Appendix Q Proposal for Review Baseline Marine Water Quality

本署檔號
OUR REF: (19) in EP2/G/G/131 Pt.15
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22 August 2018
By Fax 2512 0427

Keppel Seghers – Zhen Hua Joint Venture
19/F China Harbour Building
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(Attn: Mr. CHUNG Tai Tung, Peter)

Dear Mr. CHUNG

Contract No. EP/SP/66/12
Integrated Waste Management Facilities Phase 1
Proposal for Review Baseline Marine Water Quality

I refer to your above referenced letter dated 14 August 2018 sending us the subject revised Proposal for Review Baseline Marine Water Quality.

Please note that we have no further comment on the Proposal.

The above is advisory and administrative in nature and shall not pre-empt any statutory decision under the EIA Ordinance. As pointed out to you previously, please be reminded to follow any necessary procedures and submission requirements under the EM&A programme controlled by the Further Environmental Permit No. FEP-01/429/2012/A for the IWMF Phase 1 project.

Yours sincerely,

(Raymond L. Y. LAI)
Environmental Protection Officer
for Director of Environmental Protection

c.c.

SFG/EPD	(Attn: Mr. T. H. MAN)	Fax: 2411 3073
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環境保護署
Environmental Protection Department

Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1

Keppel Seghers

吉寶西格斯－振華聯營公司
KEPPEL SEGHERS - ZHEN HUA JOINT VENTURE

PROPOSAL FOR REVIEW BASELINE MARINE WATER QUALITY

Document No.

KSZHJV	/	312	/		/	0001	/	B
Issuer		Project Code		Type of Document		Sequential No.		Revision Index

	Prepared by:	Approved by:	Certified by:	Verified by:
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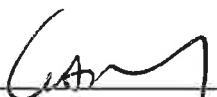
Signature				
Date:	10 August 2018	10 August 2018	14 August 2018	14 August 2018

Revision History

B	Revised as per EPD's comment issued on 8 August 2018	10 August 2018
A	First Issue	11 July 2018
Rev.	**Description of Modification**	**Date**

環境保護署
Environmental Protection Department

Contract No. EP/SP/66/12
Integrated Waste Management Facilities, Phase 1

Response to Comment issued by EPD on 8/8/18

Query	EPD's Comment	KSZHJV's Response
1	Suggest deleting the word "impact" in front of "marine water quality monitoring data" for the last para. of S.2 and S.4.2.	Revised.
2	The DO measuring equipment should be capable of measuring a DO level in the range of 0-50mg/L not 0-20mg/L so as to consistent to the original baseline monitoring (i.e. dry season).	Revised in Section 3.2.
3	Please clarify if measurement of salinity in wet season will be carried out to derive action and limit levels of salinity for brine water monitoring in operational phase as the same exercise had been performed in dry season. If affirmative, relevant paras. about salinity should be added in the proposal.	Revised in Section 3.1, 3.2, 4.3 and Appendix A.

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APPENDICES

FIGURE

1 INTRODUCTION

The Government of Hong Kong SAR will develop the Integrated Waste Management Facilities (IWMF) Phase 1 (hereafter "the Project") with incineration to achieve substantial bulk reduction of unavoidable municipal solid waste (MSW) and to recover energy from the incineration process. The IWMF will be on an artificial island to be formed by reclamation at the south-western coast of Shek Kwu Chau. Keppel Seghers – Zhen Hua Joint Venture (KSZHJV) was awarded the contract under Contract No. EP/SP/66/12 Integrated Waste Management Facilities Phase 1 to construct and operate the Project.

An environmental impact assessment (EIA) study for the Project have been conducted and the EIA Report was approved under the Environmental Impact Assessment Ordinance on 17 January 2012. An Environmental Permit (EP) (EP No.: EP-429/2012) was granted to EPD on 19 January 2012 for the construction and operation of the Project. Subsequently, the EP was amended (EP No.: EP-429/2012/A) and a further EP (FEP) (EP No.: FEP-01/429/2012/A) was granted to the Keppel Seghers – Zhen Hua Joint Venture (KSZHJV) on 27 December 2017.

