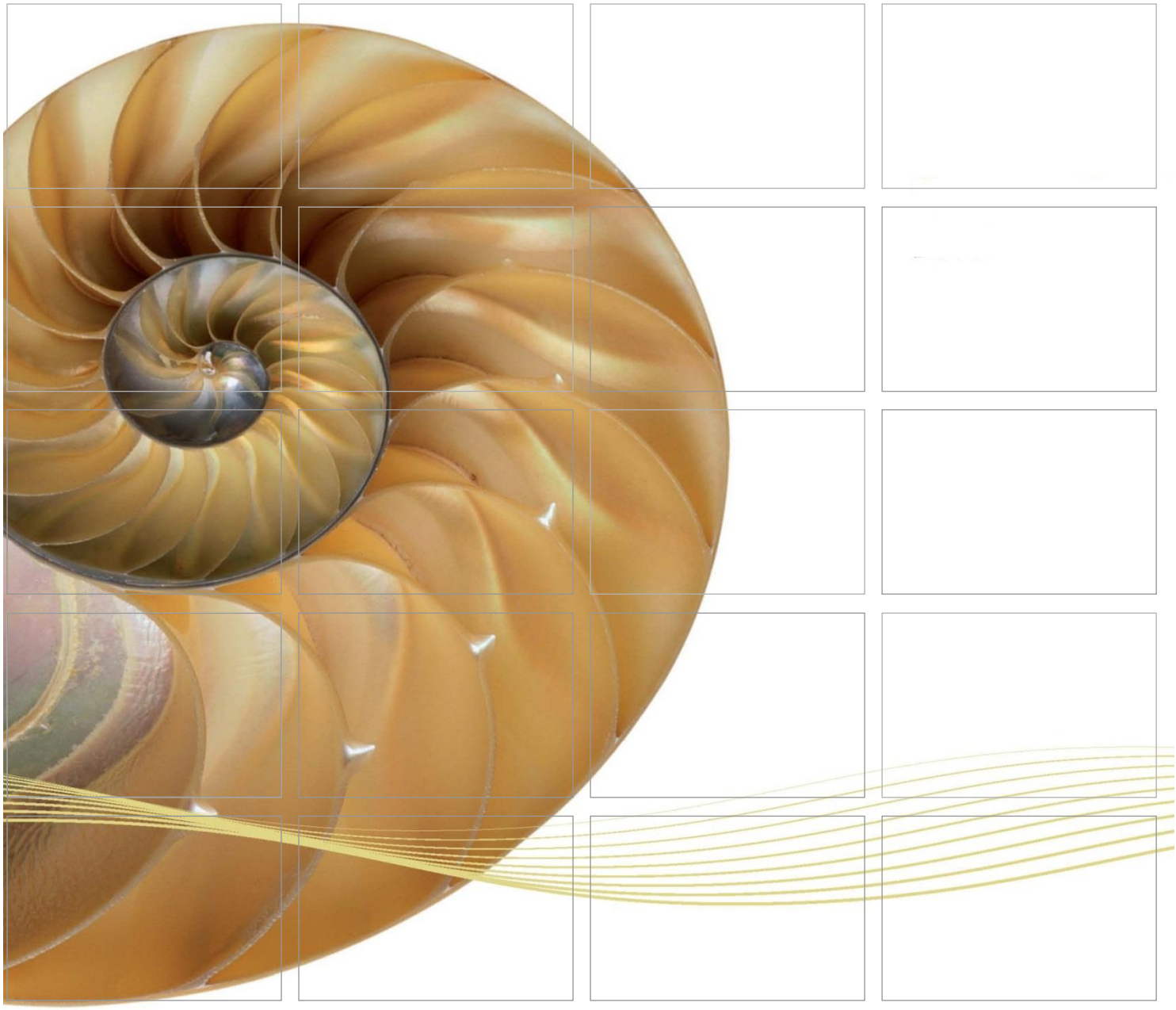

Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

Pilot Tests for Silt Curtain Efficiency – Method Statement

12 February 2016

Environmental Resources Management
16/F, Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone 2271 3000
Facsimile 2723 5660

www.erm.com

RAMBOLL ENVIRON

Ref.: HYDHZMBEEM00_0_3890L.16

22 February 2016

AECOM
Supervising Officer Representative's Office
No.8 Mong Fat Street, Tuen Mun,
New Territories, Hong Kong

By Fax (2293 6300) and By Post

Attention: Messrs. Edwin Ching / Andy Westmoreland

Dear Sirs,

Re: Agreement No. CE 48/2011 (EP)
Environmental Project Office for the
HZMB Hong Kong Link Road, HZMB Hong Kong Boundary Crossing Facilities, and Tuen Mun-Chek Lap Kok Link – Investigation

Contract No. HY/2012/08 TM-CLKL Northern Connection Sub-sea Tunnel Section
Pilot Tests for Silt Curtain Efficiency – Method Statement

Reference is made to the Pilot Tests for Silt Curtain Efficiency – Method Statement (ET's ref.: "0212330 Silt Curtain Efficiency Test_20150202.docx" dated 12 Feb. 2016) certified by the ET Leader and provided to us via e-mail on 12 Feb. 2016.

Please be informed that we have no adverse comments on the captioned Method Statement.

Thank you for your attention. Please do not hesitate to contact the undersigned or the ENPO Leader Mr. Y. H. Hui should you have any queries.

Yours sincerely,

F. C. Tsang
Independent Environmental Checker
Tuen Mun – Chek Lap Kok Link

c.c. HyD – Mr. Stephen Chan (By Fax: 3188 6614)
HyD – Mr. Matthew Fung (By Fax: 3188 6614)
AECOM – Mr. Conrad Ng (By Fax: 3922 9797)
ERM – Mr. Jovy Tam (By Fax: 2723 5660)
Dragages – Bouygues JV - Mr. C. F. Kwong (By Fax: 2293 7499)

Internal: DY, YH, LP, CL, ENPO Site

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Ramboll Environ Hong Kong Limited 英環香港有限公司
Room 2403, 24/F., Jubilee Centre, 18 Fenwick Street, Wanchai, Hong Kong Tel: 852.3465 2888 Fax: 852.3465 2899
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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

Pilot Tests for Silt Curtain Efficiency – Method Statement

Document Code: 0212330 Silt Curtain Efficiency Test_20150202.docx

Environmental Resources Management

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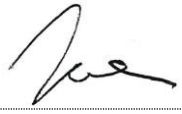
Client: DBJV	Project No: 0212330
Summary: This document presents the Pilot Tests for Silt Curtain Efficiency – Method Statement for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.	Date: 12 February 2016 Approved by:  *Mr Craig Reid* *Partner* Certified by:  *Mr Jovy Tam* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	Pilot Tests for Silt Curtain Efficiency – Method Statement	JY	JT	CAR	12/02/16

Distribution

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CONTENTS

Contract No. HY/2012/08
Tuen Mun Chek Lap Kok Link –
Northern Connection Sub-sea Tunnel Section

Pilot Tests for Silt Curtain Efficiency – Method Statement

1 PILOT TESTS FOR SILT CURTAIN EFFICIENCY

1.1 INTRODUCTION

As per the requirements of the *Contract Specific Environmental Monitoring and Audit* (EM&A) *Manual* (*Section 5.8*) [1] of *Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link (TM-CLKL) – Northern Connection Sub-sea Tunnel Section* (the "Contract"), pilot tests for silt removal efficiency of silt curtain (the "Pilot Tests") are required during the initial period of dredging and filling works. This *Method Statement* presents the methodology of the Pilot Tests during Phase II Reclamation.

