



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

Method Statement

for
Silt Curtain Efficiency Pilot Test
(Floating type at Marine Access Opening)

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1.0 INTRODUCTION

According to the Updated EM&A Manual, the pilot test shall be close to the marine access opening for the reclamation filling works. Pilot tests should be carried out during the early stage of reclamation to confirm whether the silt removal efficiency of the silt curtain systems at marine access opening can achieve at least 80% silt removal efficiency for reclamation filling. The pilot test shall include basic measurements such as turbidity and suspended solids as well as current speed and direction covering both flood and ebb tide for one to two week for silt curtain efficiency testing.

This Method Statement includes the floating type silt curtain at marine access opening. **Table 1.1** summarizes the silt curtain types and their respective target of works / site activities:

Table 1.1 Silt curtain types and their respective target of works / site activities

No.	
1	Floating type – installed in the marine access opening area during the reclamation period

This Method Statement details the marine based technique, methodology, procedure, plant and equipment for the following works:-

Silt curtain efficiency pilot test;

2.0 WORK SCHEDULE

Both flood and ebb tide for one week including 3 sampling days 08:00 – 19:00 on 22, 24, 26 September 2020 tentatively.

3.0 TRANSPORTATION MEANS

- 3.1 Work boat will be deployed for water monitoring
- 3.2 Operating Licence of the vessel being used is provided as below:

香港特別行政區政府——海運處
The Government of the Hong Kong SAR—Marine Department

編號
Serial No. 2003391

根據《海商(本地船隻)(證明書及執照)條例》第15條
Pursuant to Section 15 of Merchant Shipping (Local Vessels) (Certification and Licensing) Regulation

運作牌照 (正副)
Operating Licence (PLL)

擁有權證明書號碼: Certificate of Ownership Number: B143330	有效期 (包括在內) Validity Period (inclusive) 由 From 05/07/2020 至 To 04/07/2021
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第一部/Part 1 船隻資料/Particulars of Vessel

船隻名稱: Name of Vessel: ---	船類: Class: II	總長度(米): Length Overall (m): 8.50	最大寬度(米): Extreme Breadth (m): 2.74
深度(米): Depth (m): 1.30	總噸位: Gross Tonnage: 7.00	淨噸位: Net Tonnage: 2.00	
船體材料: Material of Hull: GRP	船體顏色: Colour of Hull: 深灰 / 白 DARK GREY / WHITE	副艙艙位(數目): Auxiliary Vessel (No.): ---	
推進引擎(數目): Propulsion Engine (No.): 1	製造商: Maker	類型: Type	編號: Serial No.
			功率(千瓦): Power (kW)
參照驗船證明書 As per Certificate of Survey			

第二部/Part 2 牌照條件/Licence Conditions

1. 船員要求及運載人數
Crew requirement and carrying capacity:
最少船員人數: 2
Minimum No. of Crew: 2
允許運載乘客人數: 0
No. of Passenger Permitted to Carry: 0
允許運載總人數: 8
Total No. of Person Permitted to Carry: 8
2. 除經海運處處長允許外, 此船只限在香港水域往來航行。
Except with the permission of the Director of Marine, this vessel is restricted to ply within the waters of Hong Kong.

第三部/Part 3 批註/Endorsements

1. 此船必須持有有效驗船證明書或檢驗證明書方可操作。
This vessel is required to hold a valid Certificate of Survey or Certificate of Inspection for operation.

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AS 0 165

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根據《商船(本地船隻)(證明書及牌照事宜)規例》第15條
Pursuant to Section 15 of Merchant Shipping (Local Vessels) (Certification and Licensing) Regulation

運作牌照 (正式)
Operating Licence (FULL)

擁有權證明書號碼: Certificate of Ownership Number: BM40083C	有效期 (包括在內) Validity Period (Inclusive) 由 25/04/2020 至 24/04/2021
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第一部/Part 1 船隻資料 Particulars of Vessel

船隻名稱: Name of Vessel: WONG AH CHOI/YEUNG SUN TSE	類型: 工作船 Type: Work Boat
類別: Class: II	總長度(米): Length Overall (m): 8.90
深度(米): Depth (m): ---	總噸位: Gross Tonnage: 12.90
船體物料: Material of Hull: WOOD	船體顏色: Colour of Hull: GREEN
推進引擎(數目): Propulsion Engine (No.): 1	製造商 Maker
	類型 Type
	編號 Serial No.
	功率(千瓦) Power(kW)
	淨噸位: Net Tonnage: 9.00
	附屬船隻(數目): Ancillary Vessel (No.): ---
	As per Certificate of Survey

第二部/Part 2 牌照條件 Licence Conditions

- 船員要求及運載人數:
Crew requirement and carrying capacity:
最少船員人數: **1** 允許運載乘客人數: **0** 允許運載總人數: **8**
Minimum No. of Crew: **1** No. of Passenger Permitted to Carry: **0** Total No. of Person Permitted to Carry: **8**
-

第三部/Part 3 批註 Endorsements

- 此船必須持有有效驗船證明書或檢查證明書方可運作。
This vessel is required to hold a valid Certificate of Survey or Certificate of Inspection for operation.