Baseline marine water quality monitoring was undertaken in accordance with the requirements provided in the EM&A Manual between 26 February and 26 March 2018. A Baseline Monitoring Report was submitted on 14 June 2018 to fulfill Condition 3.3 of the FEP. It is proposed to supplement the marine water quality monitoring data in wet season (April – September) so as to further improve the baseline data to take into account potential variations within a year due to natural fluctuations and also enhance the representativeness of the water quality monitoring parameters.

2 PURPOSE AND SCOPE

As the baseline marine water quality monitoring was undertaken during the dry season (October – March), it is proposed to supplement the marine water quality monitoring data in wet season (April – September) so as to further improve the baseline data to take into account potential variations within a year due to natural fluctuations and also enhance the representativeness of the water quality monitoring parameters.

Under the latest construction programme, DCM site trial shall be carried out in the designated location as shown in **Figure 1**.

The construction sequence of DCM site trial is summarized as below:

1. Carrying out site investigation to determine the property, grading, chemical composition of the sediment;
2. Obtaining sediment samples for laboratory investigation to produce design mix of cement slurry;
3. Laying geotextile and placing of sand blanket, with at least 2m thickness, to cover the seabed at the area where DCM site trial would be carried out;
4. Positioning of marine DCM barge;
5. Inserting piling pile of mixing treatment equipment into the soft layer at the designated level;
6. Pulling up of piling pipe together with the injection of cement slurry and mixing of soft material by the agitator;
7. Monitor, control, review and adjust the cement slurry content during mixing;
8. Repositioning of the marine DCM barge and repeat the mixing procedure until the required pattern of strengthened material is formed;
9. Wait for 28 days to allow cement mixed marine sediment to grow strength prior to conducting Unconfined Compressive Strength (UCS) Test; and
10. Coring out the cement mixed marine sediment to carry out UCS test and determine the mixing ratio of cement: marine sediment.

After obtaining the results from the UCS test, KSZHJV will conduct the static loading test at the designated location as shown in **Figure 1** and the construction sequence of static loading test is summarized as below:

1. Laying Geotextile at seabed;
2. Laying of sand blankets with at least 2m thickness on top of geotextile, cage type silt curtain shall be deployed while laying sand blanket;
3. Conduct DCM work, procedures as stated in Points 4 -8 of the construction sequence of DCM site trial, using the cement mixing ratio as determined by DCM site trial;
4. Laying Grade 400 aggregate on top of sand blanket to form a rubble mound, cage type silt curtain shall also be deployed while laying of Grade 400 aggregate; and
5. Placing concrete blocks on top of rubble mound to form a platform to install the survey monitoring equipment.

Therefore, it is proposed to make use of the marine water quality monitoring data to be collected in the period during cement mixed marine sediment to grow 28 days strength prior to conducting UCS test to represent the baseline monitoring data for wet season. At that period of time, the key construction activities will be operating at most 3 nos. of drill rigs for site investigation works. No marine construction works will be undertaken.

3 WATER QUALITY MONITORING REQUIREMENTS

3.1 Water Quality Parameters to be Monitored

The following water quality parameters to be monitored are summarized in **Table 1**.

Table 1 – Water Quality Parameters

Water Quality Parameters	Baseline Monitoring for Wet Season
Dissolved Oxygen (DO) / Dissolved Oxygen Saturation (DO%)	x
pH	x
Temperature	x
Turbidity	x
Suspended Solids (SS)	x
Water depth	x
Salinity	x

x – Parameters to be tested

3.2 Monitoring Equipment and Procedures

Monitoring of DO, DO%, pH, temperature, turbidity, water depth and salinity should be measured in-situ whereas SS should be sampled and then determined by laboratory. The equipment required for each type of monitoring are specified below.

Data record sheets shall be completed for each monitoring location. Sample data record sheets based on the one presented in the "EM&A Guideline for Development Projects in Hong Kong" are shown in **Appendix A**.

