	Works	Item	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
	A. TM-CLKL Northern Reclamation			08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02
	Portion N-c	Mobilisation and preparation																																												
1		Seawall dredging and reclamation	DN1															DN1	1	1	1	1	DN1																								
2		Seawall filling (50% rock, 50% PF)	FN1															FN1	4	4	4	4	4	FN1																								
		Construct seawall																																												
3		Reclamation filling (PF)	FN2																			FN2	12	12	12	FN2 (behind seawall: partial)																				
		Reclamation filling (above +2.5mPD)																							0																						
	Portion N-a and N-b	Mobilisation and preparation																																												
5		Seawall dredging	DN2																		DN2	1	1	1	1	DN2																					
6		Seawall filling (50% rock, 50% PF)	FN3																		linked activities with ID1, same rate				FN3	4	4	4	4	4	FN3																	
		Construct seawall																																												
		Reclamation dredging - not required																																						FN4 (behind seawall: partial -> full)						
7		Reclamation filling (PF)	FN4																											FN4	12	12	12	12	12	12									
		Reclamation filling (above +2.5mPD)																																						0	0					
		Total Daily No. of Plant Trips																	5	5	5	5	17	13	13	5	4	4	4	4	0	0	12	12	12	12	12	12	0	0						
	B. TM-CLKL Southern Reclamation																																												
	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Portion S-a	Mobilisation and preparation																																											
8		Seawall dredging and reclamation	DS1															DS1	2	2	2	2	2	DS1																								
9		Seawall filling (50% rock, 50% PF)	FS1																FS1	6	6	6	6	6	6	FS1																					
		Construct seawall																																												
10		Reclamation filling (70% sand, 30 % PF)	FS2																				FS2	6	6	6	6	6	6	6	6	FS2 (behind seawall: partial)														
		Reclamation filling (above +2.5mPD)																														6	0													
	Portion S-b	Plant mobilisation																																												
11		Seawall dredging	DS2																							DS2	2	2	2	2	2	DS2															
12		Seawall filling (50% rock, 50% PF)	FS3																								FS3	4	4	4	4	4	4	4	FS3											
		Construct seawall																																												
		Reclamation dredging - not required																																												FS4 (behind seawall: partial)
13		Reclamation filling (70% sand, 30 % PF)	FS4																											FS4	6	6	6	6	6	6	6	6	6	6	6	6	6			
		Reclamation filling (above +2.5mPD)																																									0	0	0	
	Portion S-c	Mobilisation and preparation																																												
14		Dredging for seawall	DS3																															DS3	1	1	1	DS3								
15		Seawall filling (50% rock, 50% PF)	FS5																									FS5								4	4	4	FS5							
		Construct seawall																																												
		Reclamation dredging - not required																																												FS6 (behind seawall: partial -> full)
16		Reclamation filling (70% sand, 30 % PF)	FS6																																			FS6	4	4	4	6	6	6		
		Reclamation filling (above +2.5mPD)																																											0		
17	Viaduct	Piling & Pile Cap Construction	P																	p	15	15	15	15	15	15	15	15	15	15	15	15	15	15	p												
		Total Daily No. of Plant Trips																	2	8	23	23	23	27	27	21	23	27	27	27	27	33	25	25	7	11	11	10	14	10	10	12	12	12	0	0
	C. HKBCF																																												
	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Phase 1 - Portion A	Mobilisation and preparation																																											
18		Seawall dredging (Portion A)	1	1	7	7	7	7	7	7	7	1																																		
19		Seawall filling (Portion A)	a			a	88	88	88	88	88	88	Rock Fill	a																																	
20		Reclamation dredging (Portion A)	1							1		7	7	7	1	[No seawall assumed!]																															
21		Reclamation filling (Portion A)	a						linked activities, higher rate (ID18) assumed					a	88	88	(behind seawall: full, temporary)																															
22	Phase 1 - Portion B	Seawall dredging (Portion B)	7/2			7/2 -> 7	5	5	5		10	10	10	7																															
25		Seawall filling (Portion B)	f							f	132	132	132	132	Rock Fill	1																															
28		Reclamation dredging (Portion B)	2										2	6	6	2	(behind seawall: partial)																														
29		Reclamation filling (Portion B)	b												b	88	88	88	88	b	(behind seawall: full)																											
23	Phase 1 - Portion C	Seawall dredging (Portion C)	7/2			7/2	5	5	5	7																																			
26		Seawall filling (Portion C)	f					f	132	132	Rock Fill	1																																		
		Reclamation dredging (Portion C) - not required																																											
30		Reclamation filling (Portion C)	a										a	88	88	88	88	88	88	44	44	44	44	a	(behind seawall: partial -> full)																				
24	Phase 1 - Portion D	Seawall dredging (Portion D)	3																											3	5	5	5	3											
27		Seawall filling (Portion D)	b																													b	8	88	88	Rock Fill	b							
31		Reclamation dredging (Portion D)	3																													3	5	5	3	[No seawall assumed]								
32		Reclamation filling (Portion D)	b																														b	8	88	Rock Fill	b	(behind seawall: partial)						
33	Phase 2	Seawall dredging	4																																										
34		Seawall filling	c																																											
37		Reclamation dredging	5																																										
38		Reclamation filling	d																																										
33	Pits for Mf sediment	Install sheet piles																																											
34		Dredging to form the Mf pits																																											
35		Redeposition of Mf sediments within the pits																																											
36		Remove sheet pile after capping by sandfill																																											
39	APM & FSD berth	Dredging for seawall and reclamation (FSD)	6	6	2	2	2	2	2	2	2	6									6	1	2	2	2	2	2	2	2	2	c															
40		Seawall filling (FSD)	e			e	22	22	22	22	22	Rock Fill	e									e	2	22	22	22	22	22	22	22	22	22	e													
41		Reclamation filling (FSD)	e								e	22	22	e	(behind seawall: partial)																														
42		Dredging for APM (by IMT method)	6																																										
43		Filling for APM after installation to IMT	e																																										
		Total Daily No. of Plant Trips		0	9	9	129	129	261	261	261	259	161	343	182	274	186	220	220	88	88	90	90	68	68	68	64	24	27	27	30	64	61	127	127	127	127	122	34	34	34	34	34			

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

E. Project Summary		Time	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
	TM-CLKL North	TM-CLKL North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5	5	17	13	13	5	4	4	4	4	-	-	12	12	12	12	12	12	12	12	12	12	12	-	-
	TM-CLKL South	TM-CLKL South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	8	23	23	23	27	27	21	23	27	27	27	27	27	33	25	25	7	11	11	10	14	10	10	12	12	12	-	-
	HKBCF	HKBCF	-	9	9	129	129	261	261	261	259	161	343	182	274	186	220	220	88	88	90	90	68	68	68	64	24	27	27	27	30	64	61	127	127	127	122	34	34	34	34	-	-	-	-
	HKLR	HKLR	-	-	-	-	-	-	-	3	3	3	3	3	48	73	73	73	73	48	48	48	48	76	76	76	76	66	94	66	66	66	63	63	63	35	35	35	35	35	35	35	35	-	-
	All 3 Prjs	All 3 Prjs	-	9	9	129	129	261	264	264	262	164	346	230	347	259	293	300	149	164	166	206	184	184	170	157	149	124	124	120	160	161	199	181	185	185	179	83	79	79	81	81	47	-	-

	Dredging	Filling
	Dredging behind partially full seawall / pilling	Filling behind partially full seawall
	Dredging behind full seawall	Filling behind full seawall, or Above +2.5 mPD, or Rock Fill

Partial Seawall = Substantially Completed Seawall with 100-200m leading edge.
Full Seawall = Substantially Completed Seawall with 50-100m opening for marine access.

F. Summary of Project Activities		Max no.	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
TM-CLKL North	Dredging	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4	4	4	16	12	12	4	4	4	4	-	-	-	12	12	12	12	12	12	-	-	-	-	-	-	-	-
TM-CLKL South	Dredging	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	2	2	-	-	-	2	2	2	2	2	2	-	-	1	1	1	-	-	-	-	-	-	-	-	-
	Filling	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	6	12	12	6	6	10	10	10	10	10	16	10	10	6	10	10	10	14	10	10	12	12	12	-	-
HKBCF	Dredging	19	-	9	9	19	19	19	19	19	17	7	13	6	10	10	4	4	4	4	6	6	6	6	6	6	2	2	5	5	8	8	5	5	5	5	5	-	-	-	-	-	-	-	-
	Filling	330	-	-	-	110	110	242	242	242	242	154	330	176	264	176	216	216	84	84	84	84	62	62	62	62	22	22	22	22	56	56	122	122	122	122	34	34	34	34	34	34	34	34
HKLR	Dreding	3	-	-	-	-	-	-	-	3	3	3	3	3	3	-	-	-	-	3	3	3	3	3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	56	-	-	-	-	-	-	-	-	-	-	-	-	-	28	28	28	28	-	-	-	28	28	28	28	28	56	28	28	28	28	28	-	-	-	-	-	-	-	-	-	-	-	-	-

Remark: Works items (2) and (7) include a TSHD; Table F exclude the quantity for viaduct bored piling works.

Overall Programme for TM-CLKL + HKBCF + HKLR - Daily No. of Plant Trips (Sequence A)

Figure 7c

Sequence A

A. TM-CLKL Northern Reclamation

ID	Area	Works	Item	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	**Feb-11**	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	**Apr-12**	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	**Apr-13**	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
				08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12	01	02
	Portion N-c	Mobilisation and preparation																																												
1		Seawall dredging and reclamation	DN1															DN1																														
2		Seawall filling (50% rock, 50% PF)	FN1															FN1																														
		Construct seawall																																												
3		Reclamation filling (PF)	FN2																			FN2				FN2 (behind seawall: partial)																				
		Reclamation filling (above +2.5mPD)																																												
	Portion N-a and N-b	Mobilisation and preparation																																												
5		Seawall dredging	DN2																		DN2						DN2																				
6		Seawall filling (50% rock, 50% PF)	FN3																		linked activities with ID1, same rate				FN3																							
		Construct seawall																																							FN4 (behind seawall: partial -> full)						
		Reclamation dredging - not required																																												
7		Reclamation filling (PF)	FN4																												FN4																
		Reclamation filling (above +2.5mPD)																																							0	0				
		Total No. of Active Plants on Site																	2	2	2	2	3	2	2	2	2	1	1	1	1	0	0	1	1	1	1	1	1	0	0						

B. TM-CLKL Southern Reclamation

ID	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Portion S-a	Mobilisation and preparation																																												
8		Seawall dredging and reclamation	DS1															DS1																														
9		Seawall filling (50% rock, 50% PF)	FS1																FS1																														
		Construct seawall																																													
10		Reclamation filling (70% sand, 30 % PF)	FS2																				FS2										FS2 (behind seawall: partial)														
		Reclamation filling (above +2.5mPD)																																0	0												
	Portion S-b	Plant mobilisation																																												
11		Seawall dredging	DS2																							DS2							DS2														
12		Seawall filling (50% rock, 50% PF)	FS3																								FS3								FS3											
		Construct seawall																																													
		Reclamation dredging - not required																																													
13		Reclamation filling (70% sand, 30 % PF)	FS4																												FS4																FS4 (behind seawall: partial)
		Reclamation filling (above +2.5mPD)																																												
	Portion S-c	Mobilisation and preparation																																												
14		Dredging for seawall	DS3																																DS3												
15		Seawall filling (50% rock, 50% PF)	FS5																																	FS5											
		Construct seawall																																													
		Reclamation dredging - not required																																													
16		Reclamation filling (70% sand, 30 % PF)	FS6																																				FS6								FS6 (behind seawall: partial -> full)
		Reclamation filling (above +2.5mPD)																																												
17	Viaduct	Piling & Pile Cap Construction	P																	p	p																											
		Total No. of Active Plants on Site																	2	3	18	18	18	18	18	17	19	20	20	20	20	22	18	18	3	4	4	3	5	4	4	4	4	4	0	0	

C. HKBCF

ID	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Phase 1 - Portion A	Mobilisation and preparation																																											
18		Seawall dredging (Portion A)	1	1	7	7	7	7	7	7	7	1																																		
19		Seawall filling (Portion A)	a			a	4	4	4	4	4	4	Rock Fill	a																																	
20		Reclamation dredging (Portion A)	1							1		7	7	7	1																															
21		Reclamation filling (Portion A)	a						linked activities, higher rate (ID18) assumed					a	1	4	4	c	(behind seawall: full, temporary)																															
22	Phase 1 - Portion B	Seawall dredging (Portion B)	7/2			7/2 -> 7	4	4	4		8	8	8	7																															
25		Seawall filling (Portion B)	f							f	6	6	6	6	Rock Fill	f																															
28		Reclamation dredging (Portion B)	2										2	4	4	4	4	2	(behind seawall: partial)																													
29		Reclamation filling (Portion B)	b												b	4	4	4	4	b	(behind seawall: full)																													
23	Phase 1 - Portion C	Seawall dredging (Portion C)	7/2			7/2	4	4	4	7																																			
26		Seawall filling (Portion C)	f				f	6	6		Rock Fill	1																																	
		Reclamation dredging (Portion C) - not required																																												
30		Reclamation filling (Portion C)	a										a	4	4	4	4	4	4	2	2	2	2	a	(behind seawall: partial -> full)																							
24	Phase 1 - Portion D	Seawall dredging (Portion D)	3																											3	5	5	5	3												
27		Seawall filling (Portion D)	b																														b		4	4	Rock Fill	b							
31		Reclamation dredging (Portion D)	3																															3		5	5	3	[No seawall assumed]						
32		Reclamation filling (Portion D)	b																																b		4	Rock Fill	b	(behind seawall: partial)					
33	Phase 2	Seawall dredging	4													4	4	4	4	4	4	4	4	4	4	4	4	4																		
34		Seawall filling	c																3	3	3	3	3	3	3	3	3	Rock Fill	c																		
37		Reclamation dredging	5																									5	3	3	3	5	(behind seawall: full)												
38		Reclamation filling	d																												d	3	3	3	3	3	3	3	3	3	3	3	3	d	(behind seawall: full)	
33	Pits for Mf sediment	Install sheet piles																																											
34		Dredging to form the Mf pits																																												
35		Redeposition of Mf sediments within the pits																																												
36		Remove sheet pile after capping by sandfill																																												
39	APM & FSD berth	Dredging for seawall and reclamation (FSD)	6	6	2	2	2	2	2	2	2	6																																	
40		Seawall filling (FSD)	e			e	2	2	2	2	2	Rock Fill	e																																	
41		Reclamation filling (FSD)	e								e	2	2	2	e	(behind seawall: partial)																															
42		Dredging for APM (by IMT method)	6																							6	1	2	2	2	2	2	2	2	2	6										
43		Filling for APM after installation to IMT	e																								1	e	1	2	2	2	2	2	2	2	2	e							
		Total No. of Active Plants on Site		0	9	9	23	23	29	29	29	27	15	27	12	20	16	15	15	9	9	11	11	11	11	11	7	4	7	7	10	13	10	12	12	12	12	7	3	3	3	3	3			

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

D. HKLR

ID	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14
	Portion 1	Mobilisation and preparation																																											
44		Seawall dredging	1						1	3	3	3	3	3	3	1																														
45		Seawall filling	a											a		2	2	2	2	a				linked activities, higher rate (ID48) assumed																						
46		Reclamation dredging	1										linked activities, higher rate (ID44)assumed					1		3	3	3	1	2	(behind seawall: full)assumed			b																		
47		Reclamation filling	b													linked activities, higher rate (ID45) assumed						b	2	2	2	2	2	2	(behind seawall: full)																		
48	Portion 2 & 3	Dredging for seawall and reclamation	1																			1	3	3	3	3	3	3	3	1																
49		Filling for seawall and reclamation	a -> b																								a	2	2	2	2	2	a -> b													
50	Viaduct in western open sea	Piling & Pile Cap Construction (Portion A)	p1											p1	35	35	35	35	35	35	35	35	35	35	p1	15	35	35	35	35	35	35	35	35	p1	35	35	35	35	35	35	35	35	35	p1	
51		Piling & Pile Cap Construction (Portion B)	p1																					p1	15	35	35	35	35	35	35	35	35	p1												
52		Piling & Pile Cap Construction (Portion C)	p1																															p1	35	35	35	35	35	35	35	35	35	35	35	p1	
	Pits for Mf sediment	Install sheet piles																																											
		Dredging to form the Mf pits																																												
		Redeposition of Mf sediments within the pits																																												
		Remove sheet pile after capping by sandfill																																												
53	Viaduct at Airport Channel	Piling & Pile Cap Construction (Portion 1)	p2											p2	10	10	10	10	10	10	p2	10	10	10	10	10	10	p2																		
54		Piling & Pile Cap Construction (Portion 2)	p2																	p2	10	10	10	10	10	10	p2																				
55		Piling & Pile Cap Construction (Portion 3) (No marine works)	p3																								p3	1	0	0	0	0	0	p3												
56		Piling & Pile Cap Construction (Portion 4) (No marine works)	p3																														p3	1	0	0	0	0	0	p3					
57		Piling & Pile Cap Construction (Portion 5) (No marine works)	p3																																				p3	1	0	0	0	0	0	p3	
		Superstructure, roadworks & E&M works																																												
		Total No. of Active Plants on Site								3	3	3	3	3	48	47	47	47	47	48	48	48	50	50	50	50	40	42	40	40	37	37	37	35	35	35	35	35	35	35	35	35	35	35		

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

E. Project Summary	Time	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
TM-CLKL North	TM-CLKL North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	2	3	2	2	2	1	1	1	1	-	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-
TM-CLKL South	TM-CLKL South																2	3	18	18	18	18	18	17	19	20	20	20	20	22	18	18	3	4	4	3	5	4	4	4	4	4	-	-
HKBCF	HKBCF	-	9	9	23	23	29	29	29	27	15	27	12	20	16	15	15	9	9	11	11	11	11	11	7	4	7	7	10	13	10	12	12	12	7	3	3	3	3	3	-	-	-	-
HKLR	HKLR	-	-	-	-	-	-	-	3	3	3	3	3	48	47	47	47	47	48	48	48	50	50	50	40	42	40	40	40	37	37	37	35	35	35	35	35	35	35	35	35	35	-	-
All 3 Prjs	All 3 Prjs	-	9	9	23	23	29	32	32	30	18	30	60	67	63	62	66	62	77	79	82	81	81	80	67	67	68	68	67	72	66	66	51	52	52	46	43	42	42	42	42	39	-	-

Dredging	Filling
Dredging behind partially full seawall / pilling	Filling behind partially full seawall
Dredging behind full seawall	Filling behind full seawall, or Above +2.5 mPD, or Rock Fill

Partial Seawall = Substantially Completed Seawall with 100-200m leading edge.
Full Seawall = Substantially Completed Seawall with 50-100m opening for marine access.