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3.3 Light Goods Vehicle will be applied for samples delivery on land.

4.0 MANPOWER

ET's technicians, work supervisors and Coxswain/Crew (with sufficient no. of them according to Operating License/Certificate of Survey) would be deployed on vessel.

5.0 TOOLS & EQUIPMENT

- i) Water sampler (Model: Wildco 2L Water Sampler with messenger or equivalent);
- ii) Turbidimeter (Model: Horiba U-53 or equivalent);
- iii) Global Positioning System (Model: Garmin GPSMAP 78 Handheld GPS or equivalent);
- iv) Sonar Water Depth Detector (Model: Hummingbird 160 Portable or equivalent);
- v) Current Meter (Model: Valeport 106 or equivalent);
- vi) Cool boxes;
- vii) 1L Sample containers; &
- viii) First aid box.

Refer to the section 4.4.1 of the approved silt curtain deployment plan, water sampling equipment used during the course of the monitoring programme will be decontaminated by manual washing and rinsed clean seawater / distilled water after each sampling event.

6.0 MONITORING LOCATIONS

6.1 Floating Type Silt Curtain

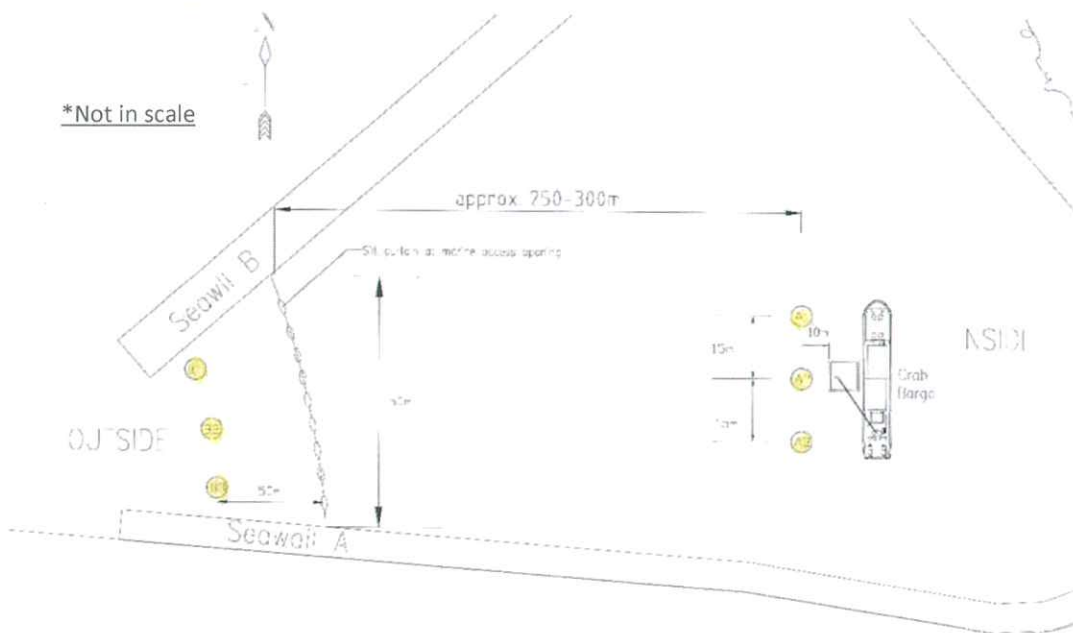
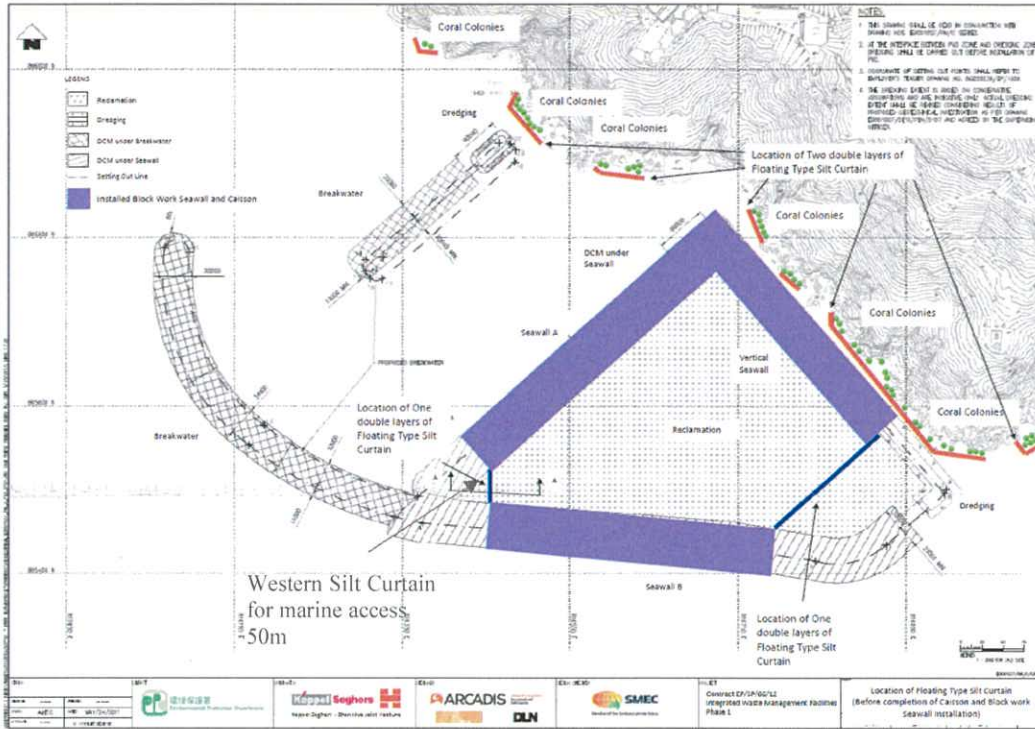
The water monitoring of the pilot test will be conducted at a total of six monitoring stations.