In-situ Monitoring

- Dissolved Oxygen Measuring Equipment – the instrument should be portable and weatherproof using a DC power source. It should be capable of measuring a dissolved oxygen level in the range of 0-50mg/L and 0-200% saturation.
- pH Measuring Equipment – a portable pH meter capable of measuring a range between 0.0 and 14.0 should be provided to measure pH under the specified conditions according to the Standard Methods, APHA.
- Temperature Measuring Equipment – the instrument should be portable and weatherproof using a DC power source. It should be capable of measuring a temperature of 0-45 degree

Celsius with a capability of measuring to ±0.1 degree Celsius.

- Turbidity Measuring Equipment – the instrument should be portable and weatherproof using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000NTU.
- Positioning Device – a hand held or boat fixed type differential Global Positioning System (dGPS) with way point bearing indication or other equivalent instrument of similar accuracy should be provided and used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements
- Water Depth Detector – a portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. The unit would either be handheld or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.
- Salinity - the instrument should be portable and weatherproof using a DC power source. It should be capable of measuring salinity in the range 0-40ppt.

Calibration of In-situ Instruments

All in-situ monitoring instrument should be checked, calibrated and certified by a laboratory accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or other international accreditation scheme that is HOKLAS-equivalent before use, and subsequently re-calibrated at three 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.

For the on-site calibration of field equipment, the BS 1427:2009, Guide to on-site test methods for the analysis of waters should be observed.

Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration etc.

Water Samples for Laboratory Testing

Collection of Water Samples

Water samples for all monitoring parameters should be collected, stored, preserved and analysis according to the Standard Methods, APHA 22nd ed. and/or other methods as agreed by the EPD.

A water sampler comprises a transparent PVC cylinder, with a capacity of not less than two litres, and could be effectively sealed with latex cups at both ends should be used. 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. Kahlsico Water Sampler or a similar instrument approved by the ET and SO should be used.

Water samples should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4 °C without being frozen), delivered to the laboratory within 24 hours of collection.

Laboratory Measurement / Analysis

Analysis of SS should be carried out in a HOKLAS accredited laboratory (or other international accredited laboratory that is HOKLAS-equivalent). Sufficient water samples should be collected at the monitoring stations for carrying out the laboratory determination. The laboratory determination work should start within 24 hours after receipt of the water samples. The analysis should follow the standard methods summarised in **Table 2**.

Table 2: Laboratory analysis for SS

Parameters	**Instrumentation**	**Analytical Method**	**Reporting Limit**
Suspended Solids (SS)	Analytical Balance	APHA 2540D	1 mg/L

Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis should be kept by the laboratory for three months in case repeat analysis is required.

4 BASELINE MONITORING FOR WET SEASON

4.1 Purpose

The purpose of the baseline monitoring for wet season is to supplement the baseline data to take into account the potential variations within a year due to natural fluctuations and to enhance the representativeness of the water quality monitoring parameters. These baseline conditions shall be established by measuring DO, DO%, pH, temperature, turbidity, salinity and SS at designated monitoring stations.

4.2 Timing

It is proposed to make use of the marine water quality monitoring data to be collected in the period during cement mixed marine sediment to grow 28 days strength prior to conducting UCS test to

represent the baseline monitoring data for wet season. At that period of time, the key construction activities will be operating approximately 3 nos. of drill rigs for site investigation works. No marine construction works will be undertaken.

4.3 Monitoring Locations

Baseline water quality for wet season will be measured at the monitoring stations as listed in **Table 3** and illustrated in **Figure 2**. The monitoring stations will be the same as those for the IWMF's marine water quality monitoring stations during construction phase. DO, DO%, pH, temperature, turbidity, salinity and SS are measured at all monitoring stations.

Table 3 – Proposed Monitoring Stations

Station	Description	Easting	Northing	Parameters
B1	Beach – Cheung Sha Lower	813342	810316	DO, DO%, pH, Temperature, Turbidity, SS, Salinity
B2	Beach – Pui O	815340	811025	
B3	Beach – Yi Long Wan	817210	808395	
B4	Beach – Tai Long Wan	817784	808682	
H1	Horseshoe Crab – Shek Kwu Chau	816477	806953	
C1	Control Station	810850	806288	
C2	Control Station	819421	808053	
F1	Cheung Sha Wan Fish Culture Zone	818631	810966	
S1	Submarine Cable Landing Site	814245	810335	
S2	Submarine Cable	815076	807747	
S3	Submarine Cable Landing Site	816420	805621	
CR1	Coral	817144	805597	
CR2	Coral	816512	805882	
M1	Tung Wan	821572	807799	

4.4 Monitoring Procedures

The measurements will be taken three days per week, at mid-flood and mid-ebb tides, for a period of four weeks when there are no marine construction activities to be carried out. The interval between two sets of monitoring will be not less than 36 hours.