F. Summary of Project Activities		Max no.	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14
TM-CLKL North	Dreding	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	1	1	1	1	1	1	1	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-
TM-CLKL South	Dreding	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	2	2	-	-	-	2	2	2	2	2	2	2	-	-	1	1	1	-	-	-	-	-	-	-	-	-
	Filling	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	3	3	2	2	3	3	3	3	5	3	3	2	3	3	3	5	4	4	4	4	4	-	-	-
HKBCF	Dreding	17	-	9	9	17	17	17	17	17	15	7	11	4	8	8	4	4	4	4	6	6	6	6	6	2	2	5	5	8	8	5	5	5	5	5	-	-	-	-	-	-	-	-	-
	Filling	16	-	-	-	6	6	12	12	12	12	8	16	8	12	8	11	11	5	5	5	5	5	5	2	2	2	2	2	5	5	7	7	7	7	7	3	3	3	3	3	-	-	-
HKLR	Dreding	3	-	-	-	-	-	-	3	3	3	3	3	3	-	-	-	-	3	3	3	3	3	3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	4	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	-	-	-	2	2	2	2	2	4	2	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

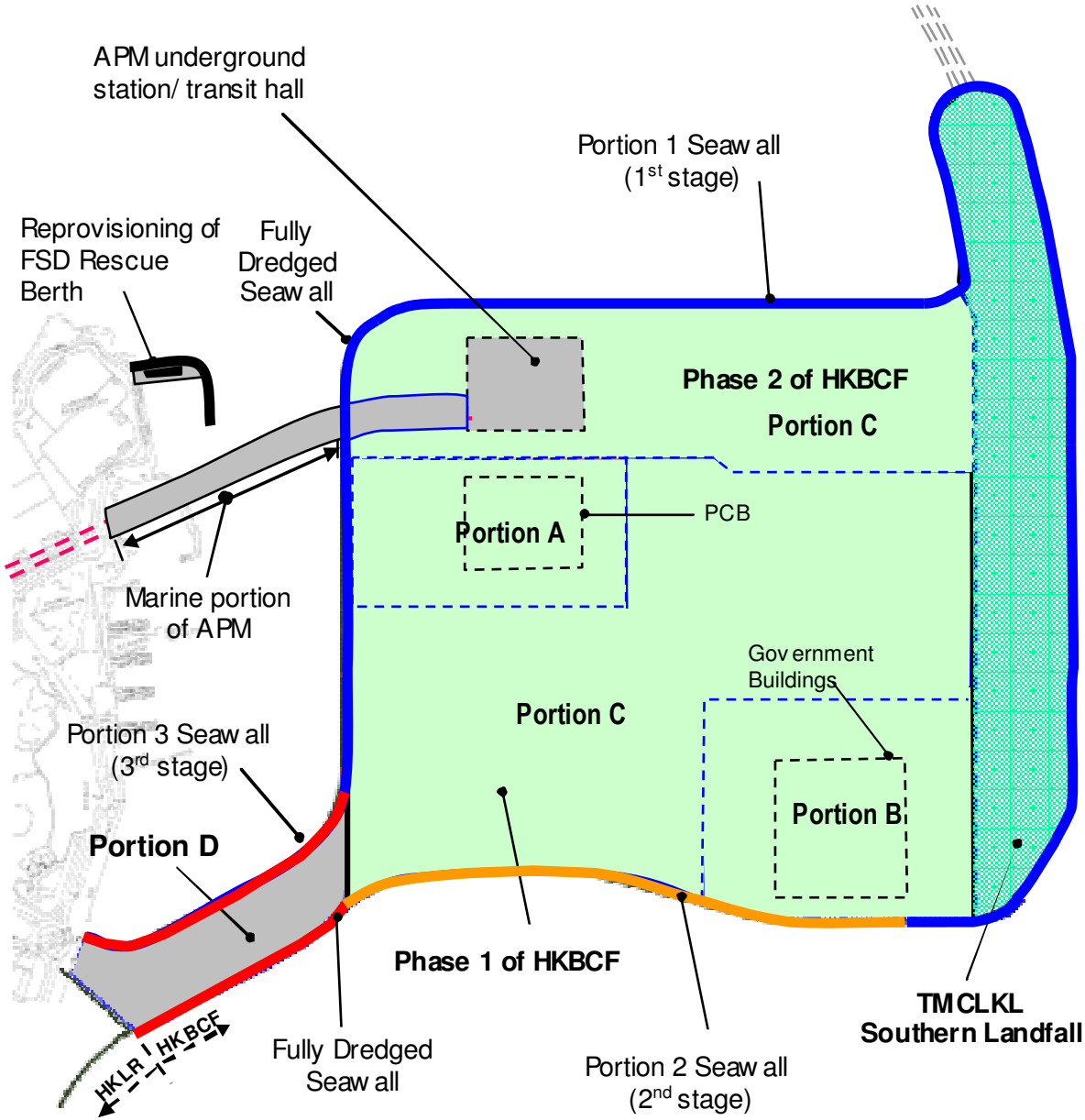
Remark: Works items (2) and (7) include a TSHD; Table F exclude the quantity for viaduct bored piling works.

Overall Programme for TM-CLKL + HKBCF + HKLR - No. of Active Dredging/Filling Plants on Site (Sequence A)

Figure 7d

APPENDIX E2

Typical Arrangement of HKBCF Sequence B



Fully dredged

Non-dredged (with Band Drains)

Portion 1 seawall
Portion 2 seawall
Portion 3 seawall
} Fully dredged

Phase 1 of HKBCF

Seawall – Fully Dredged

Reclamation:
Portion A – Non-dredged (with band drains)
Portion B – Non-dredged (with band drains)
Portion C – Non-dredged (with band drains)
Portion D – Fully dredged
FSD Rescue Berth – Fully dredged

Phase 2 of HKBCF

Seawall – Fully dredged

Reclamation – Non-dredged (with band drains) except the areas at underground APM station and tunnel by fully dredged.

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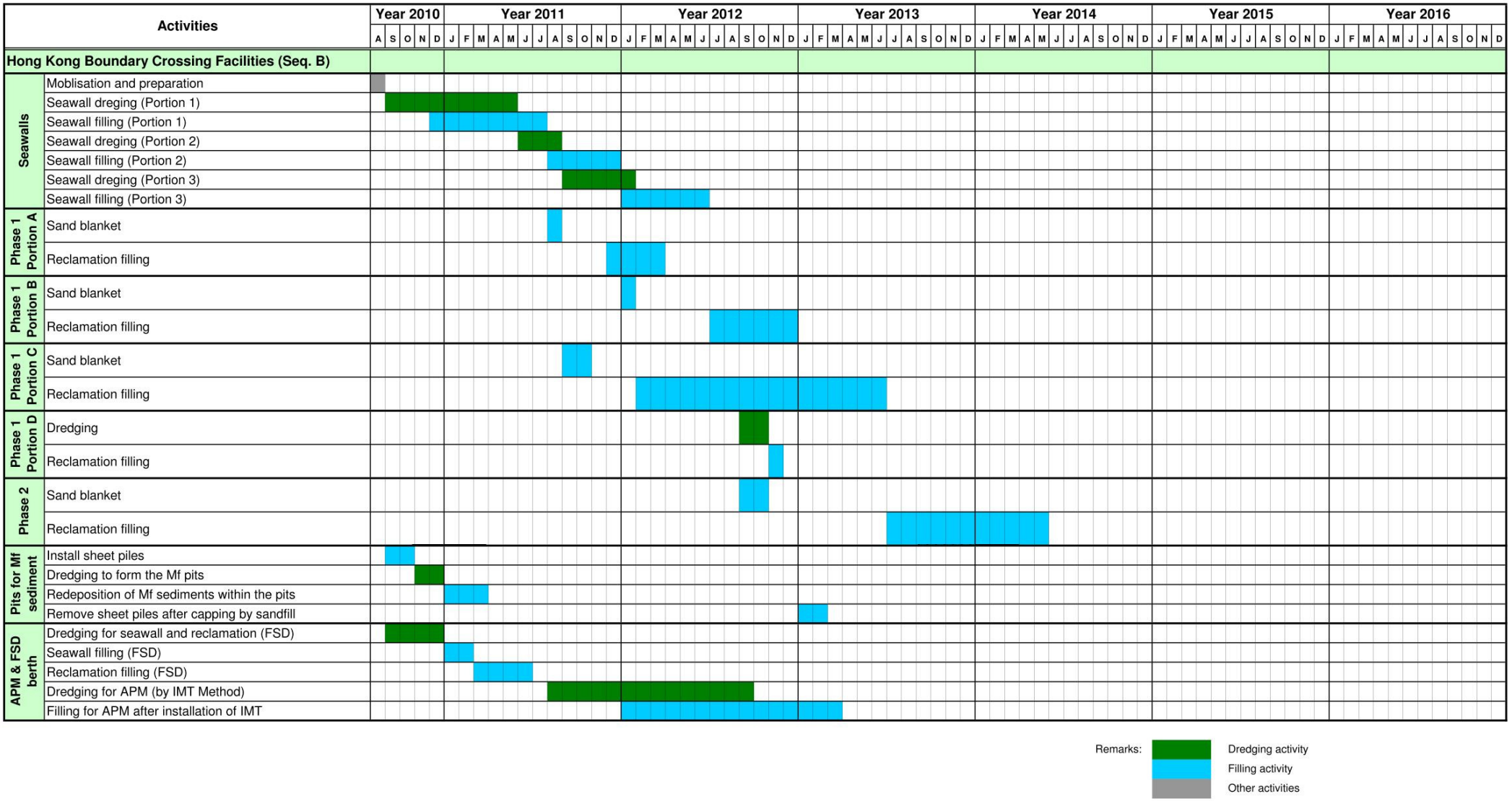

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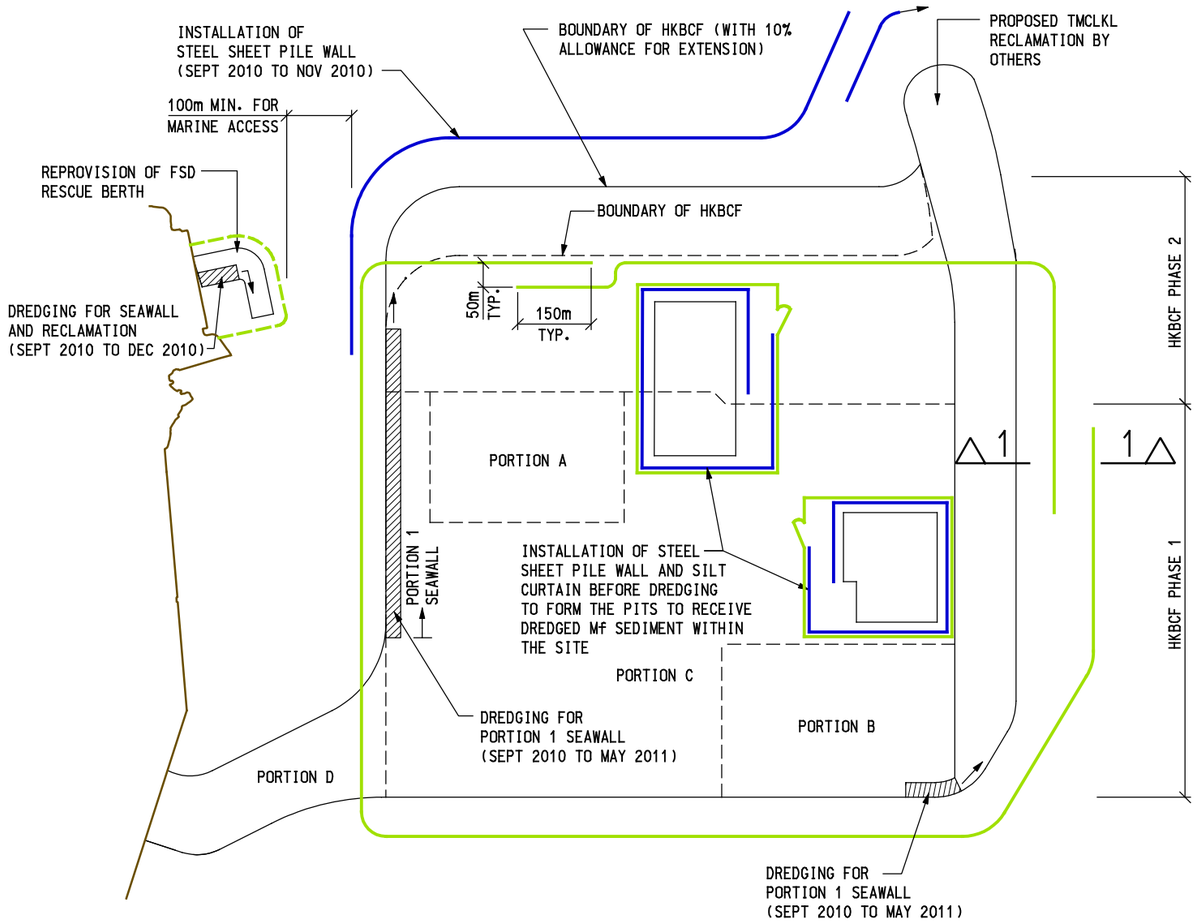
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited

Drawing Title

Envisaged Program for HKBCF Reclamation (Sequence B)

Drawing No.

Figure 9A2-2



NOTE:

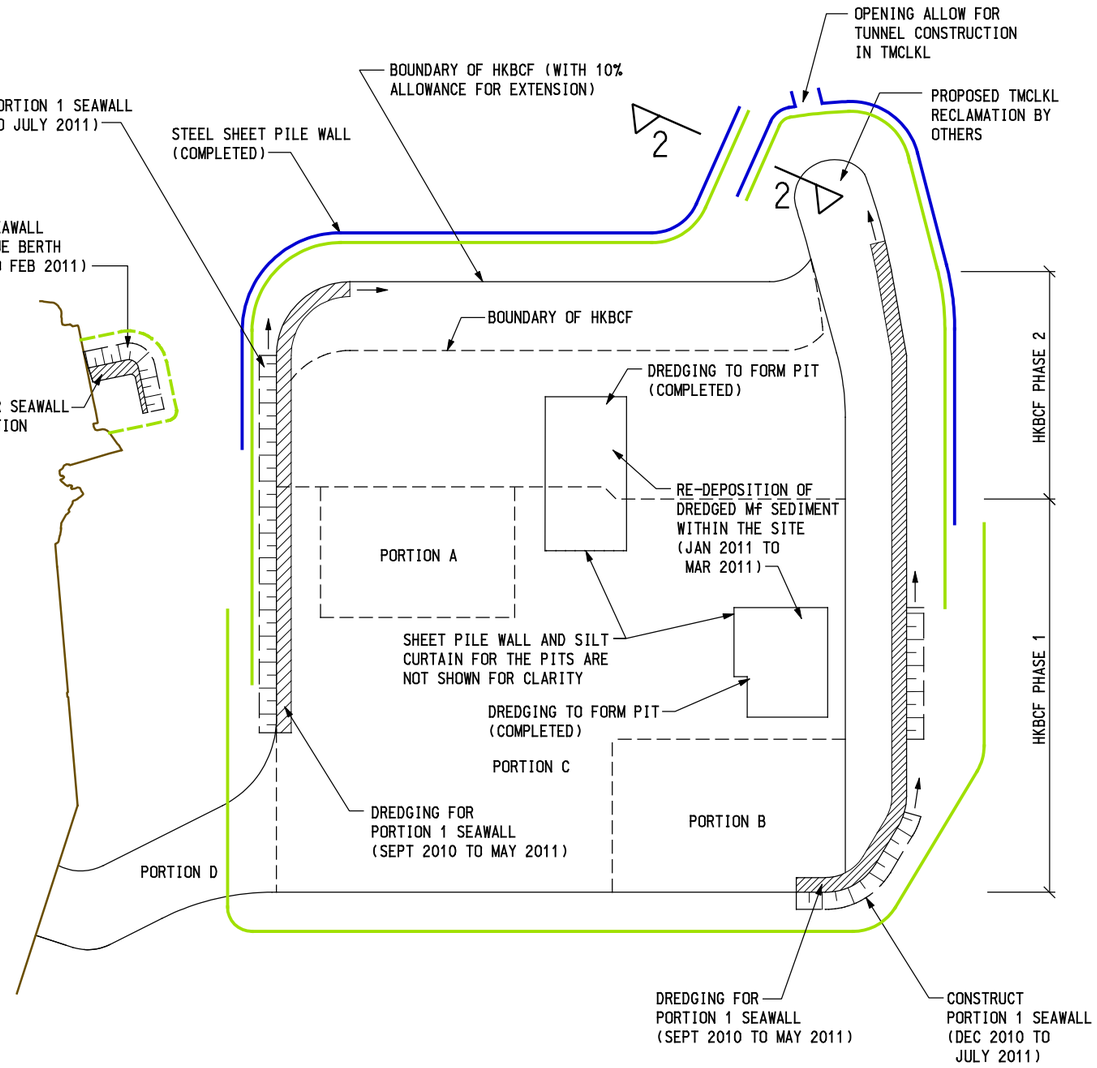
FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA

STAGE 1 (ON OCT 2010)



NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 2 (ON FEB 2011)

Printed by : 'o'
Filename : J:#25308#ARUP#CIVIL#SKETCH#Reclamation#25308-SK-41-301A.dgn
29/7/2009

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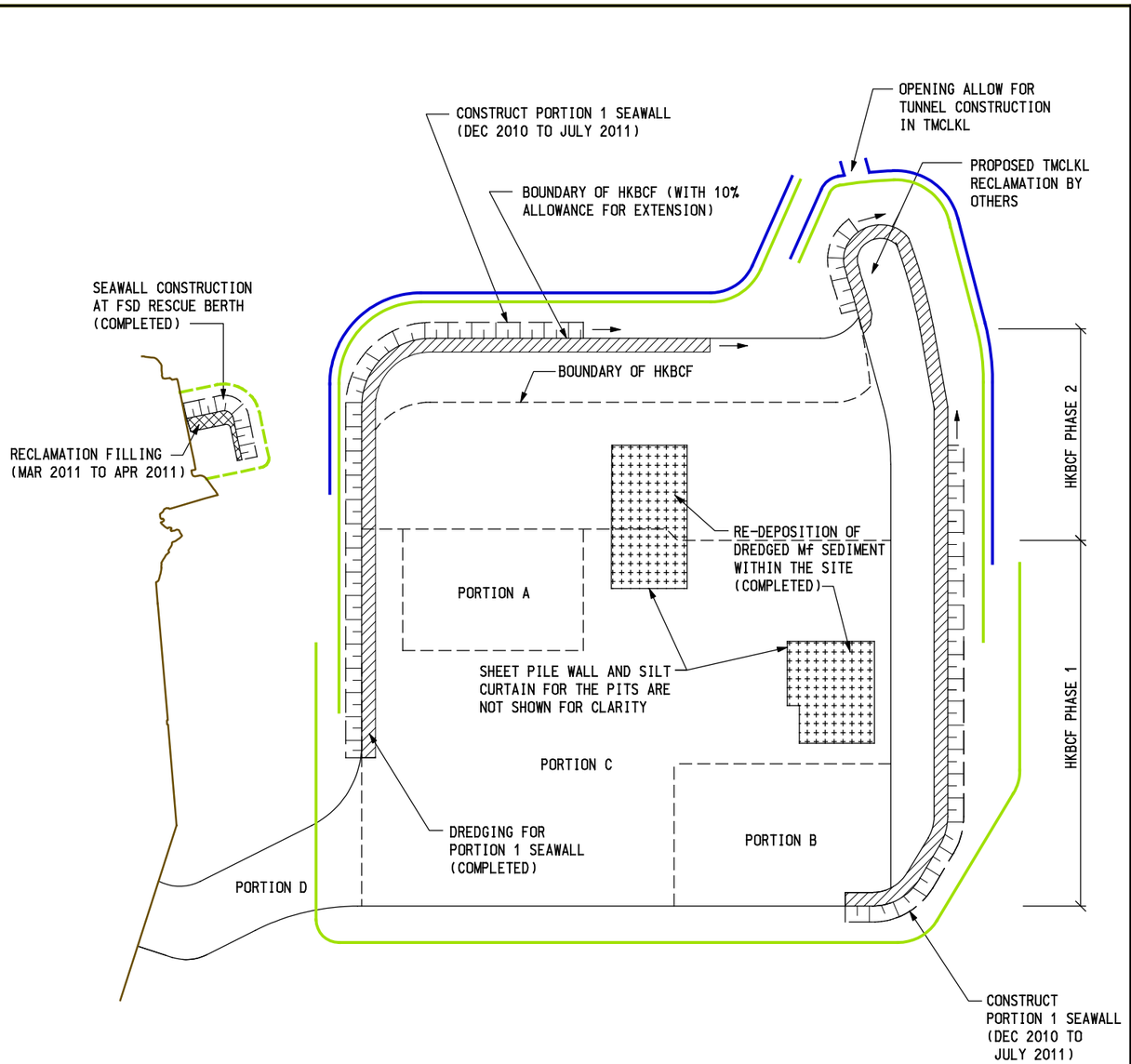
Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn: CN	Date: 02/09	Drawing No.: 25308/041/301A	
Checked: SK	Approved: AK		
Scale: 1:12500 on A3		Status: PRELIMINARY	Rev.: A