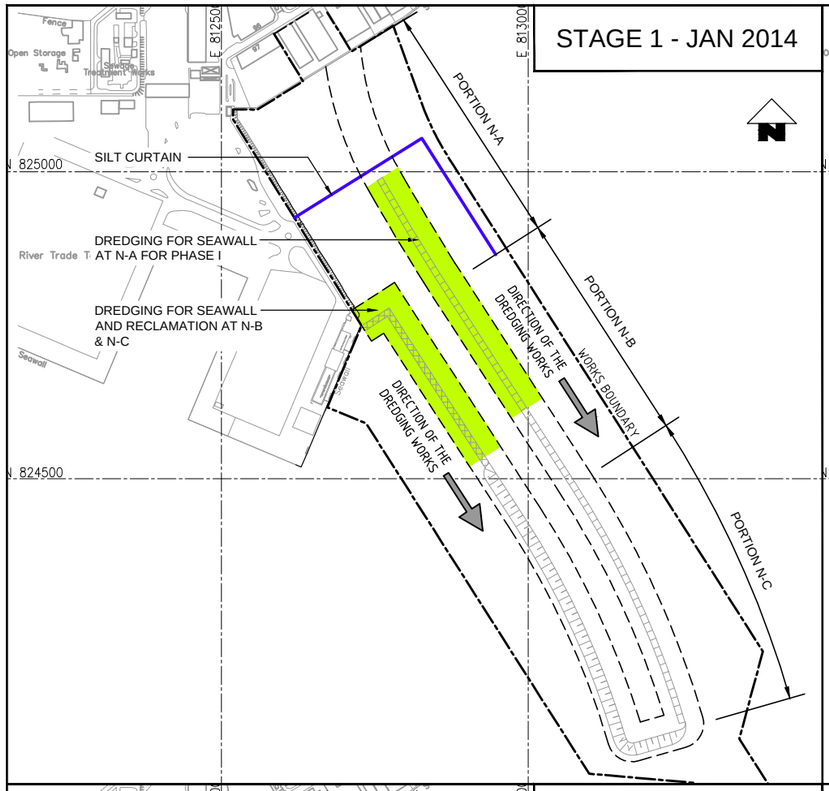
1.2 MONITORING REQUIREMENT

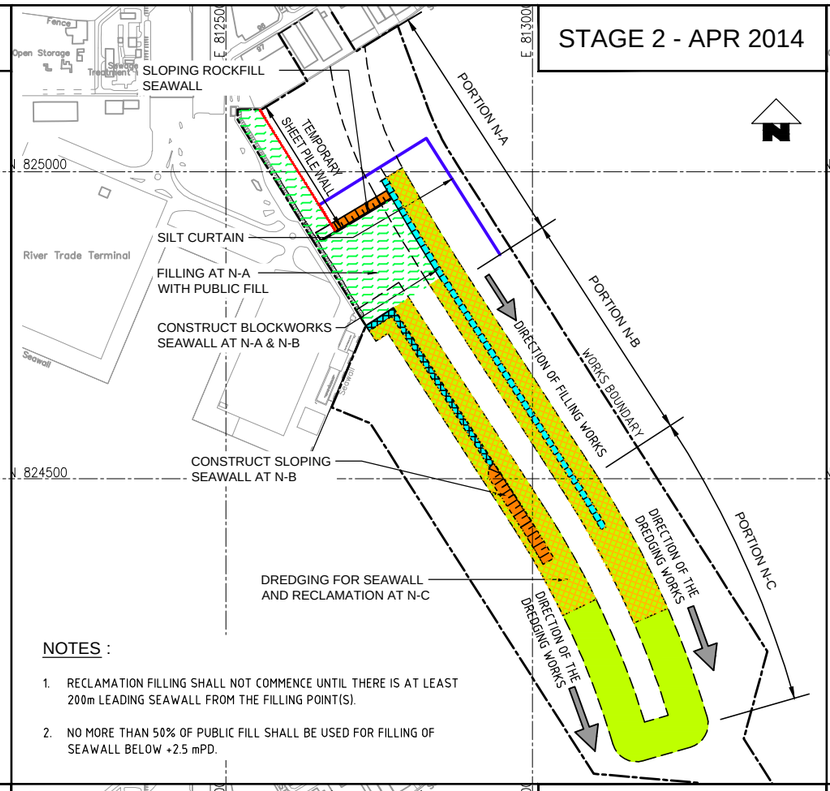
1.2.1 Construction design and silt curtain arrangements

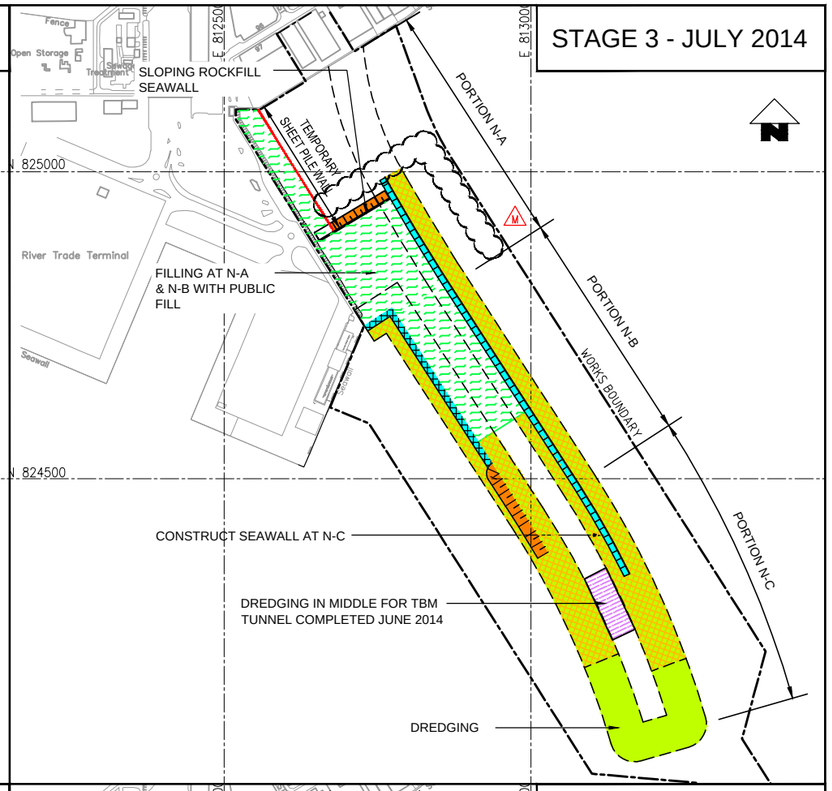
According to the approved Environmental Impact Assessment (EIA) of TM-CLKL (*Sections 6.7.4.17 & 6.7.4.19*) and the latest notification of construction sequence [2], the relevant silt curtain scenarios are listed in *Table 1.1*. The latest construction design and silt curtain arrangements are shown in *Figure 1.1*.