Samples will be taken at three depths (at 1m below surface, at mid-depth, and at 1m above bottom) for locations with water depth >6m. For locations with water depth between 3m and 6m, two depths (surface and bottom) were taken. Locations with water depth< 3m, only surface depth will be taken. Duplicate water samples will be taken and analysed.

4.5 Action and Limit Levels

The Action and Limit levels are defined in **Table 4** in accordance with the Updated EM&A Manual.

Table 4 - Action and Limit Levels for Water Quality Parameters

Parameters	Action Level	Limit Level
Construction Phase Impact Monitoring		
DO in mg/L	≦5 percentile of baseline data	≦4mg/L
Suspended Solids (SS) in mg/L	95 percentile of baseline data or 120% of upstream control station at the same tide at the same day, whichever is higher	99 percentile of baseline data or 130% of upstream control station at the same tide of the same day, whichever is higher
Turbidity in NTU	95 percentile of baseline data or 120% of upstream control station at the same tide at the same day, whichever is higher	99 percentile of baseline data or 130% of upstream control station at the same tide of the same day, whichever is higher
Operational Phase Impact Monitoring		
Salinity in ppm	95 percentile of baseline data or 105% of upstream control station at the same tide at the same day, whichever is higher	99 percentile of baseline data or 109% of upstream control station at the same tide of the same day, whichever is higher

Notes:
1. For DO, non-compliance of water quality results when monitoring results are lower than the limits.
2. Depth-averaged results are used unless specified otherwise
3. For SS and Turbidity, non-compliance of water quality results when monitoring results are higher than the limits.
4. Baseline data to be adopted in the marine water quality monitoring are specified in the Baseline Monitoring Report.
5. With reference to Plate 5b.8 of the approved EIA report EIA-201/2011, the upstream control station shall be C2 during flood tide and C1 during ebb tide.

4.6 Event and Action Plan

The actions in accordance with the Event and Action Plan in **Table 5** should be carried out if the water quality assessment criteria are exceeded at the impact monitoring stations.

Table 5 - Event and Action Plan for Marine Water Quality Monitoring

	Action			
Event	**Environmental Team (ET)**	**Independent Environmental Checker (IEC)**	**Supervising Officer (SO)**	**KSZHJV**
Action level being exceeded by one sampling day	1. Repeat in-situ measurement to confirm findings; 2. Identify reasons for non-compliance and sources of impact; 3. Inform IEC and KSZHJV; 4. Check monitoring data, all plant, equipment and KSZHJV's working methods; 5. Discuss mitigation measures with IEC and KSZHJV; 6. If not already undertaking daily monitoring, increase monitoring frequency.	1. Discuss with ET and KSZHJV on the mitigation measures; 2. Review proposals on mitigation measures submitted by KSZHJV and advise SO accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented; 3. Assess the effectiveness of the implemented mitigation measures.	1. Inform SO and confirm receipt of ET's notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Provide report of the status and condition of plant, equipment and mitigation measures to ET; 5. Consider changes of working methods; 6. Discuss with ET and IEC and propose mitigation measures.

	Action			
Event	**Environmental Team (ET)**	**Independent Environmental Checker (IEC)**	**Supervising Officer (SO)**	**KSZHJV**
Action Level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurement to confirm findings; 2. Identify reasons for non-compliance and sources of impact; 3. Inform IEC and KSZHJV; 4. Check monitoring data, all plant, equipment and KSZHJV's working methods; 5. Discuss mitigation measures with IEC and KSZHJV; 6. Ensure mitigation measures are implemented; 7. If not already undertaking daily monitoring, increase monitoring frequency.	1. Discuss with ET and KSZHJV on the mitigation measures; 2. Review proposals on mitigation measures submitted by KSZHJV and advise SO accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented; 3. Assess the effectiveness of the implemented mitigation measures.	1. Inform SO and confirm receipt of ET's notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Provide report of the status and condition of plant, equipment and mitigation measures to ET; 5. Consider changes of working methods; 6. Discuss with ET and IEC and propose mitigation measures to IEC and SO within 3 working days; 7. Implement the agreed mitigation measures. 8. As directed by SO, to slow down all or part of the construction activities.