NOTE:

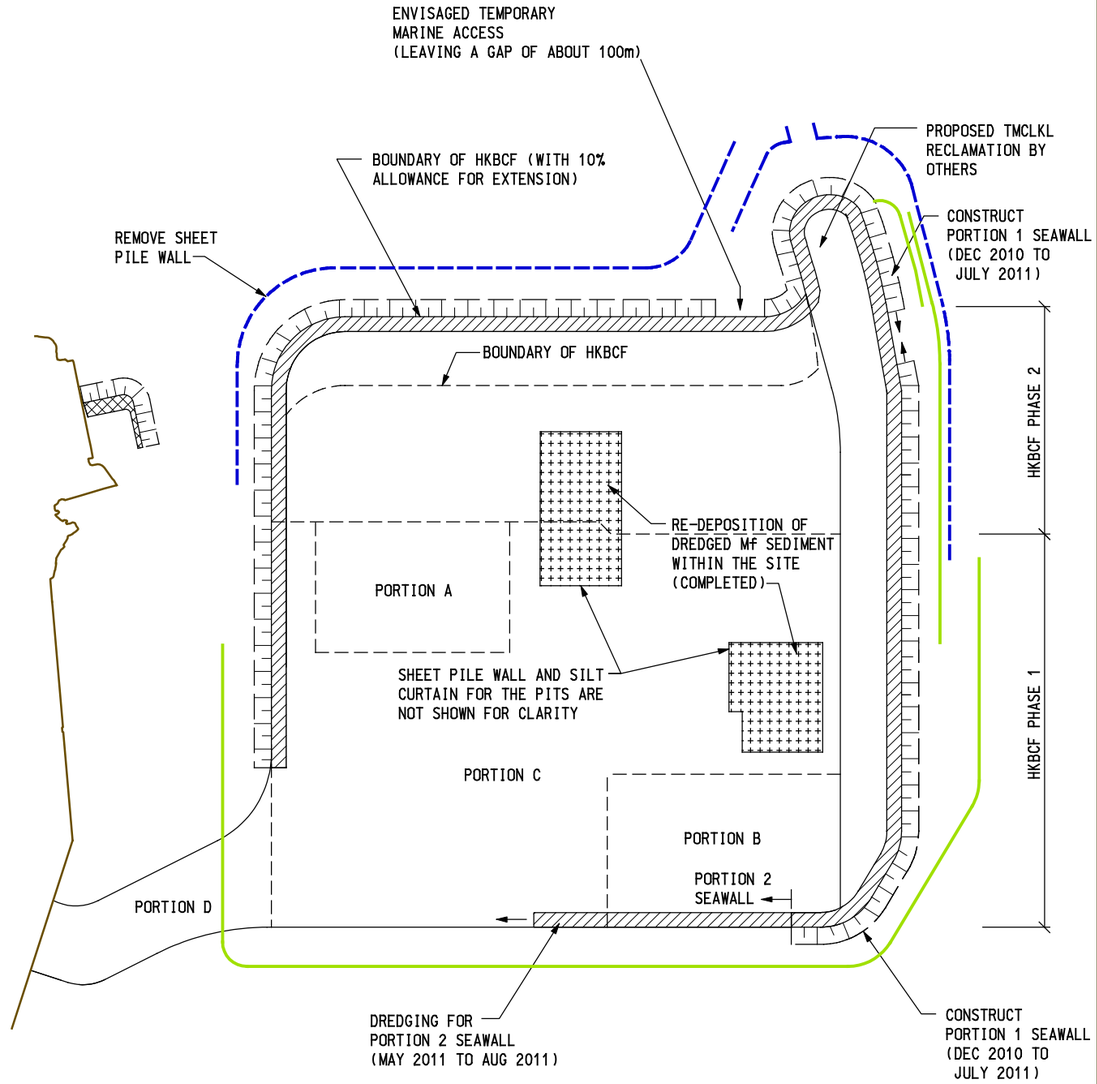
FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RE-DEPOSITION OF DREDGED Mf SEDIMENT
- RECLAMATION WORKS COMPLETED

STAGE 3 (ON APR 2011)



NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RE-DEPOSITION OF DREDGED Mf SEDIMENT
- RECLAMATION WORKS COMPLETED

STAGE 4 (ON JUNE 2011)

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Hong Kong - Zhuhai - Macao Bridge
Hong Kong Project Management Office

ARUP Ove Arup & Partners Hong Kong Limited

Job Title
Agreement No. CE 14/2008 (CE)
Hong Kong-Zhuhai-Macao Bridge Hong Kong
Boundary Crossing Facilities – Investigation

Drawing Title
ANTICIPATED CONSTRUCTION SEQUENCE OF HKBCF (SEQUENCE B)

Rev.	Description	Date
A	FIRST ISSUE	02/09

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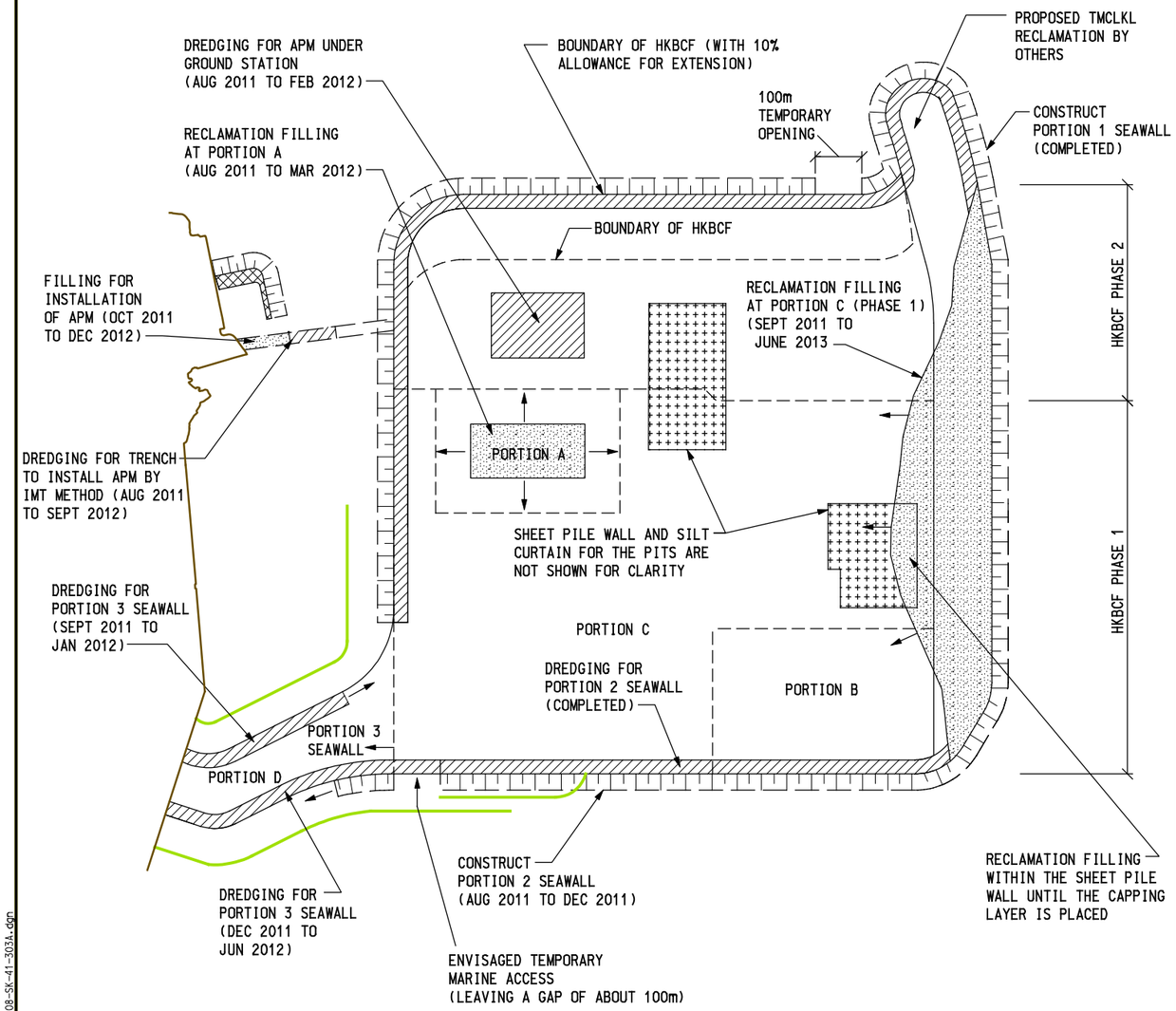
Checked	SK	Approved	AK
Scale	1:12500 on A3		
Status	PRELIMINARY	Rev.	A

Drawing No. 25308/041/302A



LEGEND:

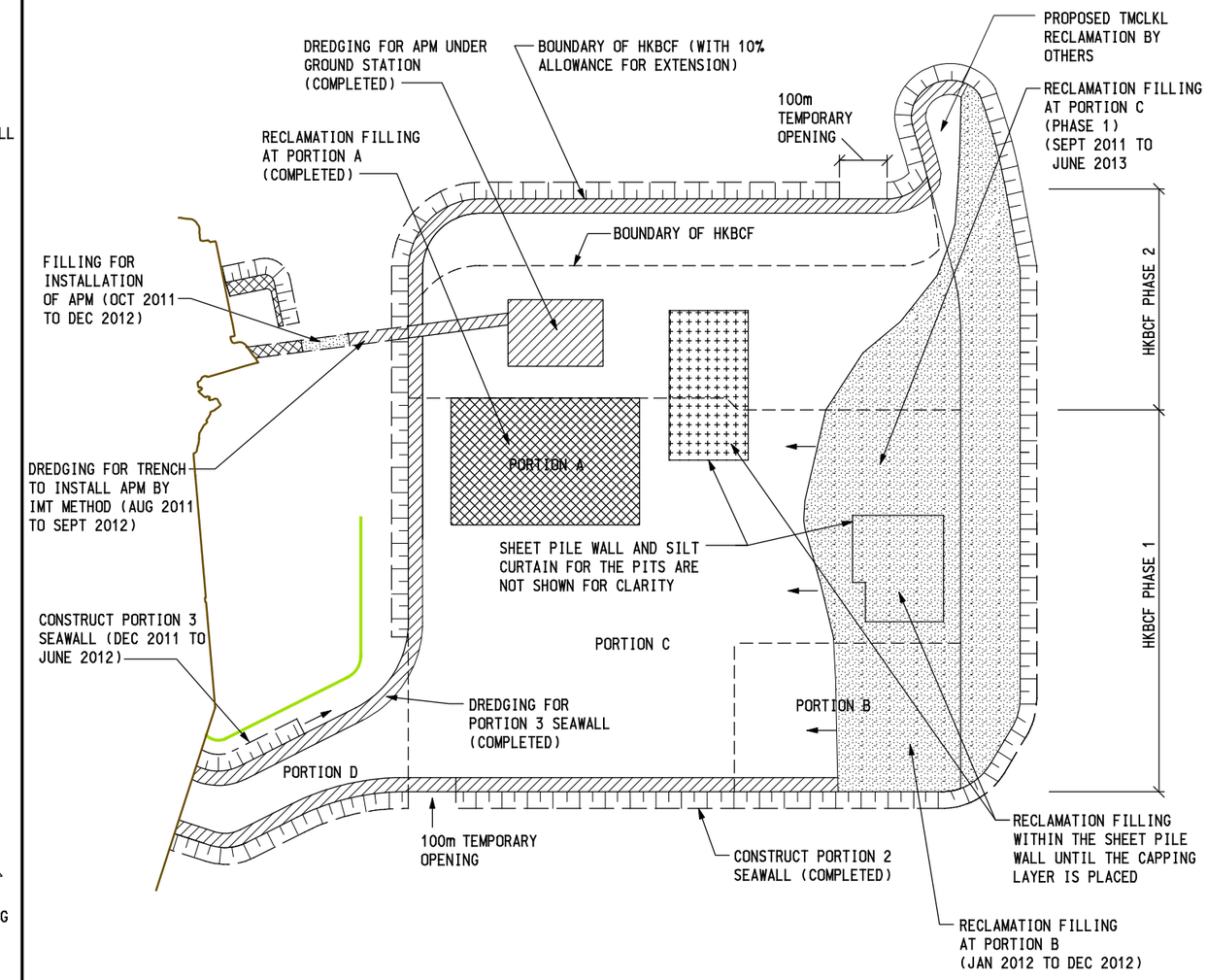
- STEEL SHEET PILE WALL
- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RECLAMATION FILLING AREA
- RECLAMATION WORKS COMPLETED
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

STAGE 5 (ON DEC 2011)



LEGEND:

- SINGLE SILT CURTAIN
- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RECLAMATION FILLING AREA
- RECLAMATION WORKS COMPLETED
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

STAGE 6 (ON APR 2012)

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Filename : J:\25308\ARUP\CIVIL\SKETCH\Reclamation\25308-SK-41-303A.dgn

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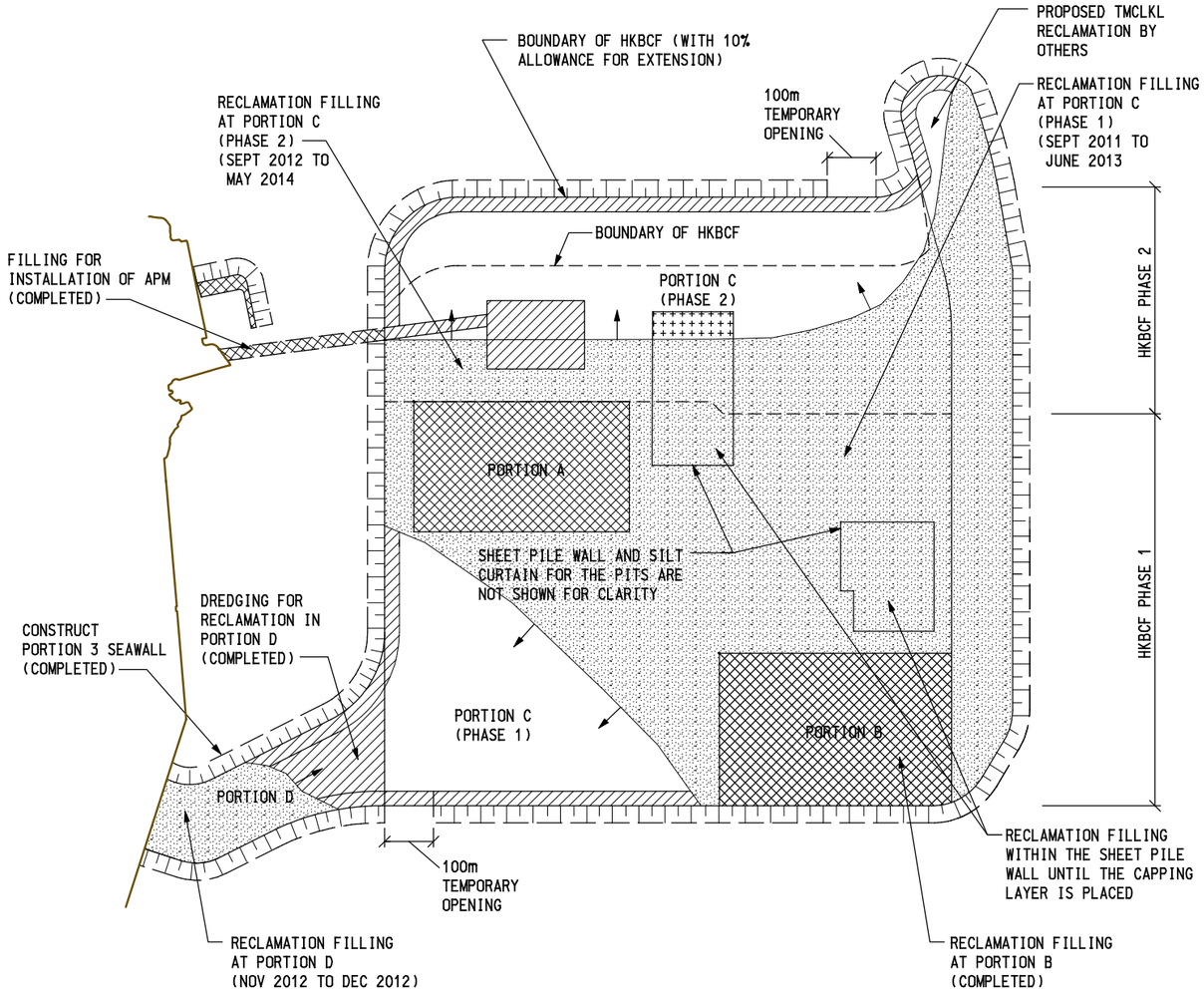
Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn: CN	Date: 02/09	Drawing No.: 25308/041/303A	
Checked: SK	Approved: AK		
Scale: 1:12500 on A3		Status: PRELIMINARY	Rev.: A



NOTE:

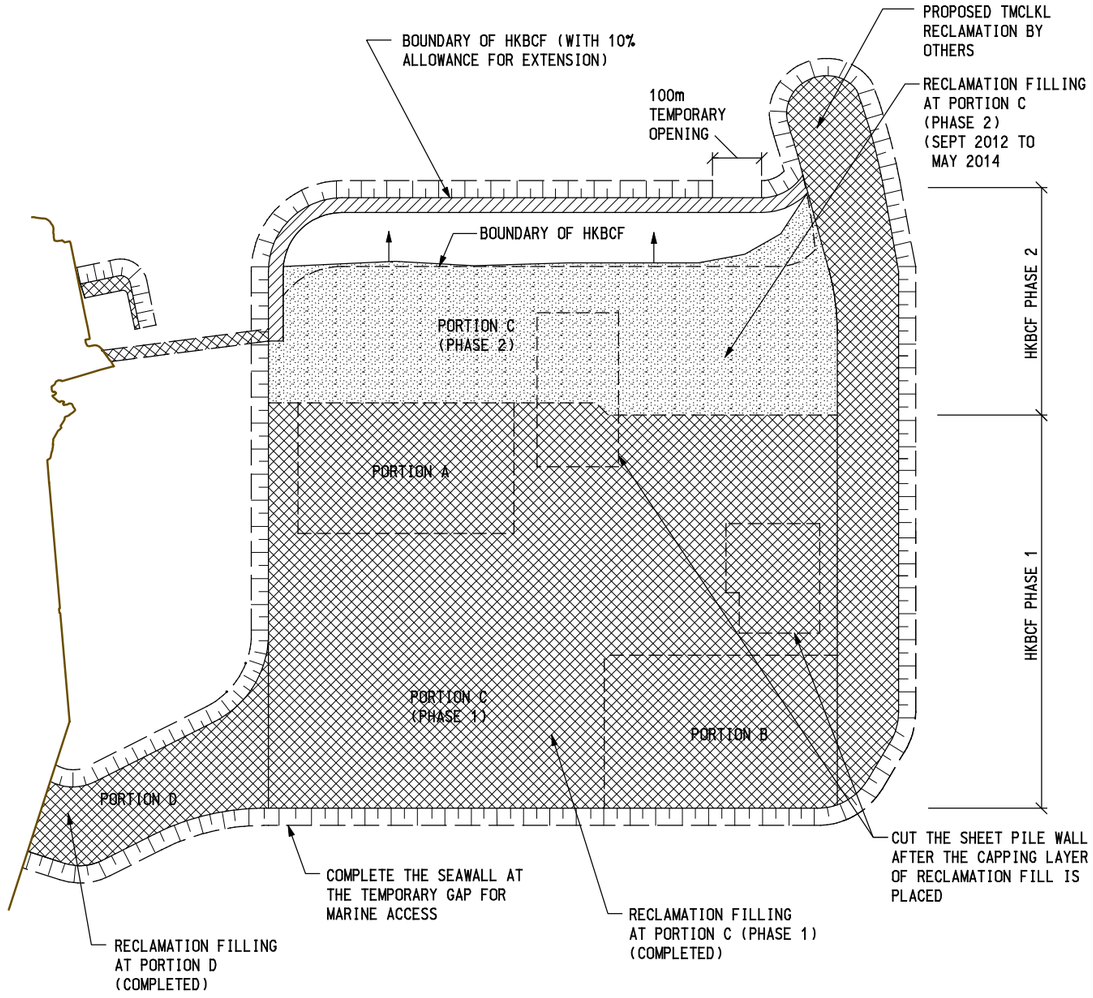
FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RECLAMATION FILLING AREA
- RECLAMATION WORKS COMPLETED
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 7 (ON DEC 2012)



NOTE:

FIRST MEASURE: CAGE TYPE SILT CURTAIN FOR ALL GRAB DREDGERS (SEE TYPICAL SECTION ATTACHED)

SECOND MEASURE: SINGLE SILT CURTAIN AROUND THE SITE (SEE TYPICAL SECTION ATTACHED)

LEGEND:

- DREDGED AREA
- COMPLETED SLOPING SEAWALL
- RECLAMATION FILLING AREA
- RECLAMATION WORKS COMPLETED
- RE-DEPOSITION OF DREDGED Mf SEDIMENT

STAGE 8 (ON DEC 2013)

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Filename : J:\25308\ARUP\CIVIL\SKETCH\Reclamation\25308-SK-41-304A.dgn
29/7/2009

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

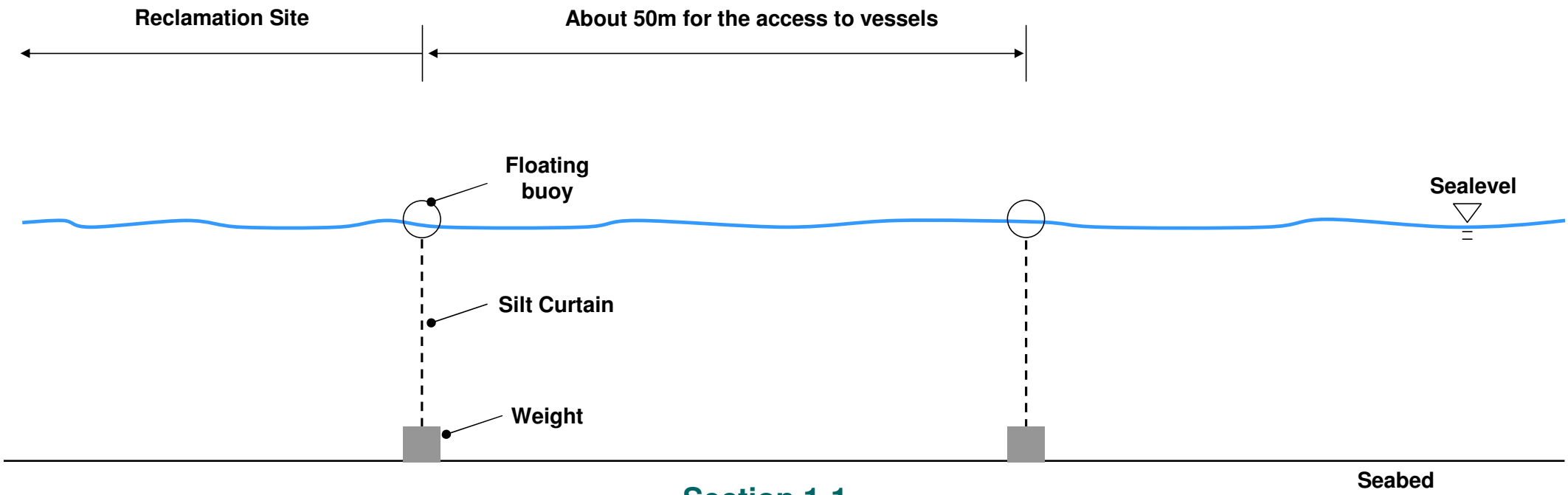
ARUP Ove Arup & Partners Hong Kong Limited

Job Title
Agreement No. CE 14/2008 (CE)
Hong Kong-Zhuhai-Macao Bridge Hong Kong
Boundary Crossing Facilities – Investigation

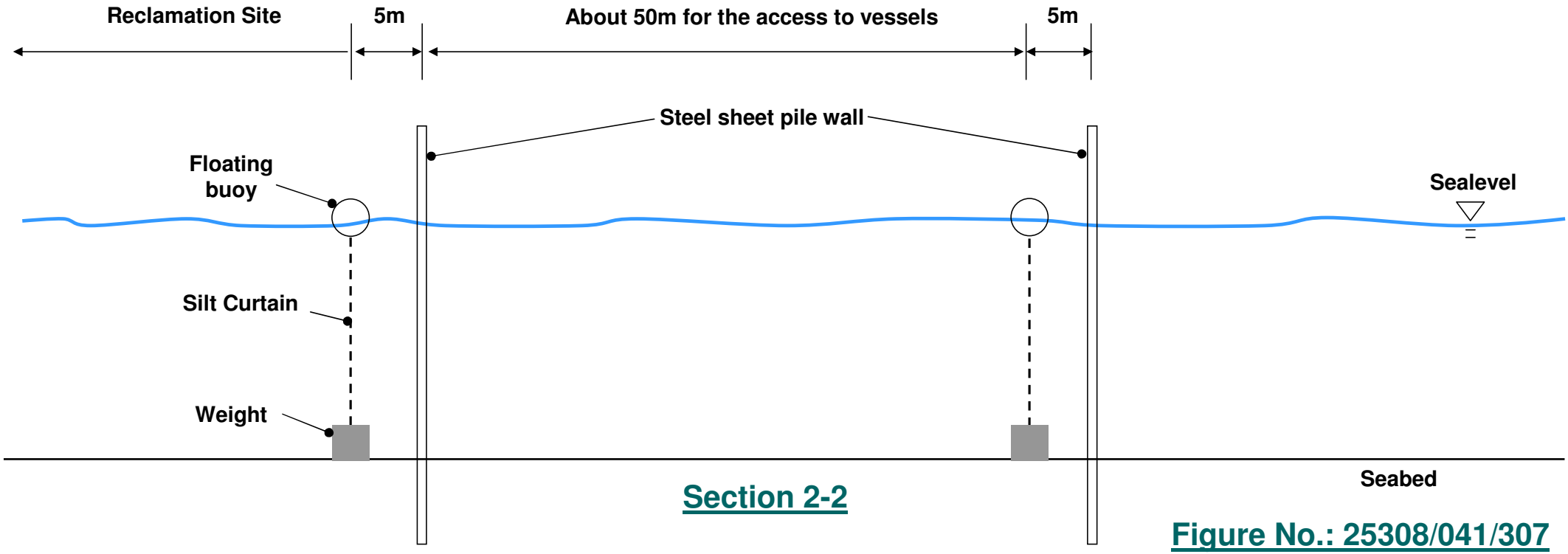
Drawing Title
ANTICIPATED CONSTRUCTION SEQUENCE OF HKBCF (SEQUENCE B)

Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn: CN	Date: 02/09
Checked: SK	Approved: AK
Scale: 1:12500 on A3	
Drawing No.: 25308/041/304A	
Status: PRELIMINARY	Rev.: A

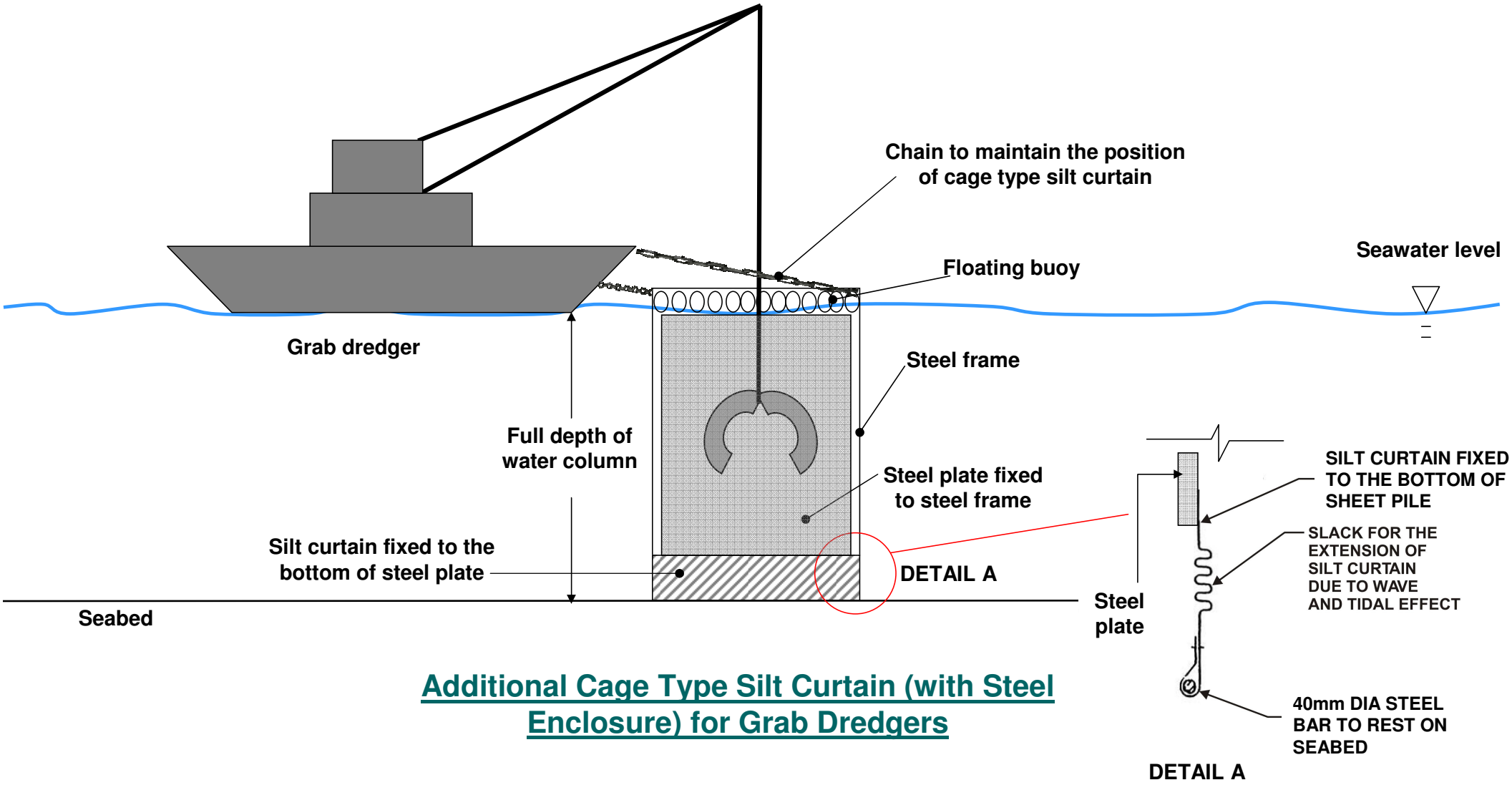


Section 1-1



Section 2-2

Figure No.: 25308/041/307



Additional Cage Type Silt Curtain (with Steel Enclosure) for Grab Dredgers

Figure No.: 25308/041/308a

Sequence B

A. TM-CLKL Northern Reclamation

ID	Area	Works	Item	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
	Portion N-c	Mobilisation and preparation																																														
1		Seawall dredging and reclamation	DN1															DN1	7,200	7,200	7,200	7,200	DN1																												
2		Seawall filling (50% rock, 50% PF)	FN1															FN1	4,000	4,000	4,000	4,000	4,000	FN1																										
		Construct seawall																																															
3		Reclamation filling (PF)	FN2																			FN2	12,000	12,000	12,000	FN2																									
		Reclamation filling (above +2.5mPD)																							0																									
	Portion N-a and N-b	Mobilisation and preparation																																															
5		Seawall dredging	DN2																		DN2		7,200	7,200	7,200	7,200	DN2																								
6		Seawall filling (50% rock, 50% PF)	FN3																		linked activities with ID1, same rate				FN3	4,000	4,000	4,000	4,000	4,000	FN3																							
		Construct seawall																																					FN4 (behind seawall: partial -> full)											
		Reclamation dredging - not required																																															
7		Reclamation filling (PF)	FN4																												FN4	12,000	12,000	12,000	12,000	12,000	12,000													
		Reclamation filling (above +2.5mPD)																																			0	0											
		Total Daily Production Rate																	11,200	11,200	11,200	11,200	23,200	19,200	19,200	11,200	4,000	4,000	4,000	4,000	0	0	12,000	12,000	12,000	12,000	12,000	12,000	0	0	0	0	0	0	0	0	0	0	0	0	0

B. TM-CLKL Southern Reclamation

ID	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14	03-14	04-14	05-14	06-14
	Portion S-a	Mobilisation and preparation																																															
8		Seawall dredging and reclamation	DS1b						DS1b	64,800																																								
9		Seawall filling (50% rock, 50% sand)	FS1b							FS1b	6,000	6,000	6,000	6,000	6,000	6,000	FS1b																																		
		Construct seawall																																																
10		Reclamation filling (70% sand, 30 % PF)	FS2b												FS2b	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	FS2b (behind seawall: full)																									
		Reclamation filling (above +2.5mPD)																																															
	Portion S-b	Mobilisation and preparation																																															
11		Seawall dredging	DS2b				DS2b	43,200	43,200	DS2b																																								
12		Seawall filling (50% rock, 50% sand)	FS3b						FS3b	6,000	6,000	6,000	6,000	FS3b																																				
		Construct seawall																																																
		Reclamation dredging - not required																																															
13		Reclamation filling (70% sand, 30 % PF)	FS4b												FS4b	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	FS4b (behind seawall: full)																									
		Reclamation filling (above +2.5mPD)																																															
	Portion S-c	Mobilisation and preparation																																															
14		Dredging for seawall	DS3b			DS3b	28,800																																										
15		Seawall filling (50% rock, 50% sand)	FS5b				FS5	4,000	4,000	4,000	4,000																																								
		Construct seawall																																																
		Reclamation dredging - not required																																															
16		Reclamation filling (70% sand, 30 % PF)	FS6b												FS6	6,000	6,000	6,000	6,000	6,000	6,000	FS6 (behind seawall: full)																									
		Reclamation filling (above +2.5mPD)																																															
17	Viaduct	Piling & Pile Cap Construction	P																	p	432	432	432	432	432	432	432	432	432	432	432	432	432	432	p																	
		Total Daily Production Rate					28,800	47,200	47,200	74,800	16,000	12,000	12,000	6,000	6,000	24,000	18,000	18,000	18,000	18,000	18,432	12,432	12,432	12,432	6,432	6,432	6,432	6,432	432	432	432	432	432	432	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

C. HKBCF

ID	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14	03-14	04-14	05-14	06-14
	Seawalls	Mobilisation and preparation																																															
18		Seawall dredging (Portion 1)	8	8	64,800	64,800					64,800	64,800	64,800	8																																				
19		Seawall filling (Portion 1)	A				A	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	A																																				
20		Seawall dredging (Portion 2)	9										9	43,200	43,200	43,200	9																																
21		Seawall filling (Portion 2)	B												B	50,000	50,000	50,000	50,000	50,000	B																													
22		Seawall dredging (Portion 3)	9													9	43,200	43,200	43,200	43,200	43,200	9																												
25		Seawall filling (Portion 3)	B																	B	50,000	50,000	50,000	50,000	50,000	50,000	B																							
28	Phase 1 - Portion A	Sand blanket	C												C	40,000	C																																
29		Reclamation filling	H																H	80,000	80,000	80,000	H																										
23	Phase 1 - Portion B	Sand blanket	D																	D	40,000	D																										
26		Reclamation filling	L																						L	60,000	60,000	60,000	60,000	60,000	60,000	L																	
	Phase 1 - Portion C	Sand blanket	C													C	40,000	40,000	C																														
30		Reclamation filling	I																		I	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	I																			
24	Phase 1 - Portion D	Dredging	10																									10	14,400	14,400	10																		
27		Reclamation filling	F																											F	40,000	F																	
31	Phase 2 - Portion C	Sand blanket	D																									D	40,000	40,000																		
32		Reclamation filling	I																																			I	0,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	I
33	Pits for Mf sediment	Install sheet piles																																															
34		Dredging to form the Mf pits																																															
35		Redeposition of Mf sediments within the pits																																															
36		Remove sheet pile after capping by sandfill																																															
37																																																	
38																																																	
39	APM & FSD berth	Dredging for seawall and reclamation (FSD)	11	11	7,200	7,200	7,200	7,200	11																																								
40		Seawall filling (FSD)	J				J	20,000	20,000	J																																							
41		Reclamation filling (FSD)	M							M	10,000	10,000	10,000	10,000	M																																			
42		Dredging for APM (by IMT method)	10 -> 11												10 -> 11	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	7,200	7,200	7,200	7,200	7,200	7,200	7,200	11																					
43		Filling for APM after installation to IMT	K																	K	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	K																	
		Total Daily Production Rate		0	72,000	72,000	7,200	67,200	80,000	80,000	134,800	134,800	134,800	113,200	103,200	147,600	147,600	147,600	107,600	187,600	247,600	194,400	187,200	107,200	107,200	107,200	117,200	117,200	171,600	164,400	150,000	110,000	50,000	50,000	50,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30000	30000	30000