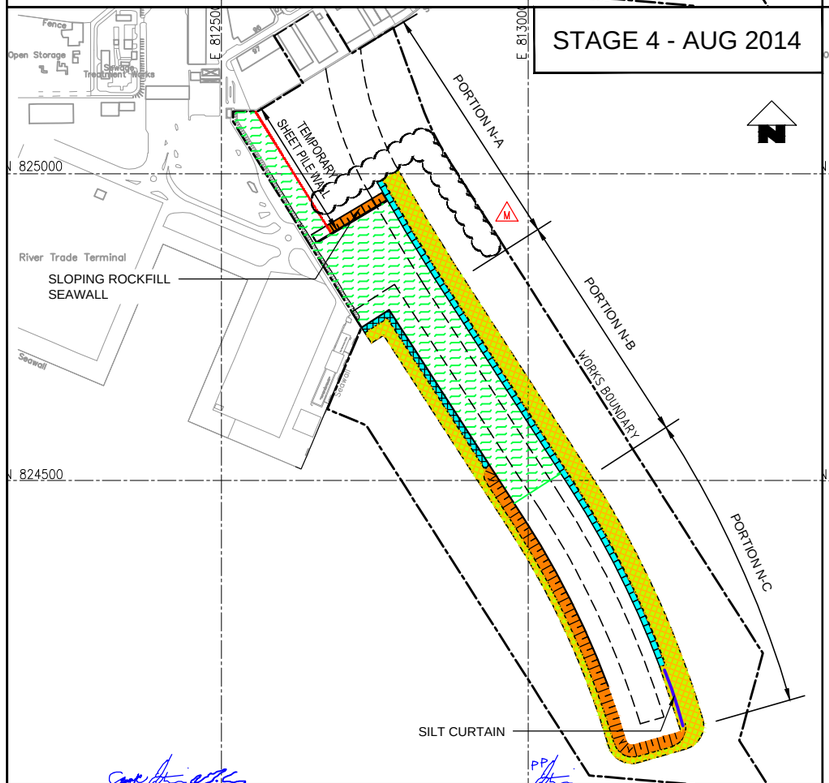
(1) Accessible at http://www.hzmbenpo.com/emna_report/tmclkl_hy201208/manual/html/toc.htm.

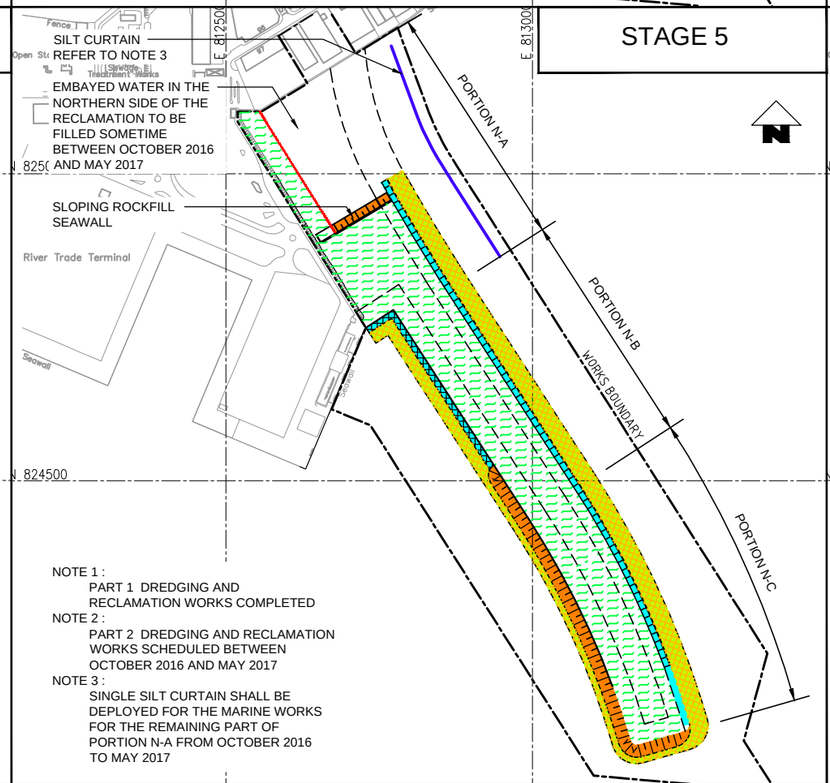
(2) The notification of change in construction sequence was submitted to ENPO in September 2014 and was subsequently approved by EPD on 7 October 2014. The approved notification of change in construction sequence is presented in *Annex A*.

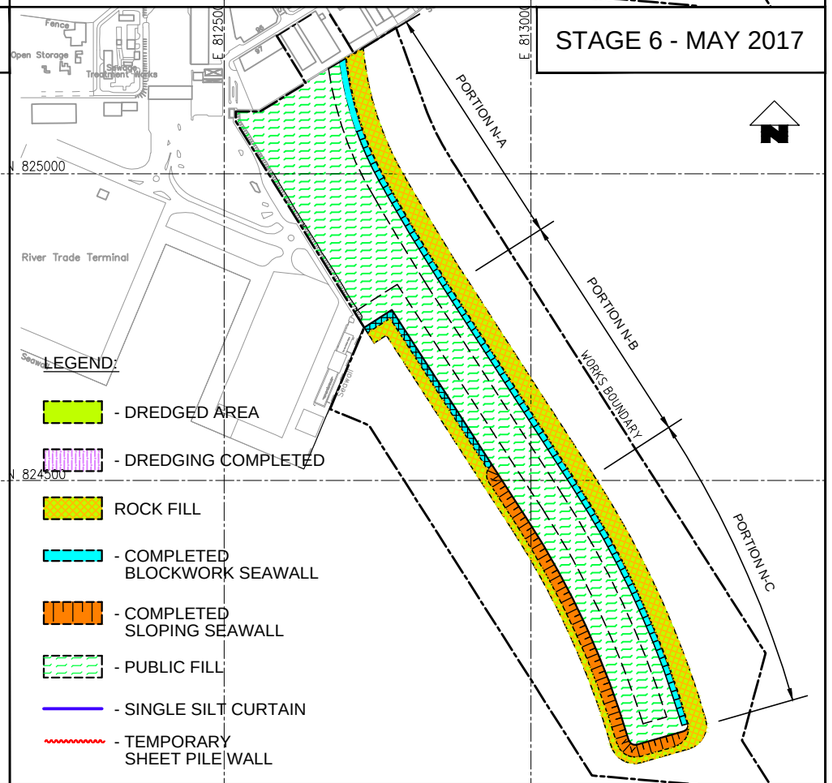












Rev.	Date	Drawn	Designed	Verified	Description	Approved
M	02SEP14	JBu	pkv	CFK	SILT CURTAIN REMOVED AT STAGES 3 & 4	SPo
L	09JUL14	JBu	pkv	CFK	UPDATED PROGRESS FOR DREDGING IN MIDDLE	SPo
K	26JUNE14	JBu	pkv	CFK	MIDDLE SILT CURTAIN ON STAGE 3 REMOVED	SPo
J	23JUNE14	JBu	pkv	CFK	MIDDLE SILT CURTAIN ON STAGE 4 REMOVED	SPo
I	19JUNE14	JBu	pkv	CFK	PROGRESS UPDATED & SILT CURTAIN ADDED FOR PILOT TEST	SPo
H	10JUNE14	pkv/JBu	pkv	CFK	SEQUENCE AND PROGRESS UPDATED	SPo

Main Contractor

Dragages - Bouygues Joint Venture 達嘉 - 布依格聯營

Client

路政署 HIGHWAYS DEPARTMENT

Contractor's Designer

ARUP Ove Arup & Partners Hong Kong Limited

Project

Contract No. HY/2012/08
Tuen Mun - Chek Lap Kok Link -
Northern Connection Sub-Sea Tunnel Section

Drawing Title

Figure 1.1

Drawing no. TMCLKL8-DBJ-NAA-MRW-00132

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CADD Ref. NAA-MRW-00132-M-DFT

Issue Status DFT (DRAFT)

Revision M

Table 1.1 Summary of Silt Curtain Scenarios as discussed in the EIA report [(a)]

Construction Activities	Scenario	Type of Silt Curtain	Loss Reduction Factor	Remarks [(b)]	Justification
Dredging Works	A	Cage-type for grab dredger (1)	80%	✓	Cage type silt curtain will be deployed throughout the dredging works.
	B	Single-layer floating type silt curtain (2)	75%	×	Single layer silt curtain will not be deployed individually for dredging works.
	C	Second layer of floating silt curtain (3)	50%	×	Not used
	D	Combined silt curtains (1 + 2)	95%	✓	Dredging for seawall construction at the remaining section of Portion N-A during Phase II Reclamation will be commenced in the fourth quarter of year 2016, in which dredging will be undertaken inside the cage type silt curtain and a single layer silt curtain will be deployed at Portion N-A parallel to the works boundary.
	E	Combined silt curtains (1 + 2 + 3)	97%	×	Not used.
	F	Combined (2 + 3)	87%	×	Not used.
Filling Activities	G	Single-layer floating type silt curtain (4)	45%		For filling works in Phase II Reclamation, two options for construction method are being considered [(c)]:
				✓	Option 1. Filling works will commence behind the completed seawall with a 100m gap for marine access at Portion N-A. A single-layer floating type silt curtain will be deployed at Portion N-A parallel to the works boundary.
				×	Option 2. Filling works will commence after the completion of the fully enclosed seawall with no gaps for marine access at Portion N-A, hence Scenario G will not be applicable for this option. The silt curtain will remain in place in accordance with Stage 5 of *Figure 1.1* until the completion of marine works for Phase-II Reclamation.
	H	Second layer of silt curtain (5)	30%	×	Not used.
	I	Combined silt curtains (4 + 5)	61%	×	Not used.