The locations of the sampling stations are described in **Table 6.1** and **Figure 1**.

Table 6.1 Locations of Monitoring Stations for Pilot Test (for floating type silt curtain)

Monitoring Stations	Location	Description
A1	Within Marine Works Area	As confirmed by the Contractor, the floating type silt curtain at marine access is 50m wide only. The distance between the inside stations (A1 to A3) will be adjusted according to the actual dimension of the floating type silt curtain on the day of the test.
A2		
A3		
B1	Outside Silt Curtain	As confirmed by the Contractor, the floating type silt curtain at marine access is 50m wide only. The distance between the outside stations (B1 to B3) will be adjusted according to the actual dimension of the floating type silt curtain on the day of the test and located within approximately 50m from the silt curtain boundary.
B2		
B3		

Figure 1 Location of Floating type silt curtain and Indicative locations of Monitoring Stations for Pilot Test



Note: The distance between the inside stations (A1 to A3) and that between the outside stations (B1 to B3) will be adjusted according to the actual dimension of the floating type silt curtain on the day of the test.

6.2 Water Sampling Equipment

For in-situ monitoring, a turbidimeter (HACH 2100Q or equivalent) will be used to measure turbidity. A sampler will be used to collect water samples for laboratory analysis of suspended solids.

6.3 Turbidity

The instrument will be portable and weatherproof using a DC power source complete with cable, sensor and comprehensive operation manuals. The equipment will be capable of measuring turbidity between 0-1000 NTU.

6.4 Water Depth Detector

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

6.5 Position System

A hand held Global Positioning System (GPS) will be used to ensure that the correct location has been selected prior to sample collection.

6.6 Current Velocity and Direction

A Valeport 106 or equivalent current meter will be used for measuring current velocity and direction to verify the exact location of the impact monitoring stations and control stations.

6.7 Suspended Solids

A water sampler, consisting of PVC or glass cylinder of a capacity of not less than two litres which can be effectively sealed with cups at both ends will be used. The water sampler will 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.

6.8 Sample Container and Storage

Following collection, water samples for laboratory analysis will be stored in high density polythene bottles with no preservatives added, packed in ice (cooled to 4°C without being frozen), delivered to the laboratory and analysed as soon as possible.

6.9 Calibration of In-Situ Instruments

The turbidimeter should be checked and calibrated before use. Turbidimeter should also be certified by a laboratory accredited under Hong Kong Laboratory Accreditation Scheme (HOKLAS) or other international accreditation scheme, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the pilot test. Responses of turbidimeter will be checked with certified standard solutions before each use.