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

D. HKLR

ID	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14	03-14	04-14	05-14	06-14
	Portion 1	Mobilisation and preparation																																															
44		Seawall dredging	1						1	21,600	21,600	21,600	21,600	21,600	21,600	1																																			
45		Seawall filling	a											a		28,000	28,000	28,000	28,000	a			linked activities, higher rate (ID48) assumed																									
46		Reclamation dredging	1									linked activities, higher rate (ID44) assumed						1			21,600	21,600	21,600																														
47		Reclamation filling	b												linked activities, higher rate (ID45) assumed							b	28,000	28,000	28,000	28,000	28,000	28,000	28,000	b																									
48	Portion 2 & 3	Dredging for seawall and reclamation	1																			1	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	1																					
49		Filling for seawall and reclamation	a -> b																									a	28,000	28,000	28,000	28,000	28,000	28,000	a -> b																
50	Viaduct	Piling & Pile Cap Construction (Portion A)	p1												p1	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	p1																										
51	in western open sea	Piling & Pile Cap Construction (Portion B)	p1											p1											p1	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	p1																	
52		Piling & Pile Cap Construction (Portion C)	p1																																		p1	p03	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	p1					
	Pits for Mf sediment	Install sheet piles																																															
		Dredging to form the Mf pits																																															
		Redeposition of Mf sediments within the pits																																															
		Remove sheet pile after capping by sandfill																																															
53	Viaduct at	Piling & Pile Cap Construction (Portion 1)	p2																																														
54	Airport Channel	Piling & Pile Cap Construction (Portion 2)	p2												p2	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287	287
55		Piling & Pile Cap Construction (Portion 3) (No marine works)	p3																																														
56		Piling & Pile Cap Construction (Portion 4) (No marine works)	p3																																														
57		Piling & Pile Cap Construction (Portion 5) (No marine works)	p3																																														
		Superstructure, roadworks & E&M works																																																
		Total Daily Production Rate								21,600	21,600	21,600	21,600	21,600	22,890	29,290	29,290	29,290	29,290	22,890	22,890	22,890	50,890	50,890	50,890	50,890	50,603	78,603	50,603	50,603	29,003	29,003	29,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	0	0	0	0	0	0

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

E. Project Summary

	Time	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14
TM-CLKL North	TM-CLKL North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,200	11,200	11,200	11,200	23,200	19,200	19,200	11,200	4,000	4,000	4,000	4,000	-	-	12,000	12,000	12,000	12,000	12,000	12,000	-	-	-	-	-	-	-	-	-	-	-	-
TM-CLKL South	TM-CLKL South	-	-	-	28,800	47,200	47,200	74,800	16,000	12,000	12,000	6,000	6,000	24,000	18,000	18,000	18,000	18,000	18,432	12,432	12,432	12,432	6,432	6,432	6,432	6,432	432	432	432	432	432	432	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HKBCF	HKBCF	-	72,000	72,000	7,200	67,200	80,000	80,000	134,800	134,800	134,800	113,200	103,200	147,600	147,600	147,600	107,600	187,600	247,600	194,400	187,200	107,200	107,200	107,200	117,200	117,200	171,600	164,400	150,000	110,000	50,000	50,000	50,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
HKLR	HKLR	-	-	-	-	-	-	21,600	21,600	21,600	21,600	21,600	22,890	29,290	29,290	29,290	29,290	22,890	22,890	22,890	50,890	50,890	50,890	50,890	50,603	78,603	50,603	50,603	29,003	29,003	29,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	-	-	-	-	-	-
All 3 Prjs (Sequence B)	All 3 Prjs	-	72,000	72,000	36,000	114,400	127,200	176,400	173,400	168,400	168,400	140,800	132,090	200,890	194,890	194,890	166,090	239,690	300,122	240,922	273,722	186,722	183,722	175,722	178,235	206,235	226,635	219,435	179,435	139,435	91,435	63,435	63,003	43,003	43,003	43,003	31,003	31,003	31,003	31,003	31,003	31,003	30,000	30,000	30,000	30,000	30,000	30,000

Dredging	Filling
Dredging behind partially full seawall / pilling	Filling behind partially full seawall
Dredging behind full seawall	Filing behind full seawall, or Above +2.5 mPD, or Rock Fill

Partial Seawall = Substantially Completed Seawall with 100-200m leading edge.
Full Seawall = Substantially Completed Seawall with 50-100m opening for marine access.

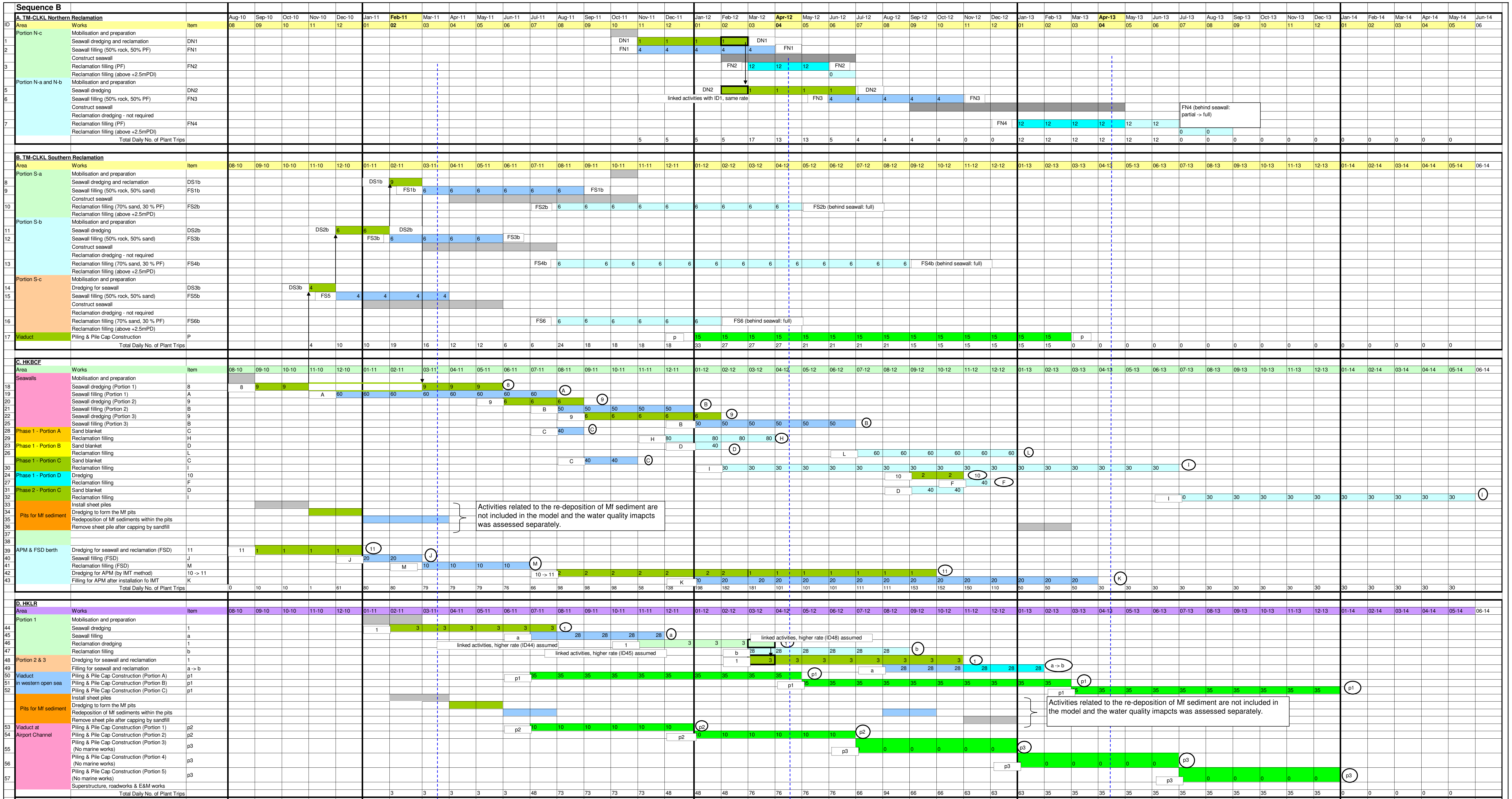
F. Summary of Project Activities

		Max rate	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14
TM-CLKL North	Dredging	7,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7,200	7,200	7,200	7,200	7,200	7,200	7,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	16,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,000	4,000	4,000	4,000	16,000	12,000	12,000	4,000	4,000	4,000	4,000	4,000	-	-	12,000	12,000	12,000	12,000	12,000	12,000	-	-	-	-	-	-	-	-	-	-	-
TM-CLKL South	Dredging	64,800	-	-	-	28,800	43,200	43,200	64,800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	24,000	-	-	-	-	4,000	4,000	10,000	16,000	12,000	12,000	6,000	6,000	24,000	18,000	18,000	18,000	18,000	18,000	12,000	12,000	12,000	6,000	6,000	6,000	6,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HKBCF	Dredging	72,000	-	72,000	72,000	7,200	7,200	-	-	64,800	64,800	64,800	43,200	43,200	57,600	57,600	57,600	57,600	57,600	57,600	14,400	7,200	7,200	7,200	7,200	7,200	21,600	14,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	190,000	-	-	-	-	60,000	80,000	80,000	70,000	70,000	70,000	70,000	60,000	90,000	90,000	90,000	50,000	130,000	190,000	180,000	180,000	100,000	100,000	100,000	110,000	110,000	150,000	150,000	150,000	110,000	50,000	50,000	50,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
HKLR	Dredging	21,600	-	-	-	-	-	-	21,600	21,600	21,600	21,600	21,600	21,600	-	-	-	-	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	56,000	-	-	-	-	-	-	-	-	-	-	-	-	28,000	28,000	28,000	28,000	-	-	-	28,000	28,000	28,000	28,000	28,000	56,000	28,000	28,000	28,000	28,000	28,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Remark: Table F exclude the quantity for viaduct bored piling works.

Overall Programme for TM-CLKL + HKBCF + HKLR - Maximum Daily Production Rate (bulked volume, m3/day) (Sequence B)

Figure 1b



E. Project Summary

	Time	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11
TM-CLKL North	TM-CLKL North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5
TM-CLKL South	TM-CLKL South	-	-	-	4	10	10	19	16	12	12	6	6	24	18	18	18	18
HKBCF	HKBCF	-	10	10	1	61	80	80	79	79	79	76	66	98	98	98	58	138
HKLR	HKLR	-	-	-	-	-	-	3	3	3	3	3	48	73	73	73	73	48
All 3 Prjs (Sequence B)	All 3 Prjs	-	10	10	5	71	90	102	98	94	94	85	120	195	189	189	154	209

	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14
TM-CLKL North	5	5	17	13	13	5	4	4	4	4	-	-	12	12	12	12	12	12	-	-	-	-	-	-	-	-	-	-	-
TM-CLKL South	33	27	27	27	21	21	21	21	15	15	15	15	15	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HKBCF	198	182	181	101	101	101	111	111	153	152	150	110	50	50	50	30	30	30	30	30	30	30	30	30	30	30	30	30	30
HKLR	48	48	76	76	76	76	66	94	66	66	63	63	63	35	35	35	35	35	35	35	35	35	35	35	-	-	-	-	-
All 3 Prjs (Sequence B)	284	262	301	217	211	203	202	230	238	237	228	188	140	112	97	77	77	77	65	65	65	65	65	65	30	30	30	30	30

Dredging
Dredging behind partially full seawall / pilling
Dredging behind full seawall
Filling
Filling behind partially full seawall
Filing behind full seawall, or Above +2.5 mPD, or Rock Fill

Partial Seawall = Substantially Completed Seawall with 100-200m leading edge.
Full Seawall = Substantially Completed Seawall with 50-100m opening for marine access.

F. Summary of Project Activities

		Max no.	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11
TM-CLKL North	Dreding	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
	Filling	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4
TM-CLKL South	Dreding	9	-	-	-	4	6	6	9	-	-	-	-	-	-	-	-	-	-
	Filling	24	-	-	-	-	4	4	10	16	12	12	6	6	24	18	18	18	18
HKBCF	Dreding	10	-	10	10	1	1	-	-	9	9	9	6	6	8	8	8	8	8
	Filling	190	-	-	-	-	60	80	80	70	70	70	70	60	90	90	90	50	130
HKLR	Dreding	3	-	-	-	-	-	-	3	3	3	3	3	3	-	-	-	-	3
	Filling	56	-	-	-	-	-	-	-	-	-	-	-	-	28	28	28	28	-

		Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14
TM-CLKL North	Dreding	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	4	4	16	12	12	4	4	4	4	4	-	-	12	12	12	12	12	12	-	-	-	-	-	-	-	-	-	-	-
TM-CLKL South	Dreding	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	18	12	12	12	6	6	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HKBCF	Dreding	8	2	1	1	1	1	1	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	190	180	180	100	100	100	110	110	150	150	150	110	50	50	50	30	30	30	30	30	30	30	30	30	30	30	30	30	30
HKLR	Dreding	3	3	3	3	3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	-	-	28	28	28	28	28	56	28	28	28	28	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Remark: Table F exclude the quantity for viaduct bored piling works.

Overall Programme for TM-CLKL + HKBCF + HKLR - Daily No. of Plant Trips (Sequence B)

Figure 1c

Sequence B

A. TM-CLKL Northern Reclamation

ID	Area	Works	Item	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14
	Portion N-c	Mobilisation and preparation																																														
1		Seawall dredging and reclamation	DN1															DN1	1	1	1	1	DN1																											
2		Seawall filling (50% rock, 50% PF)	FN1															FN1	1	1	1	1	1	FN1																									
		Construct seawall																																														
3		Reclamation filling (PF)	FN2																			FN2	1	1	1	FN2																								
		Reclamation filling (above +2.5mPD)																							0																								
	Portion N-a and N-b	Mobilisation and preparation																																														
5		Seawall dredging	DN2																		DN2	1	1	1	1	DN2																								
6		Seawall filling (50% rock, 50% PF)	FN3																		linked activities with ID1, same rate				FN3	1	1	1	1	1	FN3																				
		Construct seawall																																					FN4 (behind seawall: partial -> full)										
		Reclamation dredging - not required																																														
7		Reclamation filling (PF)	FN4																												FN4	1	1	1	1	1	1												
		Reclamation filling (above +2.5mPD)																																			0	0										
		Total No. of Active Plants on Site																	2	2	2	2	3	2	2	2	2	1	1	1	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0

B. TM-CLKL Southern Reclamation

	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14	03-14	04-14	05-14	06-14
	Portion S-a	Mobilisation and preparation																																															
8		Seawall dredging and reclamation	DS1b						DS1b	9																																								
9		Seawall filling (50% rock, 50% sand)	FS1b							FS1b	2	2	2	2	2	2	FS1b																																		
		Construct seawall																																																
10		Reclamation filling (70% sand, 30 % PF)	FS2b												FS2b	2	2	2	2	2	2	2	2	2	2	FS2b (behind seawall: full)																									
		Reclamation filling (above +2.5mPD)																																															
	Portion S-b	Mobilisation and preparation																																															
11		Seawall dredging	DS2b				DS2b	6	6	DS2b																																								
12		Seawall filling (50% rock, 50% sand)	FS3b						FS3b	2	2	2	2	FS3b																																				
		Construct seawall																																																
		Reclamation dredging - not required																																															
13		Reclamation filling (70% sand, 30 % PF)	FS4b												FS4b	2	2	2	2	2	2	2	2	2	2	2	2	2	2	FS4b (behind seawall: full)																							
		Reclamation filling (above +2.5mPD)																																															
	Portion S-c	Mobilisation and preparation																																															
14		Dredging for seawall	DS3b			DS3b	4																																										
15		Seawall filling (50% rock, 50% sand)	FS5b				FS5	2	2	2	2																																							
		Construct seawall																																																
		Reclamation dredging - not required																																															
16		Reclamation filling (70% sand, 30 % PF)	FS6b												FS6	2	2	2	2	2	2	FS6 (behind seawall: full)																										
		Reclamation filling (above +2.5mPD)																																															
17	Viaduct	Piling & Pile Cap Construction	P																	p	15	15	15	15	15	15	15	15	15	15	15	15	15	15	p																	
		Total No. of Active Plants on Site					4	8	8	13	6	4	4	2	2	8	6	6	6	6	21	19	19	19	17	17	17	17	15	15	15	15	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

C. HKBCF

	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14	03-14	04-14	05-14	06-14
	Seawalls	Mobilisation and preparation																																															
18		Seawall dredging (Portion 1)	8	8	9	9					9	9	9	8																																			
19		Seawall filling (Portion 1)	A				A	3	3	3	3	3	3	3	3	A																																		
20		Seawall dredging (Portion 2)	9										9	6	6	6	9																																
21		Seawall filling (Portion 2)	B												B	3	3	3	3	3																													
22		Seawall dredging (Portion 3)	9													9	6	6	6	6	9																												
25		Seawall filling (Portion 3)	B																	B	3	3	3	3	3	3																								
28	Phase 1 - Portion A	Sand blanket	C												C	2	C																																
29		Reclamation filling	H																H	4	4	4	4	H																									
23	Phase 1 - Portion B	Sand blanket	D																	D	2	D																											
26		Reclamation filling	L																						L	3	3	3	3	3	L																	
	Phase 1 - Portion C	Sand blanket	C													C	2	2	C																														
30		Reclamation filling	I																		I	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	I										
24	Phase 1 - Portion D	Dredging	10																									10	2	2	10																	
27		Reclamation filling	F																										F	3	F																	
31	Phase 2 - Portion C	Sand blanket	D																									D	2	2																	
32		Reclamation filling	I																																		I	1	2	2	2	2	2	2	2	2	2	2	I
33		Install sheet piles																																															
34	Pits for Mf sediment	Dredging to form the Mf pits																																														
35		Redeposition of Mf sediments within the pits																																															
36		Remove sheet pile after capping by sandfill																																															
37																																																
38																																																
39	APM & FSD berth	Dredging for seawall and reclamation (FSD)	11	11	1	1	1	1	11																																								
40		Seawall filling (FSD)	J					J	1	1	J																																						
41		Reclamation filling (FSD)	M							M	2	2	2	2	M																																	
42		Dredging for APM (by IMT method)	10 -> 11												10 -> 11	2	2	2	2	2	2	2	1	1	1	1	1	1	1	11																				
43		Filling for APM after installation to IMT	K																	K	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	K												
		Total No. of Active Plants on Site		0	10	10	1	4	4	4	14	14	14	11	9	13	13	13	11	15	19	13	12	8	8	8	8	8	12	11	10	7	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

D. HKLR

	Area	Works	Item	08-10	09-10	10-10	11-10	12-10	01-11	02-11	03-11	04-11	05-11	06-11	07-11	08-11	09-11	10-11	11-11	12-11	01-12	02-12	03-12	04-12	05-12	06-12	07-12	08-12	09-12	10-12	11-12	12-12	01-13	02-13	03-13	04-13	05-13	06-13	07-13	08-13	09-13	10-13	11-13	12-13	01-14	02-14	03-14	04-14	05-14	06-14
	Portion 1	Mobilisation and preparation																																															
44		Seawall dredging	1						1	3	3	3	3	3	3	1																																		
45		Seawall filling	a											a			2	2	2	a			linked activities, higher rate (ID48) assumed																													
46		Reclamation dredging	1									linked activities, higher rate (ID44) assumed				1			3	3	3																															
47		Reclamation filling	b												linked activities, higher rate (ID45) assumed						b	2	2	2	2	2	2	b																								
48	Portion 2 & 3	Dredging for seawall and reclamation	1																		1	3	3	3	3	3	3	3	1																					
49		Filling for seawall and reclamation	a -> b																									a	2	2	2	2	2	2	a -> b															
50	Viaduct	Piling & Pile Cap Construction (Portion A)	p1											p1	35	35	35	35	35	35	35	35	35	35	p1																									
51	in western open sea	Piling & Pile Cap Construction (Portion B)	p1																					p1	35	35	35	35	35	35	35	35	35	35	p1															
52		Piling & Pile Cap Construction (Portion C)	p1																															p1	35	35	35	35	35	35	35	35	35	35	p1					
	Pits for Mf sediment	Install sheet piles																																															
		Dredging to form the Mf pits																																															
		Redeposition of Mf sediments within the pits																																															
		Remove sheet pile after capping by sandfill																																															
53	Viaduct at	Piling & Pile Cap Construction (Portion 1)	p2																																														
54	Airport Channel	Piling & Pile Cap Construction (Portion 2)	p2											p2	10	10	10	10	10	10	p2	10	10	10	10	10	p2																								
55		Piling & Pile Cap Construction (Portion 3) (No marine works)	p3																	p2						p3	0	0	0	0	0	0	p3																	
56		Piling & Pile Cap Construction (Portion 4) (No marine works)	p3																													p3	0	0	0	0	0	0	p3									
57		Piling & Pile Cap Construction (Portion 5) (No marine works)	p3																																			p3	0	0	0	0	0	0	p3				
		Superstructure, roadworks & E&M works																																															
		Total No. of Active Plants on Site								3	3	3	3	3	48	47	47	47	47	48	48	48	50	50	50	50	40	42	40	40	37	37	37	35	35	35	35	35	35	35	35	35	35	35	0	0	0	0	0	0

Activities related to the re-deposition of Mf sediment are not included in the model and the water quality imapcts was assessed separately.