*Notes
(a) Sequence B in the approved EIA report is not included which is related to the construction at Southern Landfall, and thus is out of the scopes of this Contract.
(b) ✓ = relevant to this Contract and Pilot Tests are proposed in this *Method Statement*;
× = not relevant or not used in this Contract, thus no Pilot Tests is proposed.
(c) Silt curtain efficiency test for Scenario G would only be conducted if the Contractor proceeded to option 1 during Phase II Reclamation.

The latest progress of dredging/ filling works is summarized as follows:

Phase I Reclamation (Stage 1 to 4 in *Figure 1.1*)

- Dredging for seawall construction at Portions N-A, N-B and N-C has been completed in mid-July 2014;
- Dredging in the middle of Portion N-C has been completed in late-August 2014; and
- The first phase reclamation filling was commenced from Portion N-A in March 2014 and has been completed in the fourth quarter of year 2014.

Phase II Reclamation (Stage 5 to 6 in *Figure 1.1*)

- Dredging for seawall construction at the remaining section of Portion N-A will commence in the fourth quarter of year 2016; and
- Filling behind seawall at the remaining section of Portion N-A will commence in the fourth quarter of year 2016.

Phase II Reclamation will commence in the fourth quarter of 2016 and will be completed in early 2017 tentatively. During the preparation of this *Method Statement*, dredging and filling works for Phase I Reclamation was completed. Tentative construction programme for Phase II reclamation is provided in *Annex B* for reference.

In this *Method Statement*, the Pilot Tests are proposed for the pertinent silt curtain scenarios considering in the EIA and the latest design under this Contract. As informed by the Contractor, the construction method for Phase II Reclamation is detailed below:

Construction method for Phase II Reclamation

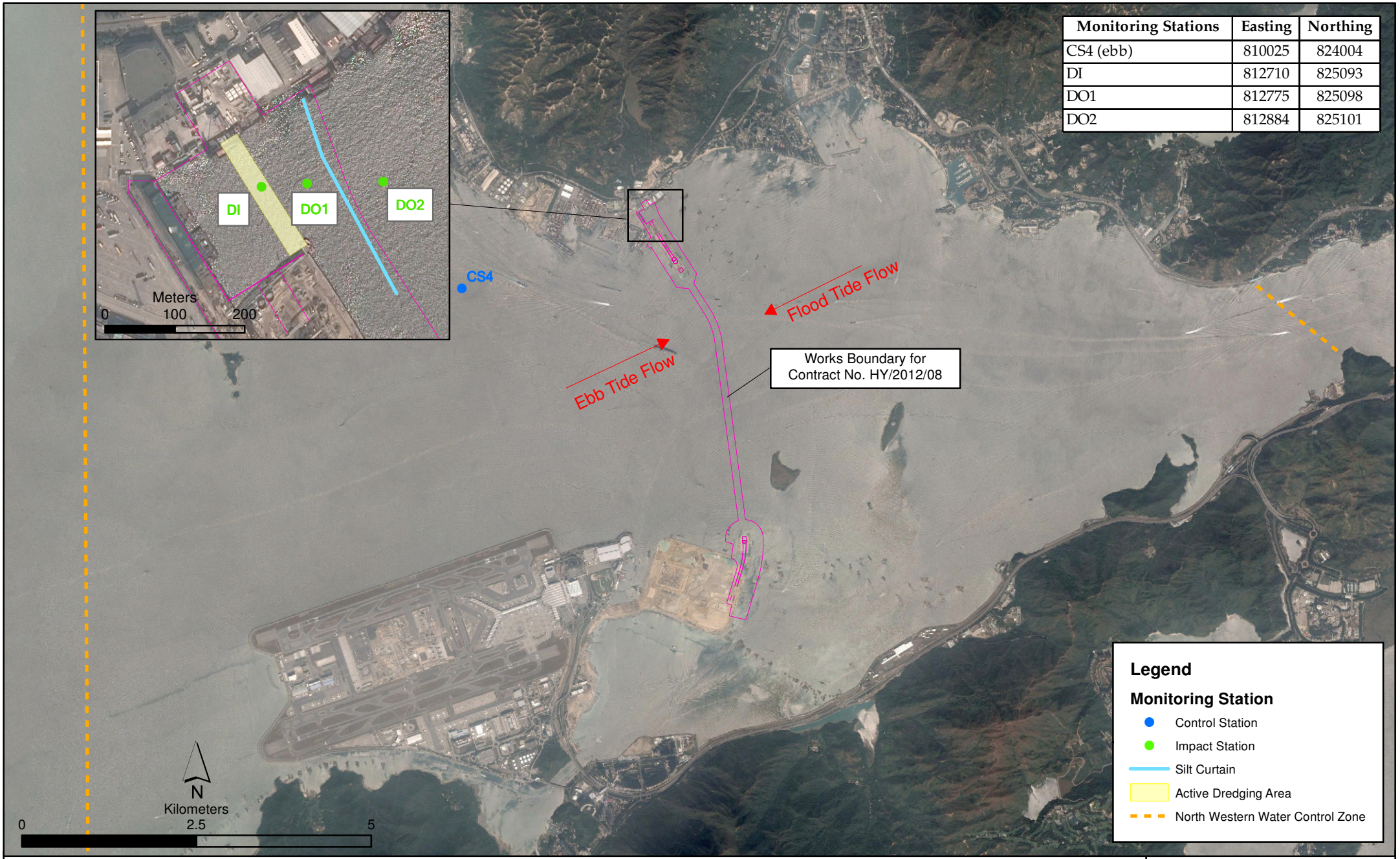
Dredging Works – Scenarios A & D

Dredging for seawall construction at Portion N-A will be undertaken inside the cage type silt curtain and a single layer silt curtain will be deployed at Portion N-A parallel to the works boundary. Under this construction method, silt curtain arrangement for Scenarios A and D will take place (see *Figure 1.2*).

Filling Works – Scenario G

For filling works, two options for construction method are being considered:

Option 1 - Filling works will commence behind the completed seawall with a 100m gap for marine access at Portion N-A. A single-layer floating type silt curtain will be deployed at Portion N-A parallel to the works boundary.



Monitoring Stations	Easting	Northing
CS4 (ebb)	810025	824004
DI	812710	825093
DO1	812775	825098
DO2	812884	825101

Figure 1.2

Pilot Tests Monitoring Stations for Dredging Works under Scenario A & D

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Date: 11/2/2016

Environmental Resources Management

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Under this construction method, silt curtain arrangement for Scenarios G will take place (see *Figure 1.3*). The actual Pilot Test scenario to be conducted will be based on the situation of abovementioned construction method during Phase II Reclamation.