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

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

Table 6.1 Water Quality Monitoring Equipment

Equipment	Model	Monitoring Parameters / Use	Quantity
Water Sampler	Wildco 2L Water Sampler with messenger or equivalent	Collection of water sample	2
Turbidimeter	Horiba U-53 or equivalent	Measurement of turbidity	2
Monitoring Position Equipment	Garmin GPSMAP 78s or equivalent	Determination of water quality monitoring stations	1
Sonar Water Depth Detector	Hummingbird 160 Portable or equivalent	Determination of water depth	1
Current Meter	Valeport 106 or equivalent	Measurement of current velocity and direction	1

The water quality parameters to be monitored are tabulated below in Table 6.2.

Table 6.2 Water Quality Parameters to be tested during Pilot Test

Water Quality Parameters	Pilot Test
Turbidity	×
Suspended Solids (SS)	×
Water depth	×
Current Velocity and direction	×

7.0 PROCEDURES

- 7.1 In advance of the sampling day, ET's staff will check wind condition on website of Hong Kong Observatory. Any wind force forecast with no. 6 will be reported for any need on reschedule;
- 7.2 Before getting on the vessel, all persons will be equipped with lifejacket, reflective vest, safety helmet and safety shoes properly;
- 7.3 ET's staff(s) will calibrate the measurement instrument before sampling event;
- 7.4 At the pier, Coxswain will judge local Beaufort Sea Status and weather (e.g. rainstorm, windy, foggy, etc.) whether it is suitable for the sampling work to go on;
- 7.5 Coxswain will park at the pier and keep steady by keeping the engines on and direction towards the pier for uploading the tools and equipment onto the vessel;
- 7.6 Trained worker(s) will tighten the cool boxes with rope at secure structure of the vessel;
- 7.7 Vessel will then sail to the sampling stations with guiding of digital Global Positioning System (GPS); A1 and B1 will be sampled at the same time, then A2 & B2 and A3 & B3 will be conducted in the similar approach.
- 7.8 After arriving the sampling station, depth will be measured using depth meter in order to determine the sampling depths;
- 7.9 The water sampler and the multi-functional meter will be lowered to the predetermined depths (1m below water surface, mid-depth and 1m above seabed) and the in-situ results of turbidity will be recorded at the same time.
- 7.10 At each measurement, two consecutive measurements of in-situ parameters will be taken. Where the difference in the value between the first and second readings of each set was more than 25% of the value of the first reading, the reading will be discarded and further readings will be taken.
- 7.11 In-situ measurement results shall include basic measurements such as turbidity and suspended solids as well as current speed and direction.
- 7.12 Water samples for SS (mg/L) measurements will be collected at the same depths with water sampler. All the containers filled sample will be placed into cool boxes.
- 7.13 Steps 7.7 to 7.12 will be repeated for remaining monitoring locations and the monitoring in next tide;
- 7.14 Coxswain will drive back to pier and park the vessel at the pier. The cool boxes with container samples will be transferred from vessel to pier and handover to the lab's representative(s) for conducting the SS testing.

8.0 LABORATORY MEASUREMENT / ANALYSIS

- 8.1 Analysis of suspended solids (SS) should be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples should be collected at the monitoring stations for carrying out the laboratory determinations. The determination work should start within 24 hours after collection of water samples. The analyses should follow the American Public Health Association (APHA) Standard Methods for the Examination of Water and Wastewater or an equivalent method subject to the approval of EPD. The suggested testing method and lowest detection limit are provided in **Table 8.1**.

Table 8.1 Analytical Methods to be Applies to Marine Water Quality Samples

Determinant	Standard Method	Detection Limit
Suspended Solids (mg/L)	APHA 2540D*	1 mg/L

Note(*): APHA American Public Health Association Standard Methods for the Examination of Water and Wastewater

- 8.2 The testing of SS should be HOKLAS accredited and comprehensive quality assurance and control procedures in place in order to ensure quality and consistency in results. The Quality Assurance / Quality Control (QA/QC) shall be in accordance with the requirements of HOKLAS or international accredited scheme.

9.0 REVIEW AND REPORT

- 9.1 The effectiveness of the proposed silt curtain system can be calculated based following equation:

$$(SS_{\text{inside}} - SS_{\text{outside}}) / SS_{\text{inside}} \times 100\% \geq 80\%$$

The silt removal efficiencies of ebb and flood tide will be calculated by taking arithmetic means of the three stations throughout different sampling dates.