E. Project Summary

	Time	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14
TM-CLKL North	TM-CLKL North	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	2	3	2	2	2	1	1	1	1	-	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
TM-CLKL South	TM-CLKL South	-	-	-	4	8	8	13	6	4	4	2	2	8	6	6	6	6	21	19	19	19	17	17	17	17	15	15	15	15	15	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HKBCF	HKBCF	-	10	10	1	4	4	4	14	14	14	11	9	13	13	13	11	15	19	13	12	8	8	8	8	8	12	11	10	7	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
HKLR	HKLR	-	-	-	-	-	-	3	3	3	3	3	48	47	47	47	47	48	48	48	50	50	50	50	40	42	40	40	37	37	37	35	35	35	35	35	35	35	35	35	35	35	-	-	-	-	-
All 3 Prjs (Sequence B)	All 3 Prjs	-	10	10	5	12	12	20	23	21	21	16	59	68	66	66	66	71	90	82	84	79	77	77	66	68	68	67	62	59	57	55	40	38	38	38	37	37	37	37	37	37	2	2	2	2	2

	Dredging	Filling	Partial Seawall = Substantially Completed Seawall with 100-200m leading edge.
	Dredging behind partially full seawall / pilling	Filling behind partially full seawall	Full Seawall = Substantially Completed Seawall with 50-100m opening for marine access.
	Dredging behind full seawall	Filing behind full seawall, or Above +2.5 mPD, or Rock Fill	

F. Summary of Project Activities

		Max no	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14
TM-CLKL North	Dredging	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	1	1	1	1	1	1	1	-	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
TM-CLKL South	Dredging	9	-	-	-	4	6	6	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	8	-	-	-	-	2	2	4	6	4	4	2	2	8	6	6	6	6	6	4	4	4	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HKBCF	Dredging	10	-	10	10	1	1	-	-	9	9	9	6	6	8	8	8	8	8	8	2	1	1	1	1	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	11	-	-	-	-	3	4	4	5	5	5	5	3	5	5	5	3	7	11	11	11	7	7	7	7	7	9	9	10	7	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
HKLR	Dredging	3	-	-	-	-	-	-	-	3	3	3	3	3	3	-	-	-	-	3	3	3	3	3	3	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Filling	4	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	2	-	-	-	2	2	2	2	2	4	2	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

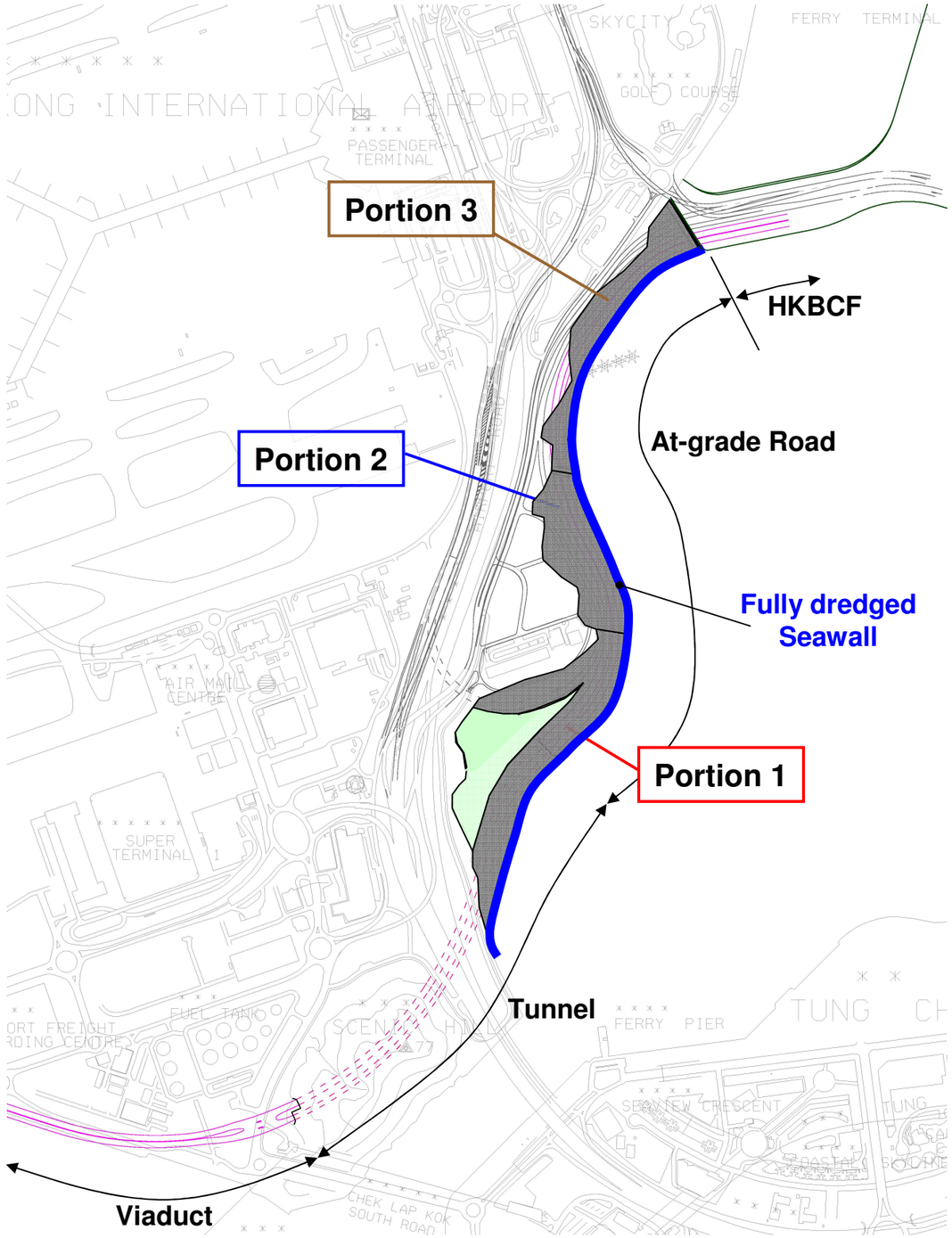
Remark: Table F exclude the quantity for viaduct bored piling works.

Overall Programme for TM-CLKL + HKBCF + HKLR - No. of Active Dredging/Filling Plants on Site (Sequence B)

Figure 1d

APPENDIX E3

Typical Arrangement of HKLR



Seawall – Fully Dredged

Reclamation:

Portion 1
- Full-dredged at seawall, tunnel area and mud pit to receive Mf sediment
- Non-dredged at other area

Portion 2 - Fully Dredged
Portion 3 - Fully Dredged

Fully dredged

Reclamation area to received dredged Mf sediment within the site

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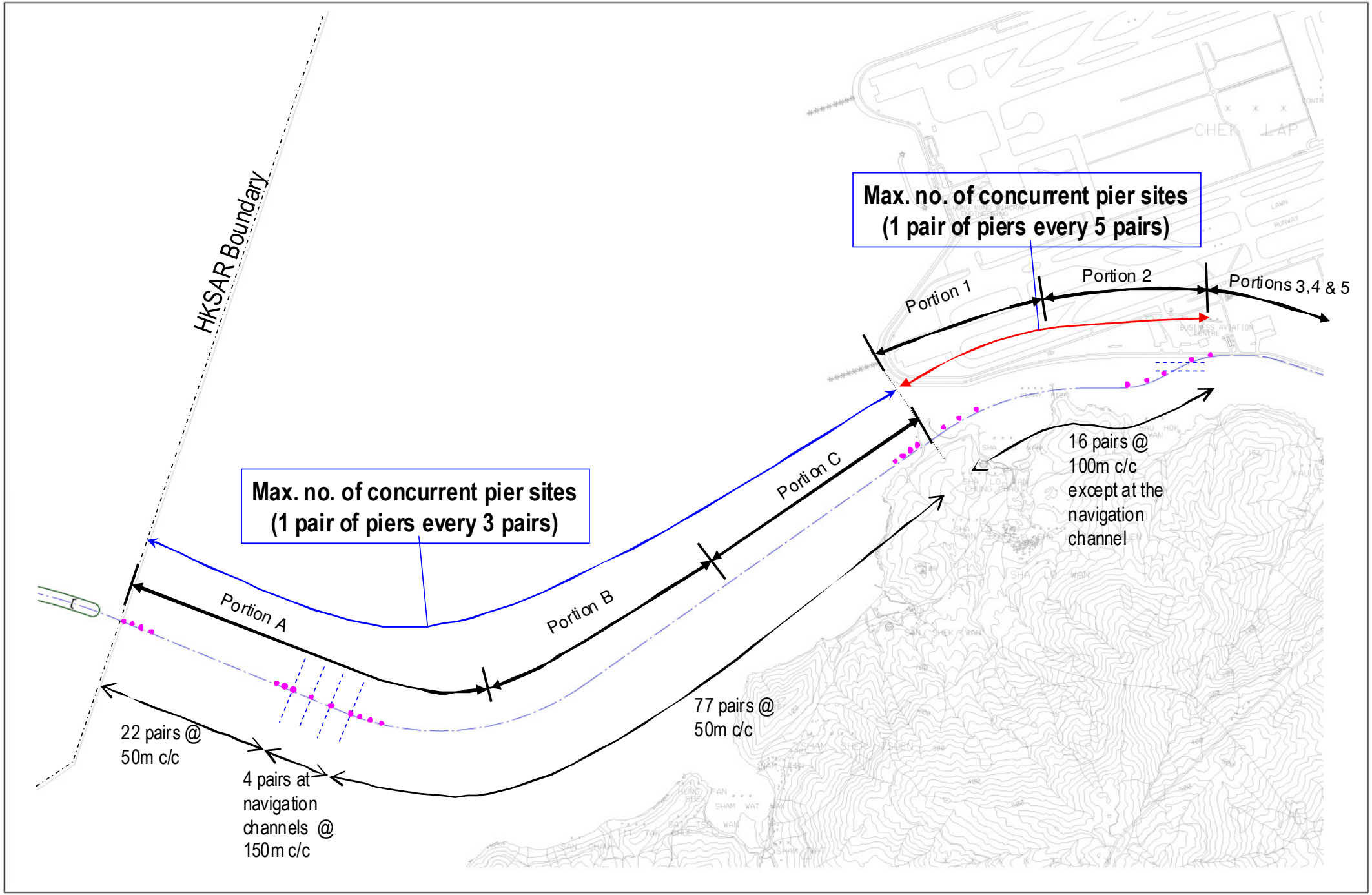

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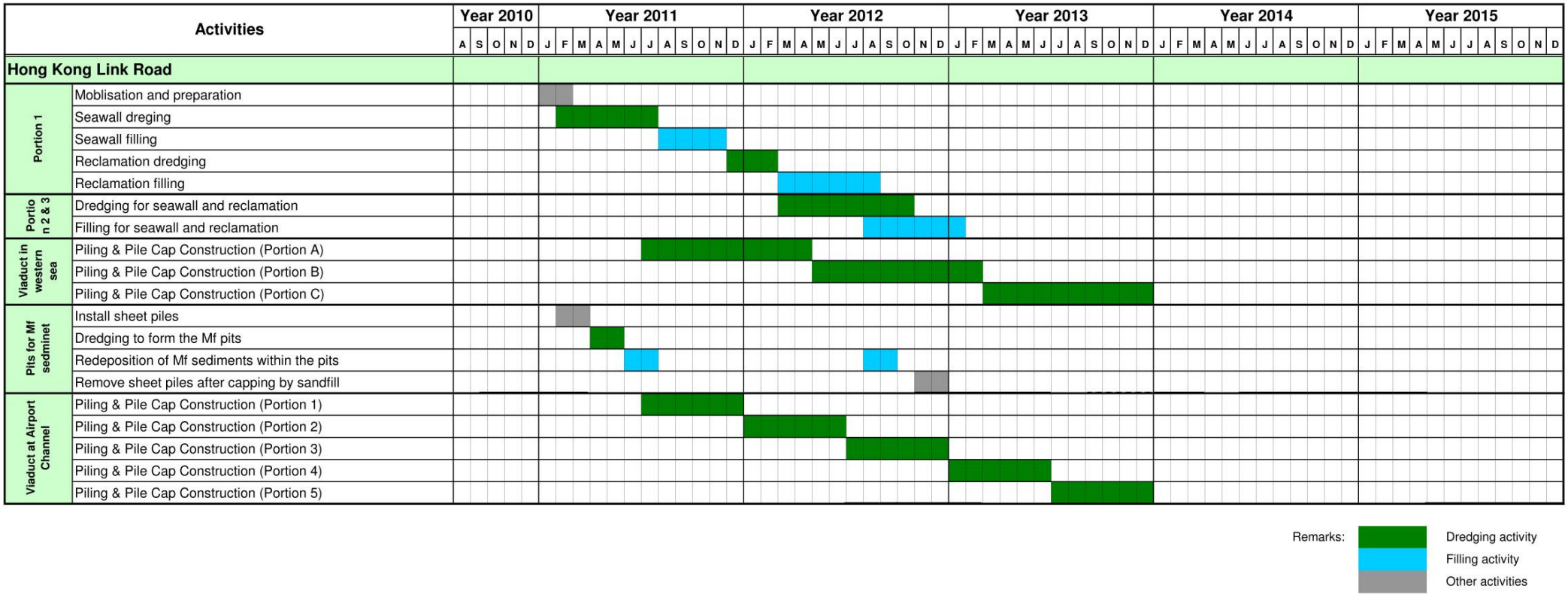

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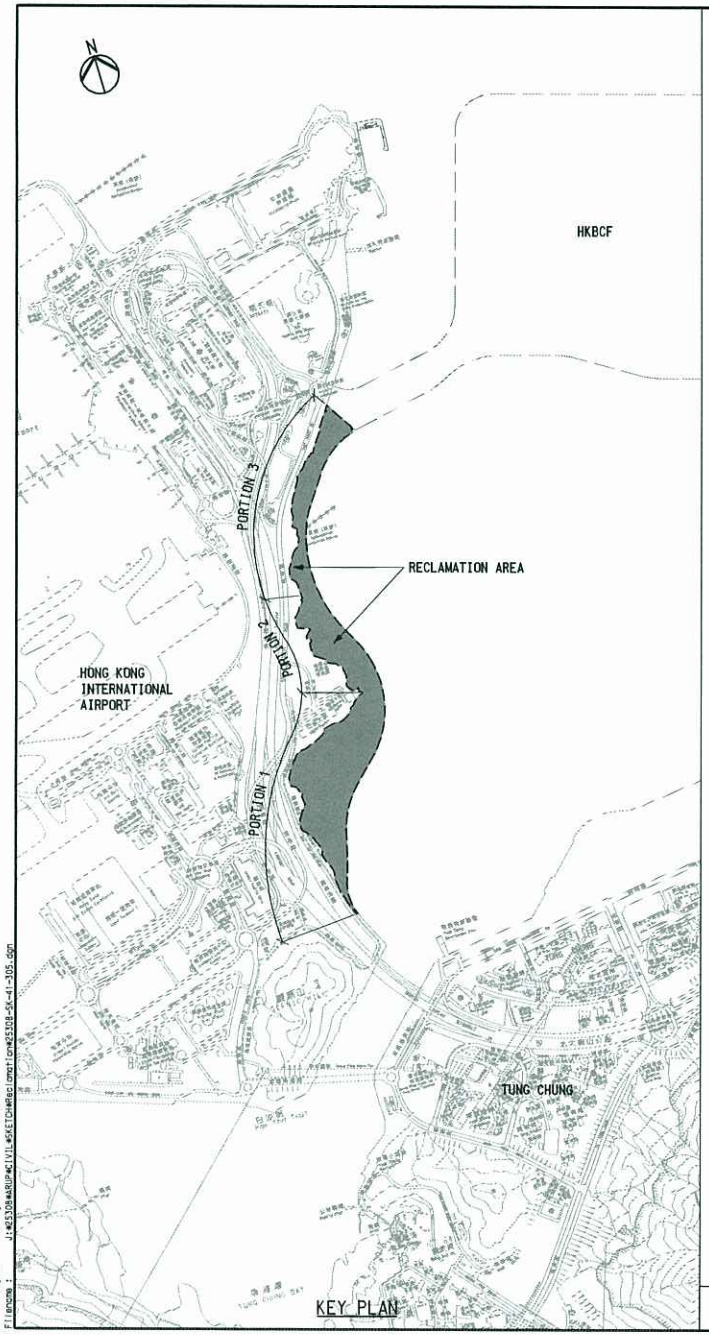
Ove Arup & Partners
Hong Kong Limited