	Action			
Event	**Environmental Team (ET)**	**Independent Environmental Checker (IEC)**	**Supervising Officer (SO)**	**KSZHJV**
Limit Level being exceeded by one sampling day	1. Repeat in-situ measurement to confirm findings; 2. Identify reasons for non-compliance and sources of impact; 3. Inform IEC, KSZHJV and EPD; 4. Check monitoring data, all plant, equipment and KSZHJV's working methods; 5. Discuss mitigation measures with IEC, SO and KSZHJV; 6. Ensure mitigation measures are implemented; 7. If not already undertaking daily monitoring, increase monitoring frequency.	1. Discuss with ET and KSZHJV on the mitigation measures; 2. Review proposals on mitigation measures submitted by KSZHJV and advise SO accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and KSZHJV on the proposed mitigation measures; 2. Request KSZHJV to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures.	1. Inform SO and confirm receipt of ET's notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Provide report of the status and condition of plant, equipment and mitigation measures to ET; 5. Consider changes of working methods; 6. Discuss with ET, IEC and SO and propose mitigation measures to IEC and SO within three working days; 7. Implement the agreed mitigation measures.

	Action			
Event	**Environmental Team (ET)**	**Independent Environmental Checker (IEC)**	**Supervising Officer (SO)**	**KSZHJV**
Limit Level being exceeded by more than one consecutive sampling days	1. Repeat in-situ measurement to confirm findings; 2. Identify reasons for non-compliance and sources of impact; 3. Inform IEC, KSZHJV and EPD; 4. Check monitoring data, all plant, equipment and KSZHJV's working methods; 5. Discuss mitigation measures with IEC, SO and KSZHJV; 6. Ensure mitigation measures are implemented; 7. If not already undertaking daily monitoring, increase monitoring frequency.	1. Discuss with ET and KSZHJV on the mitigation measures; 2. Review proposals on mitigation measures submitted by KSZHJV and advise SO accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and KSZHJV on the proposed mitigation measures; 2. Request KSZHJV to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures; 5. Consider and instruct, if necessary, the KSZHJV to slow down or to stop all or part of the construction activities until no exceedance of limit level.	1. Inform SO and confirm receipt of ET's notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Provide report of the status and condition of plant, equipment and mitigation measures to ET; 5. Consider changes of working methods; 6. Discuss with ET, IEC and SO and propose mitigation measures to IEC and SO within three working days; 7. Implement the agreed mitigation measures; 8. As directed by SO, to stop all or part of the construction activities.

4.7 Reporting

The monitoring data to be collected at the baseline monitoring for wet season shall be used to supplement the baseline monitoring data to be collected between 26 February 2018 and 26 March 2018 so as to further improve the baseline data to take into account potential variations within a year due to natural fluctuations and also enhance the representativeness of the water quality monitoring parameters. Baseline Monitoring Report shall follow the relevant reporting requirements as specified in the EM&A Manual. The Baseline Monitoring Report shall be certified by ET leader and verified by the IEC.