Option 2 - Filling works will commence after the completion of the fully enclosed seawall with no gaps for marine access at Portion N-A, hence Scenario G will not be applicable for this option. The silt curtain will remain in place in accordance with stage 5 of *Figure 1.1* until the completion of marine works for Phase-II Reclamation. The proposed construction method for Option 2 is illustrated in *Figure 1.4*.

1.2.2 Monitoring Locations

Phase II Reclamation - Dredging Activities under Scenarios A and D

For scenarios A and D, given the dredging area in Portion N-A is confined in nature and the reclaimed Northern Landfall and the River Trade Terminal will act as a physical barrier to restrict tidal flushing, significant tidal influence on the proposed Impact monitoring stations is not envisaged. Impact/Outer zone stations downstream of the dredging site are proposed for ebb tide only due to the locations of the dredging site and the silt curtain as shown in *Figure 1.2*. The monitoring locations are determined based upon the locations of the dredging activities under the Contract and the proposed silt curtain layout. In addition, upstream Control Station for impact water quality monitoring will also be monitored to facilitate comparison of the ambient water quality conditions in the surrounding environment. The proposed locations of the monitoring stations for the Pilot Tests of scenarios A and D are illustrated in *Figure 1.2* and detailed in *Table 1.2*.

Table 1.2 Monitoring Stations for Pilot Tests of Silt Curtain Efficiency – Dredging under Scenarios A and D. Indicative locations are presented.

Monitoring Stations	Description	Type of Silt Curtain	Easting	Northing
DI	Impact zone – area enclosed by the cage-type silt curtain	/	812710	825093
DO1	Outer zone – downstream location at approximately 100 m from the cage-type silt curtain	Cage-type (Scenario A)	812775	825098
DO2	Outer zone – downstream location at approximately 100 m from the single layer floating type silt curtain	Combined silt curtains (1+2) (Scenario D)	812884	825101
CS4 (ebb)	Upstream control station during mid-ebb tide	/	810025	824004

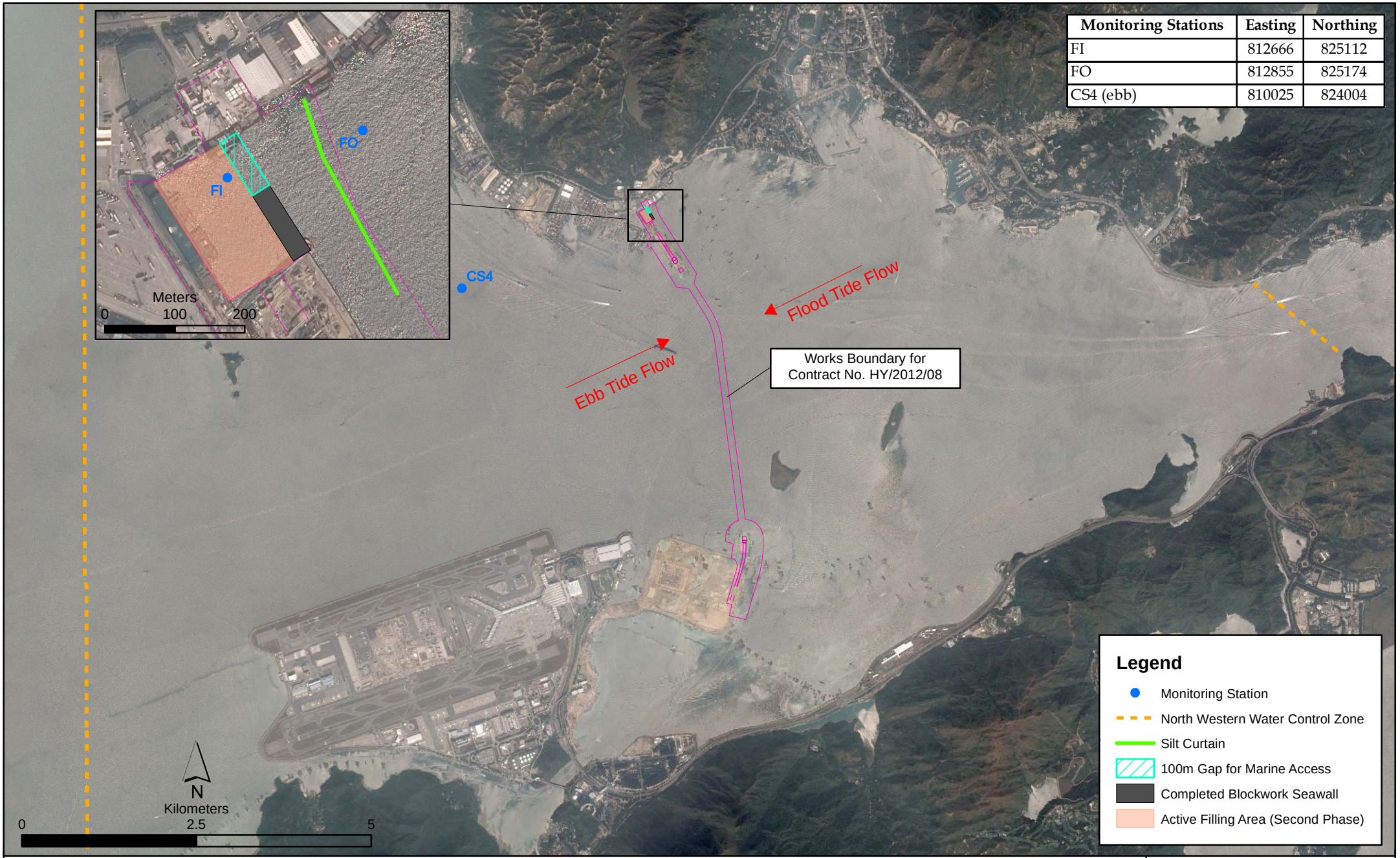

Figure 1.3

Pilot Tests Monitoring Stations for Filling Works Option 1 under Scenario G

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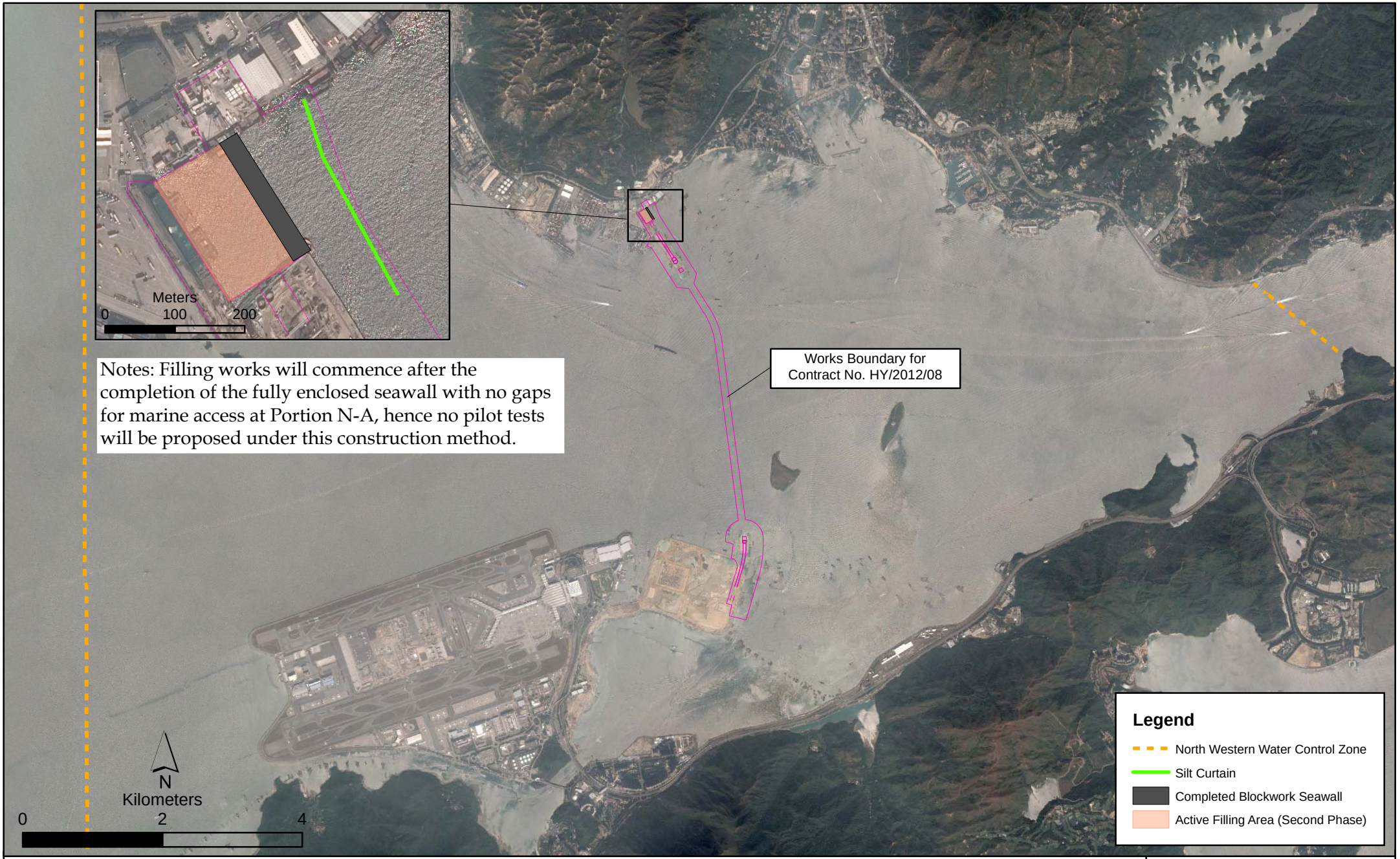