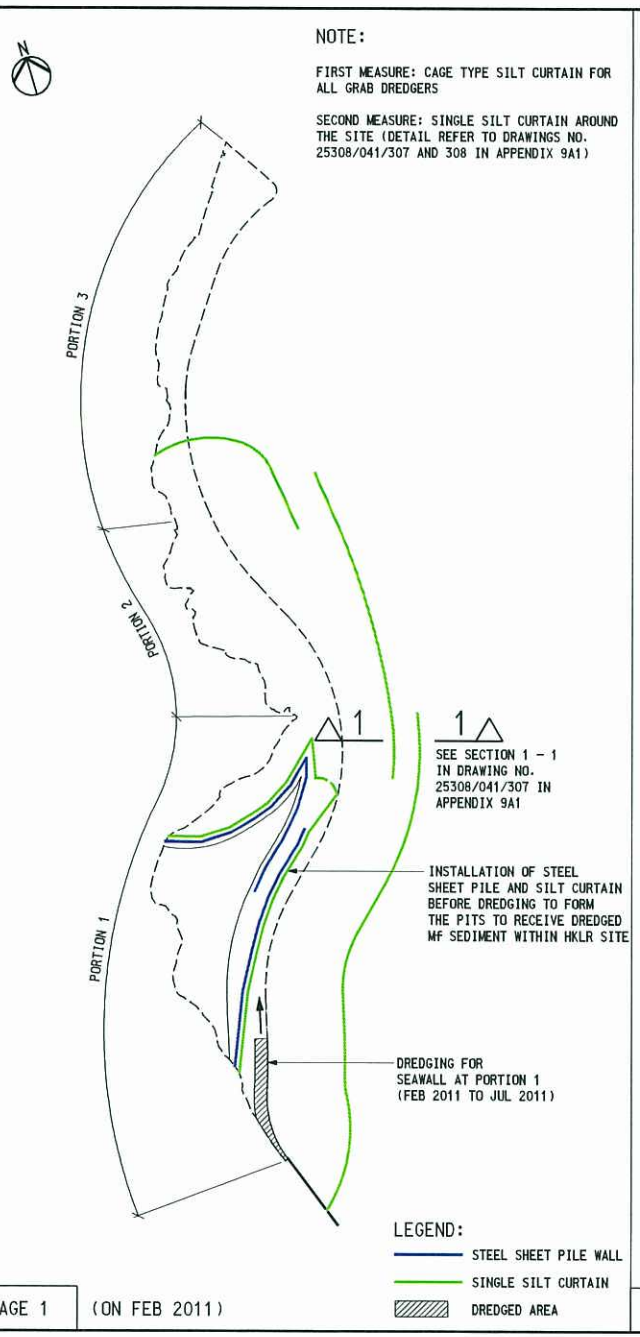
Drawing Title

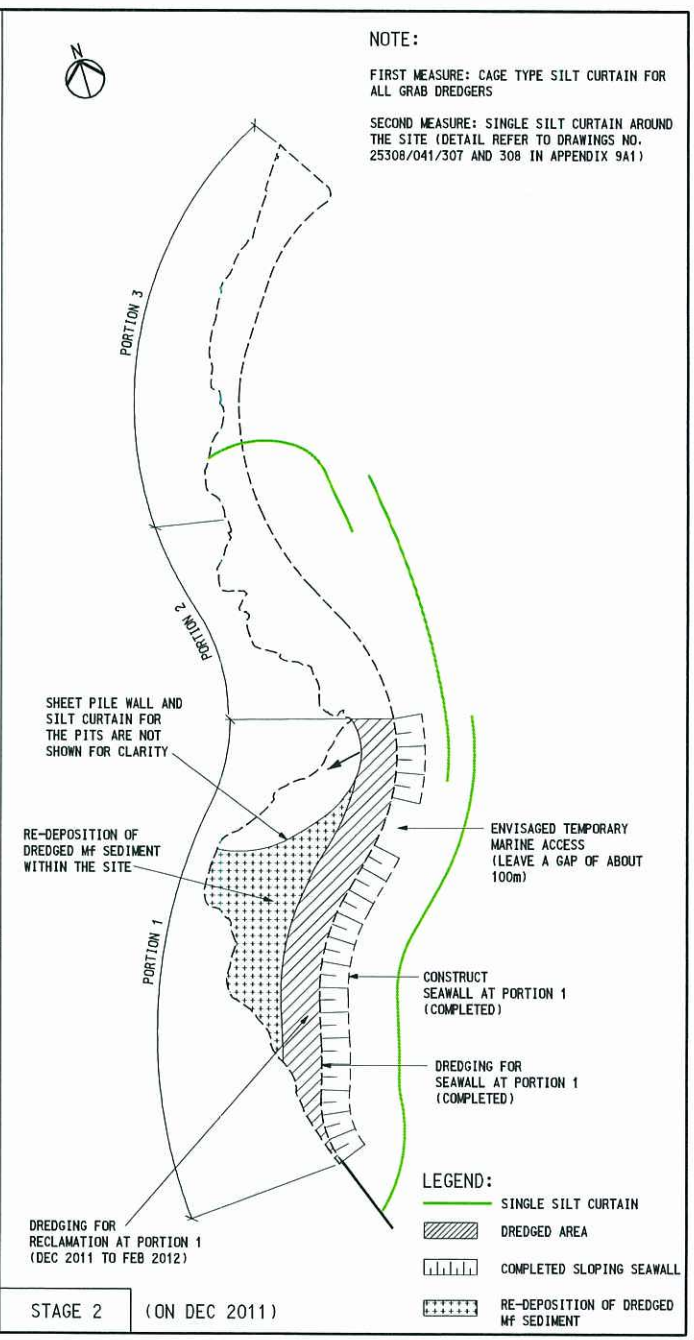
Envisaged Program for HKLR Reclamation and Foundation Work of Viaducts

Drawing No.

Figure 9C-3







Printed by : raman yick
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5/8/2009

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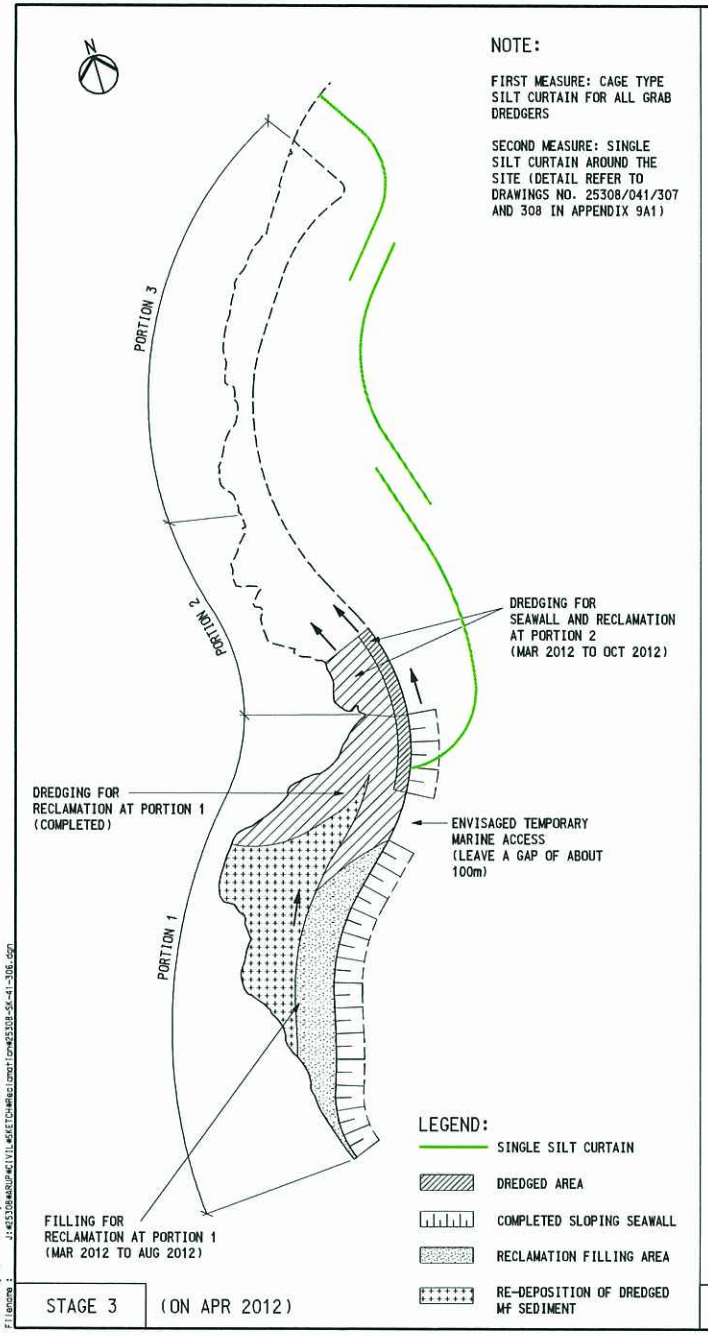
Job Title
Agreement No. CE 14/2008 (CE)
Hong Kong-Zhuhai-Macao Bridge Hong Kong
Boundary Crossing Facilities – Investigation

Drawing Title
ANTICIPATED CONSTRUCTION SEQUENCE OF HKLR

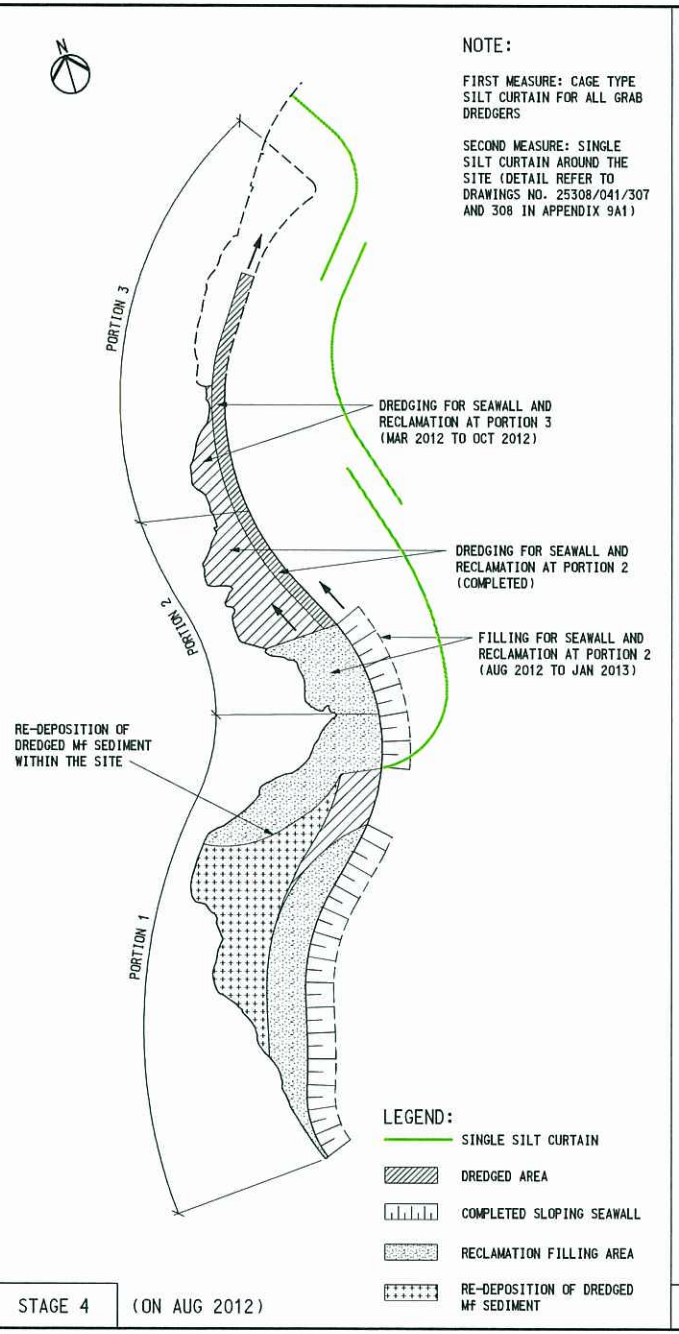
Rev.	Description	Date
A	FIRST ISSUE	02/09

Drawn	AL	Date	02/09
Checked	SK	Approved	AK
Scale	1:10000 on A3		

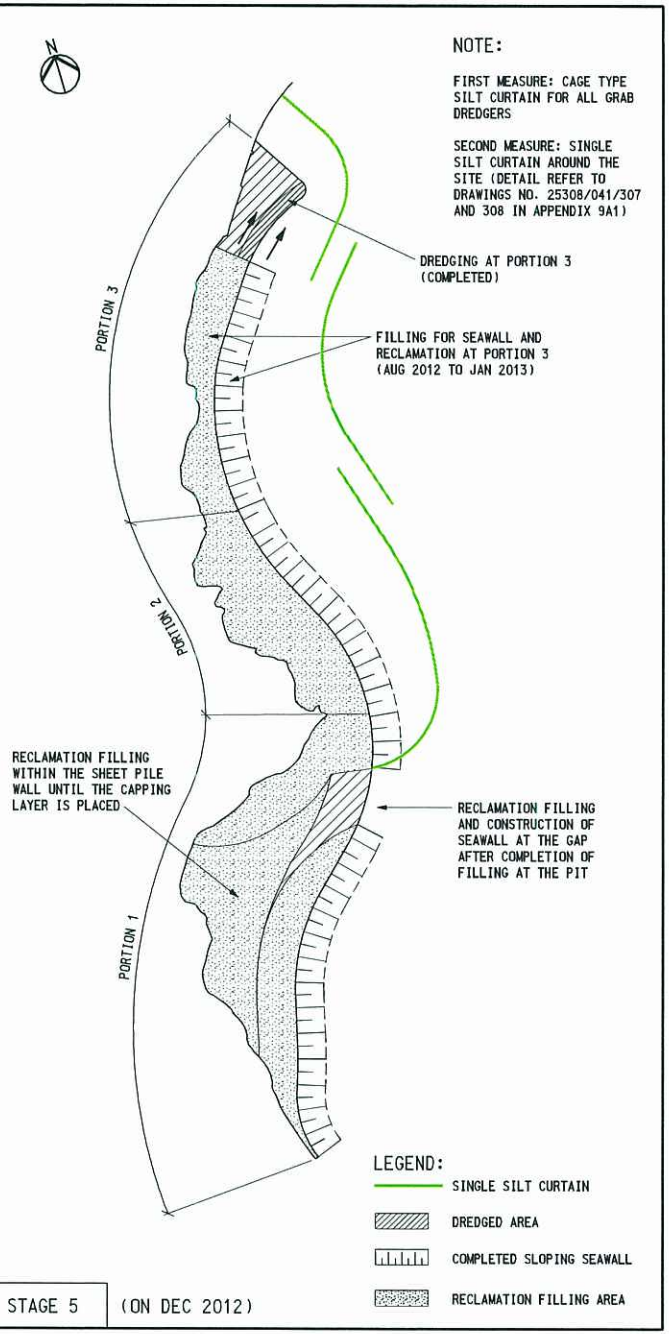
Drawing No. 25308/041/305
Status PRELIMINARY
Rev. A



STAGE 3 (ON APR 2012)



STAGE 4 (ON AUG 2012)



STAGE 5 (ON DEC 2012)

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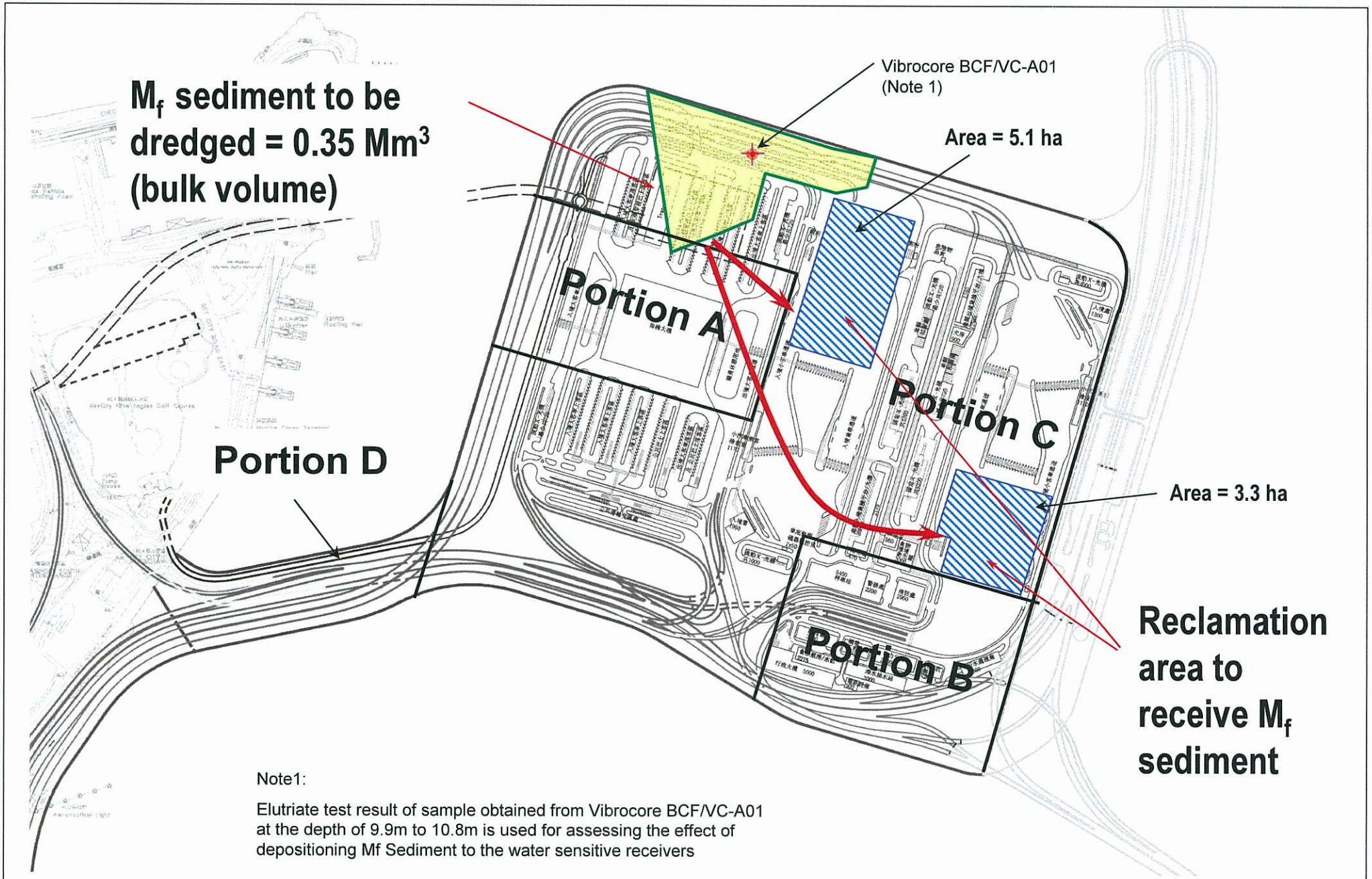
Rev.	Description	Date
A	FIRST ISSUE	02/09

APPENDIX E4

Location Plans of the Proposed Pits to Receive Mf Sediment



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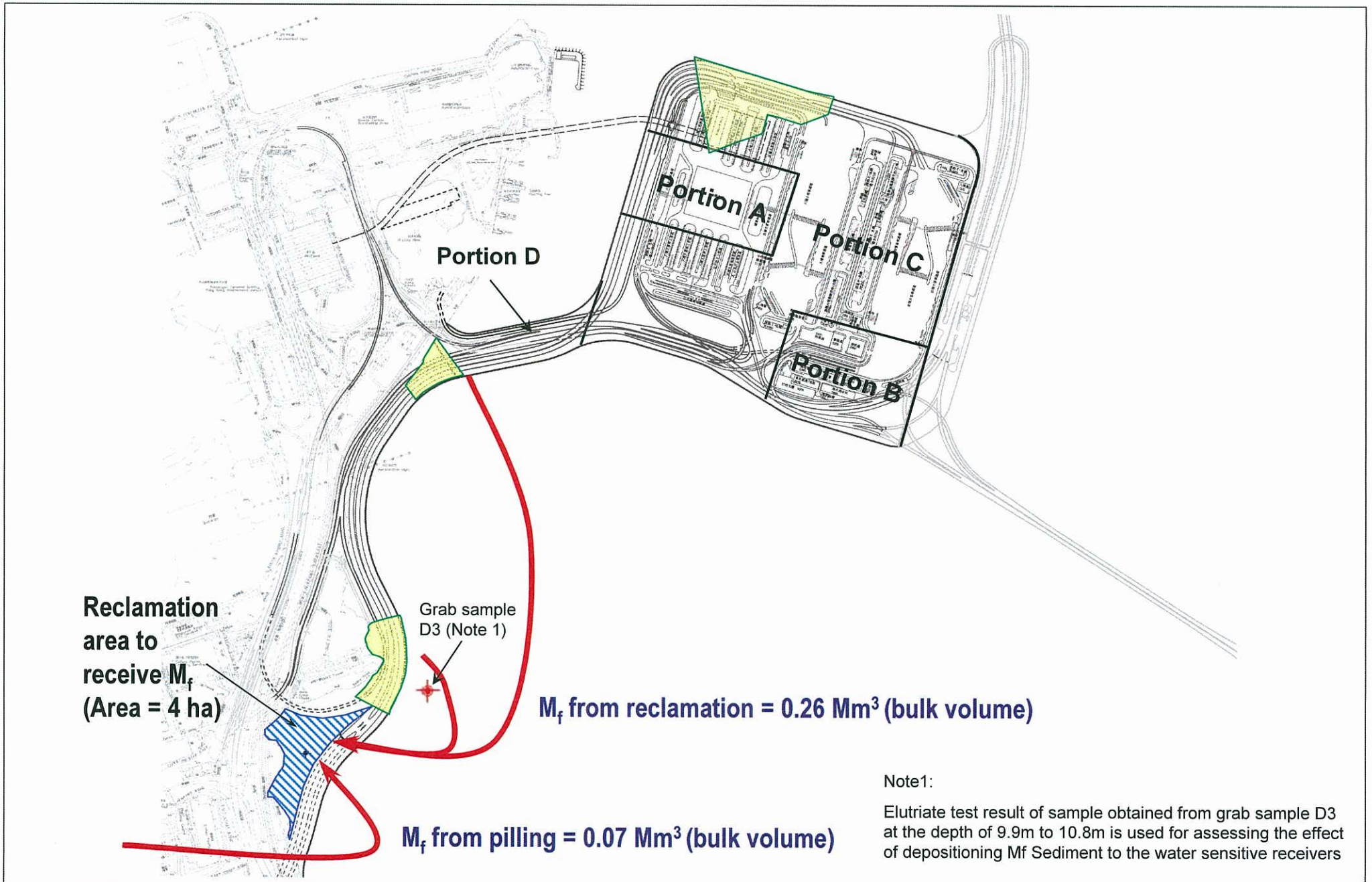