Appendix A

Sample Record Sheet

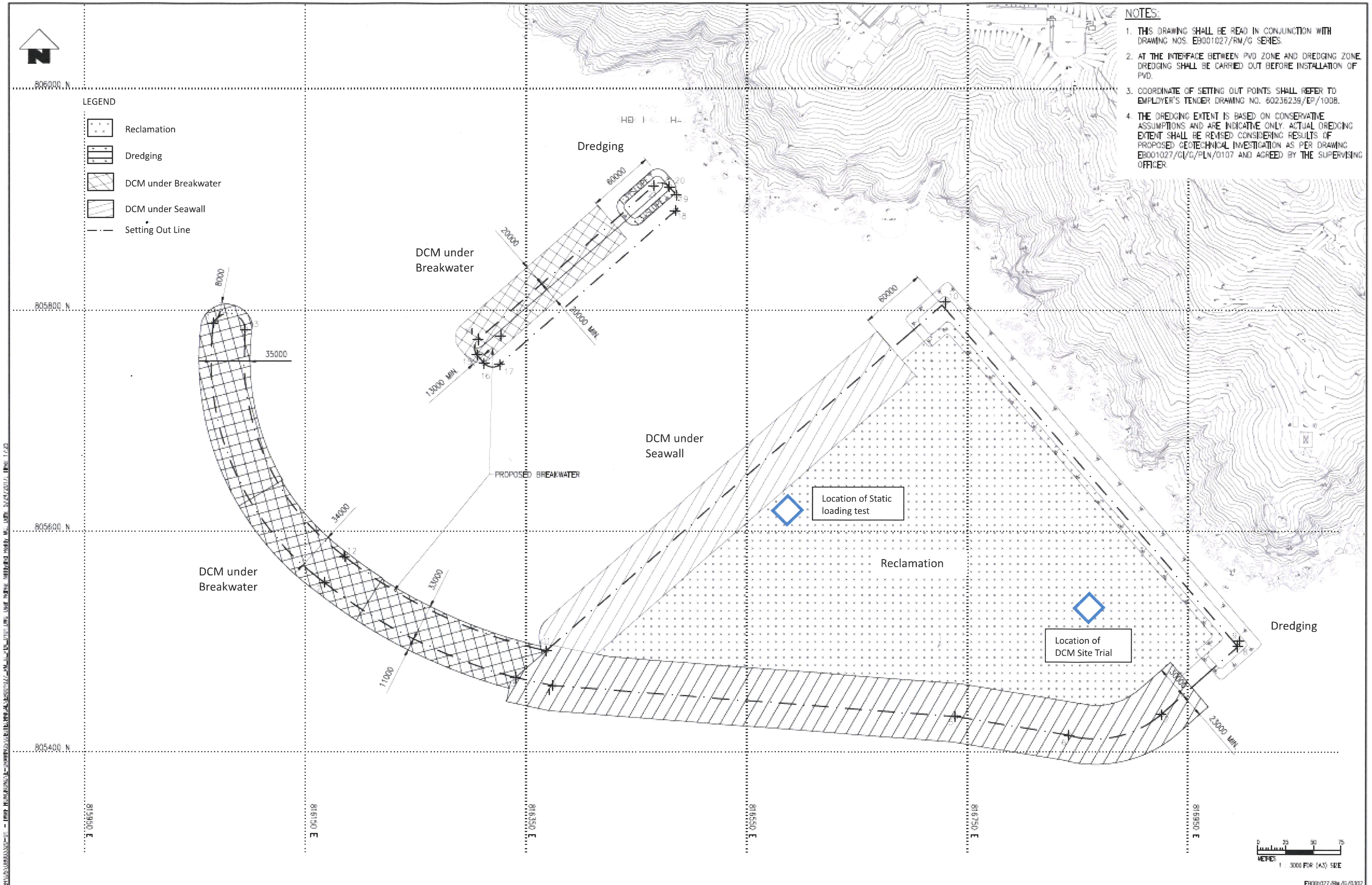
Water Quality Monitoring Data Record Sheet

Location			
Date			
Start Time (hh:mm)			
Weather			
Sea Conditions			
Tidal Mode			
Water Depth (m)			
Monitoring Results		1st reading	2nd reading or Duplicate
Dissolved Oxygen	mg/L		
Dissolved Oxygen Saturation	%		
pH			
Turbidity	NTU		
Temperature	° C		
Suspended Solids	mg/L		
Salinity	ppt		
Observed construction activities	<100m from location		
	>100m from location		
Other Observations			

	Name & Designation	Signature	Date
Recorded by:	_____	_____	_____
Checked by:	_____	_____	_____

Figure 1

Location Plan for Static Loading Test and DCM Site Trial



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TITLE: Layout Plan for Static Loading Test and DCM Site Trial

SCALE: 1 : 3000

Figure 2

Monitoring Stations for Marine Water Quality

Figure 2 Monitoring Stations for Marine Water Quality