Figure 1.4

Construction Method for Filling Works Option 2

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Date: 30/10/2015

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Monitoring Stations	Description	Type of Silt Curtain	Easting	Northing

*Note:
The status and locations of the actual monitoring locations may change after issue of this method statement. If this happens, the ET will agree with the SOR, in consultation with the IEC/ENPO, to propose the alternative and updated monitoring location.

The Impact zone station DI is defined as the active dredging area enclosed by the cage-type silt curtain, whilst the Outer zone stations DO1 and DO2 are defined as at a distance approximately 100 m away from the cage-type silt curtain and 100 m away from the combined silt curtains (1+2), respectively. Based on the predictions in the approved EIA report [1], this is expected to represent the extent of the zone of influence resulting from marine construction activities under this Contract. The actual locations of these stations will be determined on site based on the location of the dredging activities. Since DI is located at the immediate vicinity of the active dredging area within the cage-type silt curtain, due to safety consideration and progress of dredging works, its location may vary. The actual location of monitoring stations will be updated in the monitoring report of the Pilot Tests for any discrepancy from the proposed.

The loss reduction factor between impact and outer zones of deployed silt curtain will be evaluated for the respective scenario (see *Section 1.2.9*). Water quality monitoring at the Control Station will be evaluated against Action and Limit Levels to identify any exceedances found during the marine works under this Contract (see *Section 1.2.9*).

Given the Pilot Tests are aimed to evaluate primarily on the efficiency of silt curtains where the majority of marine works to be undertaken, no monitoring will be conducted for scenarios of silt curtain and seawall combination.

Phase II Reclamation - Filling Activities under – Scenario G

Filling Works – Scenario G

For scenario G, two sets of monitoring stations will be arranged, comprising both Impact zone and Outer zone of the silt curtain. Given the filling area is confined in nature and the reclaimed Northern Landfall and the River Trade Terminal will act as a physical barrier to restrict tidal flushing, the tidal influence on the proposed Impact monitoring stations is not envisaged. The Impact/Outer zone stations downstream of the filling site are proposed for ebb tide only due to the locations of the filling site and the silt curtain as shown in *Figure 1.3*). In addition, Control Station for impact water quality monitoring will also be monitored to facilitate the comparison of ambient water quality conditions in the surrounding environment. The indicative locations of the monitoring stations for the Pilot Tests for filling activities are illustrated in *Figure 1.3* and detailed in *Table 1.3*.

(1) Based on Section 6.9 of the approved EIA predictions by Delft3D hydrodynamic models, the sediment plumes are predicted to be confined to within about 500 m of the project site.

Table 1.3 ***Monitoring Stations for Pilot Tests of Silt Curtain Efficiency – Filling under Scenario G. Indicative locations are presented.***

Monitoring Stations	Description	Type of Silt Curtain / Barrier	Easting*	Northing*
FI	Impact zone – the active filling area	/	812697	825069
FO	Outer zone - approximately 100 m downstream of the single-layer silt curtain	Single-layer floating type	812781	825122
CS4 (ebb)	Upstream control station during mid-ebb tide	/	810025	824004

*Note:
The status and locations of the actual monitoring location may change after issue of this method statement. If this happens, the ET will agree with the SOR, in consultation with the IEC/ENPO, to propose the alternative and updated monitoring location.

The Impact station FI is defined as the active filling area enclosed by the single-layer silt curtain, whilst the Outer zone station FO is defined as at a distance approximately 100 m downstream of the single-layer silt curtain. Based on the predictions in the approved EIA report, this is expected to represent the extent of the zone of influence resulting from marine construction activities under this Contract. The actual locations of these stations will be determined on site based on the location of the filling activities. Since the FI is located in the close proximity of the active filling area, due to safety consideration and progress of filling activities, its location may vary.

The actual location of monitoring stations will be updated in the monitoring results of the Pilot Tests for any discrepancy from the proposed. The loss reduction factor between impact and outer zone of deployed silt curtain will be evaluated for the respective scenario (see *Section 1.2.9*). Current measurements will be taken at Outer zone monitoring station during the course of water quality monitoring for the ebb tide. Water quality monitoring at the Control Station will be evaluated against Action and Limit Levels to identify any exceedances found during the marine works under this Contract (see *Section 1.2.9*).

Given the Pilot Tests are aimed to evaluate primarily on the efficiency of silt curtains where the majority of marine works to be undertaken, no monitoring will be conducted for scenarios of silt curtain and seawall combination. In addition, the same geotextile material of silt curtain is deployed within the site area of *Contract No. HY/2012/08*, thus the findings from the Pilot Tests within the leading seawall would be applicable for the same silt curtain arrangement elsewhere (e.g. dredging and filling at Portion N-A in year 2016 during Phase II Reclamation) under this Contract.

1.2.3 Monitoring Parameters

The parameters that have been selected for measurement *in situ* and in the laboratory are those that were determined in the approved EIA report with higher potential to be affected by the dredging and filling works (i.e. suspended solids and turbidity) and other general water quality parameters (ie dissolved oxygen, salinity and temperature).

The parameter to be measured in the laboratory for silt curtain efficiency evaluation is:

- Suspended solids (SS) (mg L^{-1})

In addition to the water quality parameters, other relevant data will also be measured and recorded in Water Quality Monitoring Logs, including the location of the sampling stations, water depth, time, weather conditions, sea conditions, tidal stage, current direction and velocity, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results.

1.2.4 Monitoring Equipment

For water quality monitoring, the following equipment will be used:

- ***Dissolved Oxygen and Temperature Measuring Equipment*** - The instrument will be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and will be operable from a DC power source. It will be capable of measuring: dissolved oxygen levels in the range of 0 - 20 mg L^{-1} and 0 - 200% saturation; and a temperature of 0 - 45 degrees Celsius. It shall have a membrane electrode with automatic temperature compensation complete with a cable of not less than 35 m in length. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary (e.g. YSI Pro 2030 or an approved similar instrument).