Note1:

Elutriate test result of sample obtained from grab sample D3 at the depth of 9.9m to 10.8m is used for assessing the effect of depositioning Mf Sediment to the water sensitive receivers

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APPENDIX F

Sample Template for Interim Notification

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Location Plan

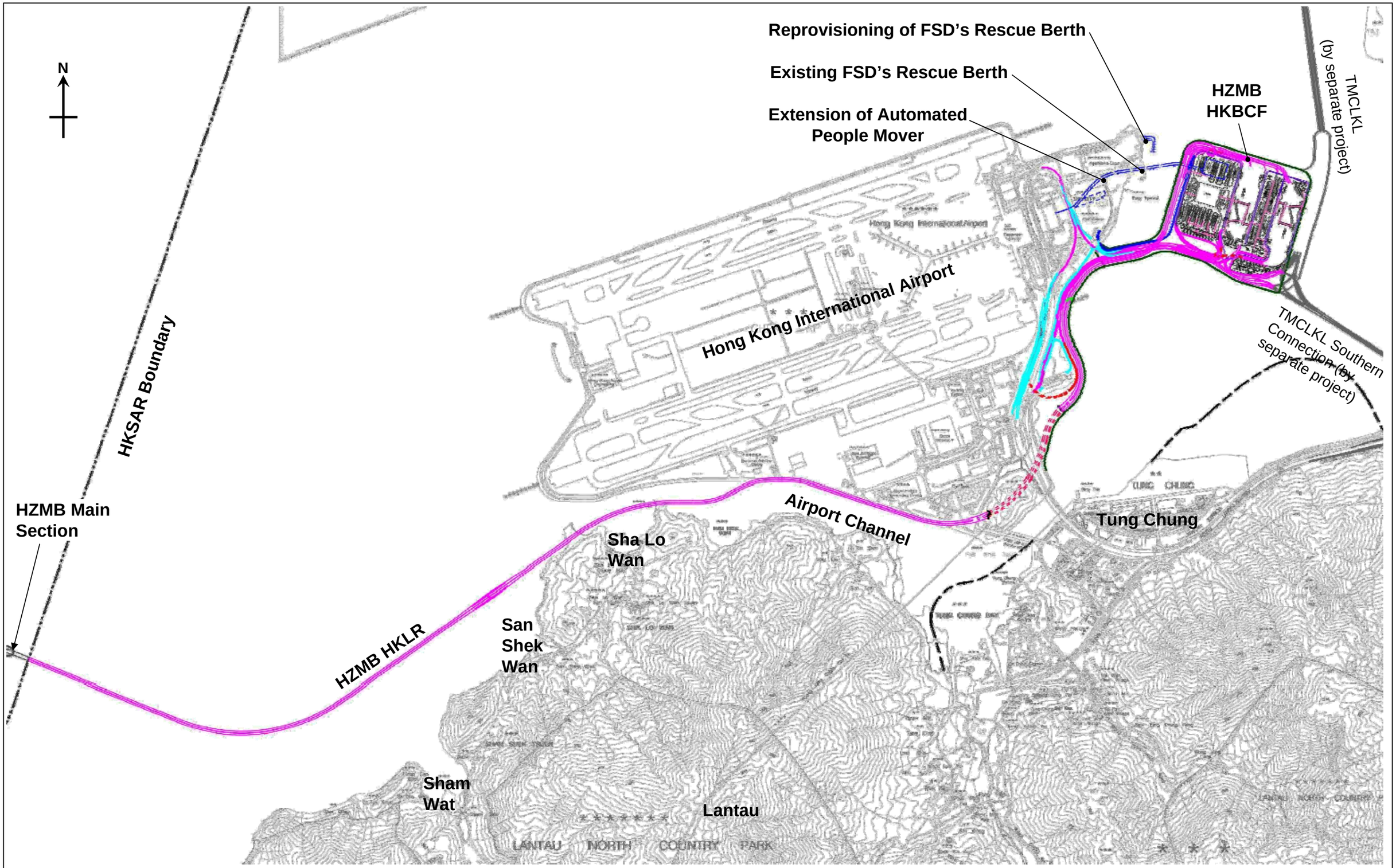
Prepared by :

Designation :

Signature :

Date :

FIGURES



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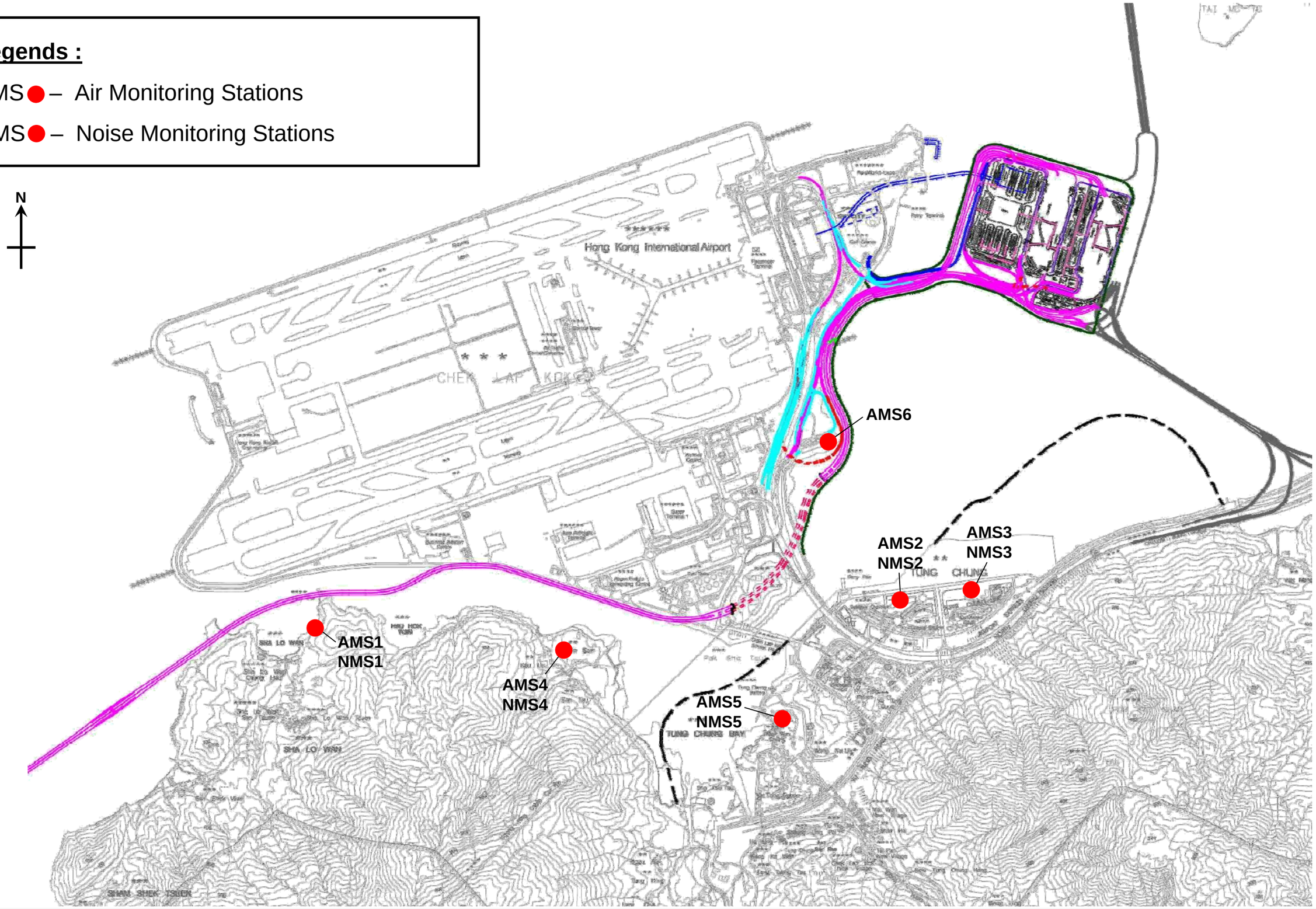
Legends :

AMS● – Air Monitoring Stations

NMS● – Noise Monitoring Stations



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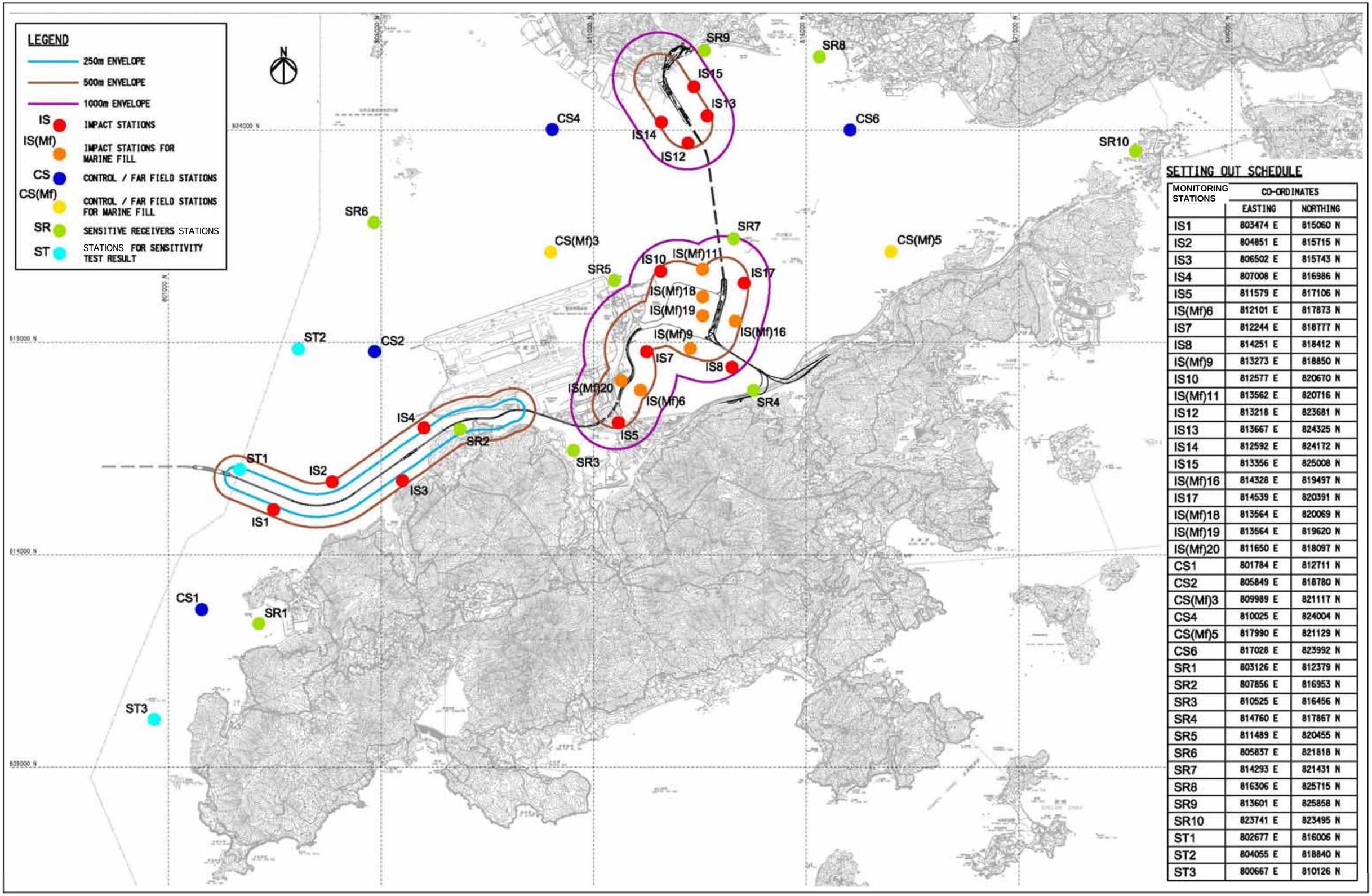

SETTING OUT SCHEDULE

MONITORING STATIONS	CO-ORDINATES	
	EASTING	NORTHING
IS1	803474 E	815060 N
IS2	804851 E	815715 N
IS3	806502 E	815743 N
IS4	807008 E	816986 N
IS5	811579 E	817106 N
IS(Mf)6	812101 E	817873 N
IS7	812244 E	818777 N
IS8	814251 E	818412 N
IS(Mf)9	813273 E	818850 N
IS10	812577 E	820670 N
IS(Mf)11	813562 E	820716 N
IS12	813218 E	823681 N
IS13	813667 E	824325 N
IS14	812592 E	824172 N
IS15	813356 E	825008 N
IS(Mf)16	814328 E	819497 N
IS17	814539 E	820391 N
IS(Mf)18	813564 E	820069 N
IS(Mf)19	813564 E	819620 N
IS(Mf)20	811650 E	818097 N
CS1	801784 E	812711 N
CS2	805849 E	818780 N
CS(Mf)3	809989 E	821117 N
CS4	810025 E	824004 N
CS(Mf)5	817990 E	821129 N
CS6	817028 E	823992 N
SR1	803126 E	812379 N
SR2	807856 E	816953 N
SR3	810525 E	816456 N
SR4	814760 E	817867 N
SR5	811489 E	820455 N
SR6	805837 E	821818 N
SR7	814293 E	821431 N
SR8	816306 E	825715 N
SR9	813601 E	825858 N
SR10	823741 E	823495 N
ST1	802677 E	816006 N
ST2	804055 E	818840 N
ST3	800667 E	810126 N

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Drawing Title

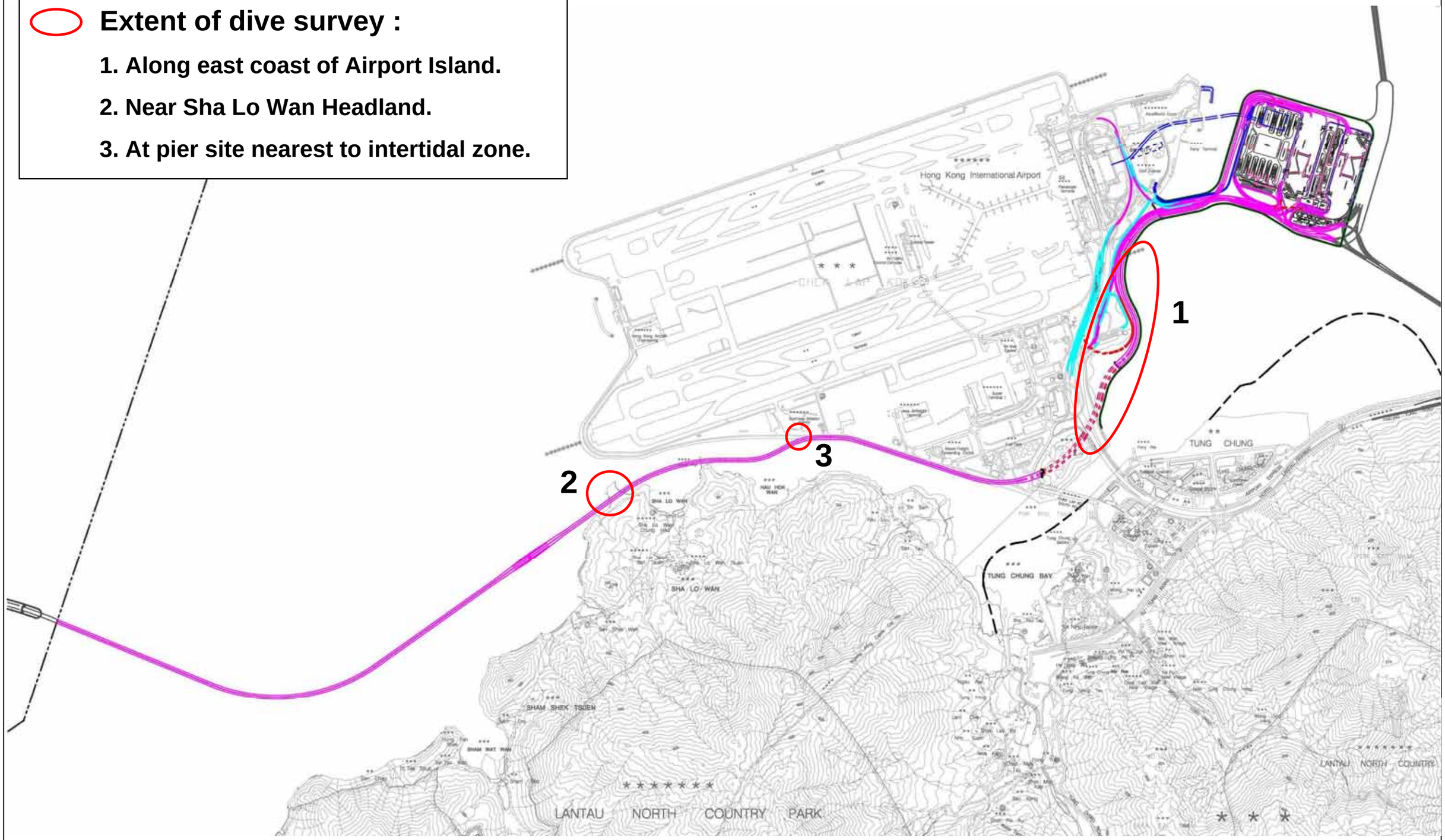
Water Quality Monitoring Stations

Drawing No.

Figure 3

Extent of dive survey :

1. Along east coast of Airport Island.
2. Near Sha Lo Wan Headland.
3. At pier site nearest to intertidal zone.



Note : Pre-construction dive survey for about 2-3 weeks will be conducted, prior to marine construction works in these three locations, to identify any coral colonies suitable for translocation, taking into account the conservation value, the health status and the translocation feasibility.

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