- ***Turbidity Measurement Equipment*** - The instrument will be a portable, weatherproof turbidity-measuring. The equipment will be operated from a DC power source, it will have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example Hach 2100Q or an approved similar instrument).

- ***Salinity Measurement Instrument*** - A portable salinometer capable of measuring salinity in the range of 0 - 40 ppt will be provided for measuring salinity of the water at each monitoring location.

- ***Water Depth Gauge*** – A portable, battery-operated echo sounder (e.g. Seafarer 700 or a similar approved instrument) will be used for the

determination of water depth at each designated monitoring station. This unit will either be hand-held or affixed to the bottom of the work boat if the same vessel is to be used throughout the monitoring period.

- ***Current Velocity and Direction*** – A current meter capable of measuring the velocity and direction of flow in the range of 0 – 6 m/s (± 0.01 m/s) and 0° to 360° (± 2°), respectively, will be used (e.g. Falmouth Scientific, Inc. 2-Dimensional Acoustic Current Meter or a similar approved instrument). The specification of the proposed current meter is provided in *Annex C*.

- ***Positioning Device*** – A Differential Global Positioning System (DGPS) shall be used during monitoring to allow accurate recording of the position of the monitoring vessel before taking measurements. The DGPS should be suitably calibrated at appropriate checkpoint to verify that the monitoring station is at the correct position before the water quality monitoring commence.

- ***Water Sampling Equipment*** - A water sampler, consisting of a PVC or glass cylinder of not less than two litres, which can be effectively sealed with cups at both ends, will be used (e.g. Kahlsico Water Sampler 13SWB203 or an approved similar instrument). 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.

The specification of geotextile employed as silt curtain under this Contract is provided in *Annex C*.

Prior to the Pilot Tests, the valid calibration certificates of the monitoring equipment to be used *in situ* will be provided to the SOR, the Contractor(s), and IEC/ENPO for agreement. All valid calibration certificates will be attached to the monitoring report. Examples of calibration certificates are shown in *Annex D*.

1.2.5 Sampling/Testing Protocols

All *in situ* monitoring instruments will be checked, calibrated and certified by a laboratory accredited under HOKLAS (1) or any other international accreditation scheme before use. Responses of sensors and electrodes will be checked with certified standard solutions before each use.

On-site calibration of field equipment shall follow the "*Guide to On-Site Test Methods for the Analysis of Waters*", BS 1427: 2009. Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can

(1) The laboratory will be contracted before commencement of the monitoring.

proceed uninterrupted even when equipment is under maintenance, calibration etc.

1.2.6 Laboratory Measurement and Analysis

All laboratory work shall be carried out in a HOKLAS accredited laboratory (1). Water samples of about 1,000 mL shall be collected at the monitoring and control stations for carrying out the laboratory analyses. Water samples for SS measurements will be collected in high density polythene bottles, packed in ice (cooled to 4° C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.

The determination work shall start within the next working day after collection of the water samples. The SS laboratory measurements shall be provided to the ET within 7 working days upon the receipt of the samples. The analyses shall follow the standard methods as described in APHA Standard Methods for the Examination of Water and Wastewater, 19th Edition, unless otherwise specified (APHA 2540D for SS) with a detection limit of 0.5 mg L^{-1}.

The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc), detection limits and accuracy. The QA/QC details shall be in accordance with requirements of HOKLAS or another internationally accredited scheme.

1.2.7 Monitoring Frequency & Arrangements

Dredging Activities – Scenarios A and D

Monitoring will be conducted at all designated stations at mid-ebb tide in the course of dredging activities. The tentative monitoring schedule is presented in *Table 1.4*.

Table 1.4 Tentative Monitoring Schedule of Background Monitoring and Pilot Tests for Dredging

Scenarios	Tide	Monitoring	Monitoring stations	Quantities	Time	Frequency
Scenarios A and D	Mid-ebb	Background Monitoring	DI, DO1, DO2 & CS4	Σ n = 2 replicates x 3 depths x 4 stations x 1 monitoring event = 24	Prior to Pilot Test when no dredging works is carried out under this Contract	One set of measurement at each stations when no dredging works is undertaken under this Contract at ebb tide

(1) The laboratory will be contracted before commencement of the monitoring.

Scenarios	Tide	Monitoring	Monitoring stations	Quantities	Time	Frequency
		Pilot Test	DI, DO1 & DO2	Σ n = 2 replicates x 3 depths x 3 stations x 4 monitoring events = 72	Within ±2 hours from the predicted mid-ebb tide during the period of dredging works	Every 1-hour (time= hr-1, hr-2, hr-3, hr-4) during the 4-hour of Pilot Tests at ebb tide
		Impact Monitoring	CS4*	Σ n = 2 replicates x 3 depths x 1 station x 1 monitoring event = 6	Within ±2 hours from the predicted mid-ebb tide during the period of dredging works	One set of measurement at the Control station within ±2 hours from the predicted mid-ebb tide during the period of dredging works

*Note: Monitoring events for Control Station CS4 will only be carried out once in the same manner as the impact marine water quality monitoring.

Background Monitoring

Background monitoring will be conducted at the designated monitoring stations prior to any dredging activities take place of the day under this Contract. The background monitoring is to investigate whether the change in the ambient environmental condition irrespective to any dredging activities take place under this Contract.

Pilot Tests for Dredging Scenarios A & D

Upon dredging commenced, water samples for SS laboratory analysis will be collected with the *in situ* parameters measurements starting from Outer zone (e.g. DO1, DO2) and eventually at Impact zone Station (e.g. DI). Per each monitoring event, the *in situ* measurements and SS sampling will be conducted every one hour for 4-hour in the predicted mid-ebb tide. Monitoring at the respective Control Station (i.e. CS4) will be undertaken in the same manner as the impact marine water quality EM&A for this Contract as to compare the water quality from the dredging site with the ambient water quality.

For a better understanding of the relationships between loss reduction factor and the dredging activities, information such as dredging rate and dredged volume during the pilot test, actual location of dredging works, will be recorded and reported together with the monitoring results.

Filling Activities – Scenario G

Monitoring will be conducted at all designated stations at mid-ebb tide in the course of reclamation filling. The tentative monitoring schedule is presented in *Table 1.5*.

Table 1.5 Tentative Monitoring Schedule of Background Monitoring and Pilot Tests for Filling

Scenario	Tide	Monitoring	Monitoring stations	Quantities	Time	Frequency
Scenario G	Mid-ebb	Background Monitoring	FI, FO & CS4	Σ n = 2 replicates x 3 depths x 3 stations x 1 monitoring event = 18	Prior to Pilot Test when no filling works is carried out under this Contract	One set of measurement at each stations when no filling works is undertaken under this Contract at ebb tide
		Pilot Test	FI & FO	Σ n = 2 replicates x 3 depths x 2 stations x 4 monitoring events = 48	Within ±2 hours from the predicted mid-ebb tide during the period of filling works	Every 1-hour (time= hr-1, hr-2, hr-3, hr-4) during the 4-hour of Pilot Tests at ebb tide
		Impact Monitoring	CS4*	Σ n = 2 replicates x 3 depths x 1 station x 1 monitoring event = 6	Within ±2 hours from the predicted mid-ebb tide during the period of filling works	One set of measurement at the Control station within ±2 hours from the predicted mid-ebb tide during the period of filling works

*Note: Monitoring events for Control Station CS4 will only be carried out once in the same manner as the impact marine water quality monitoring.

Background Monitoring

Background monitoring will be conducted at the designated monitoring stations prior to any filling activities take place of the day under this Contract. The background monitoring is to investigate whether the change in the ambient environmental condition irrespective to any filling activities take place under this Contract.

Pilot Tests for Filling Scenario G

Upon filling commenced, water samples for SS laboratory analysis will be collected with the *in situ* parameters measurements starting from Outer zone (eg. FO) and eventually at Impact zone Station (eg. FI). Per each monitoring event, the *in situ* measurements and SS sampling will be conducted every one hour for 4-hour in the predicted mid-ebb tide. Monitoring at the respective Control Station (i.e. CS4) will be undertaken in the same manner as the impact marine water quality EM&A for this Contract as to compare the water quality from the filling site with the ambient water quality.

For a better understanding of the relationships between loss reduction factor and the filling activities, information such as filling rate during the pilot test, number of dump barge used, types of filling material used, actual location of

filling works, distance between filling activities and FI station, will be recorded and reported together with the monitoring results.

1.2.8 Sampling Depths & Replication

Each station will be sampled and measurements will be taken at three depth, 1 m below sea surface, mid-depth and 1 m above the seabed. Duplicate (2) readings of the *in situ* measurements and duplicate (2) SS samples will be made at each water depth at each station. For stations that are less than 3 m in depth, only the mid depth sample will be taken. For stations that are less than 6 m in depth, the mid-depth station will be omitted.

As the QA/QC procedures for the *in-situ* measurement of DO and Turbidity, where the difference in value between the first and subsequent measurements at a certain depth is more than 25% of the value of the first measurement, the measurements should be discarded and further measurements should be taken to confirm the values.

Safety is the highest priority during sampling works and it will cease should conditions warrant ensuring the safety of the staff. The risk assessment of health and safety for silt curtain installation and related works is provided in *Annex E*.

1.2.9 Loss Reduction Factor and Water Quality Compliance

The efficiency of the silt curtains will be evaluated against the relevant loss reduction factor for suspended solids (*Table 1.6 & 1.7*) with reference to the approved EIA of TM-CLKL (*Table D6-1* in A*ppendix D6a*).

For Scenario A,

Loss Reduction Factor = 100* [(SS (in) - SS (out)) / SS (in)]

where
SS(in) = DI
SS(out) = DO1.

For Scenario D,

Loss Reduction Factor = 100* [(SS (in) - SS (out)) / SS (in)]

where
SS(in) = DI
SS(out) = DO2.

For Scenario G,

Loss Reduction Factor = 100* [(SS (in) - SS (out)) / SS (in)]

where
SS(in) = FI
SS(out) = FO.

Table 1.6 Loss Reduction Factor of Silt-removal Efficiency for Dredging

Parameter	Scenario	Loss Reduction Factor	Loss Reduction Criteria
Suspended Solids (SS) in mg/L (Depth-averaged [a])	A	100* [(SS (in) - SS (out)) / SS (in)] [b]	Loss reduction factor ≥ **80%**
	D	100* [(SS (in) - SS (out)) / SS (in)] [b]	Loss reduction factor ≥ **95%**

Notes:

a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

b. (out): represents mean measurement of SS at Outer zone (e.g. Monitoring station DO1/DO2) of dredging works during the same tidal cycle.
(in): represents mean measurement of SS at Impact zone (e.g. Monitoring station DI) of dredging works during the same tidal cycle.

Table 1.7 Loss Reduction Factor of Silt-removal Efficiency for Filling

Parameter	Scenario	Loss Reduction Factor [b]	Loss Reduction Criteria
Suspended Solids (SS) in mg/L (Depth-averaged [a])	G	100* [(SS (in) - SS (out)) / SS (in)]	Loss reduction factor ≥ **45%**

Notes:

a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

b. (out): represents mean measurement of SS at Outer zone (e.g. Monitoring station FO) of filling activities during the same tidal cycle.
(in): represents mean measurement of SS at Impact zone (e.g. Monitoring station FI) of filling activities during the same tidal cycle.

Since the proposed Control Station (i.e. CS4) is adopted from the *Contract Specific EM&A Manual*, the Action and Limit Levels for the Water Quality Monitoring will also be adopted from the manual (please refer to *Section 5.12* of the manual) [1]. Water quality monitoring at the Control Station will be evaluated against Action and Limit Levels (*Table 1.8*).

Table 1.8 Action and Limit Levels for Water Quality Monitoring

Parameter	Action Level#	Limit Level#

[1] Accessible at http://www.hzmbenpo.com/emna_report/tmclkl_hy201208/manual/html/toc.htm.

Parameter	Action Level#	Limit Level#
DO in mg/L [a], [e]	Surface and Middle **5.0 mg/L** Bottom **4.7 mg/L**	Surface and Middle **4.2 mg/L** Bottom **3.6 mg/L**
Turbidity in NTU (Depth-averaged [b], [c])	120% of upstream control station at the same tide of the same day and 95%-ile of baseline data, i.e., **27.5 NTU**	130% of upstream control station at the same tide of the same day and 99%-ile of baseline data, i.e., **47.0 NTU**
SS in mg/L (Depth-averaged [b], [c])	120% of upstream control station at the same tide of the same day and 95%-ile of baseline data, i.e., **23.5 mg/L**	130% of upstream control station at the same tide of the same day and 10mg/L for WSD Seawater Intakes at Tuen Mun and 99%-ile of baseline data, i.e., **34.4 mg/L**

Notes:

Baseline data: data from HKZMB Baseline Water Quality Monitoring between 6 and 31 October 2011.

(a) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

(b) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

(c) For turbidity and SS, exceedance of the water quality occurs when monitoring result is higher than the Action/Limit levels.

(d) All figures given in the table are used for reference only, and EPD may amend the figures whenever it is considered as necessary.

(e) The 1%-ile of baseline data for surface and middle DO is 4.2 mg/L, whilst for bottom DO is 3.6 mg/L.

1.3 REPORTING

In respect to the construction phase EM&A marine works, the ET will prepare and submit the monitoring results of the Pilot Tests for Silt Curtain Efficiency within 30 working days following the completion of the monitoring. Copies of the monitoring results of the Pilot Tests for Silt Curtain Efficiency will be submitted to the following: the Contractor(s), the SOR, the IEC/ENPO and the EPD as appropriate. The ET will liaise with the relevant parties on the exact number of copies required.

As stated in the *Contract Specific EM&A Manual* [1], regardless of the measured efficiency of the silt curtain system, the event and action plan provided in the *Contract Specific EM&A Manual* will only be based on the monitoring results at the designated monitoring stations.

[1] Accessible at http://www.hzmbenpo.com/emna_report/tmclkl_hy201208/manual/html/toc.htm.

1.4 EVENT & ACTION PLAN

Should exceedance of the Action/Limit Levels are reported at the Control Station, the Event and Action Plan of Water Quality stipulated in *Table 5.3, Section 5.12* of the *Contract Specific EM&A Manual* shall be followed [1].

[1] The event and action plan shall only be based on the monitoring results at the designated Control monitoring stations, regardless of the outcome of the measured efficiency of the silt system being tested, as stated in the EM&A Manual.

Annex A

Notification of Changes in the Construction Sequence

Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Contract No. HY/2012/08

TECHNICAL REPORT

Document Ref. No.:

Project Ref. Num.	issuer	Location	Doc. Type	Doc. Sequential. Num.	Rev.	Status.
TMCLKL8-1	DBJ	GEN	REP	98745	A	IFA

Document Title:

Environmental Assessment

Changes in Dredging Extent of Northern Landfall

	PREPARED BY:	INTERNAL REVIEW:		INTERNAL APPROVAL
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POSITION	Environmental Manager	Safety & Environmental Manager	Deputy Project Manager	Project Director
SIGNATURE				
DATE	11 Sep 2014	11/9/14	12/9/14	12/9/14

DOCUMENT STATUS

Details of Revision:

Revision	Rev. Date	Sections	Amendment Source and/or Details
A	23 June 2014	All	First Issue for Approval

Revision Table:

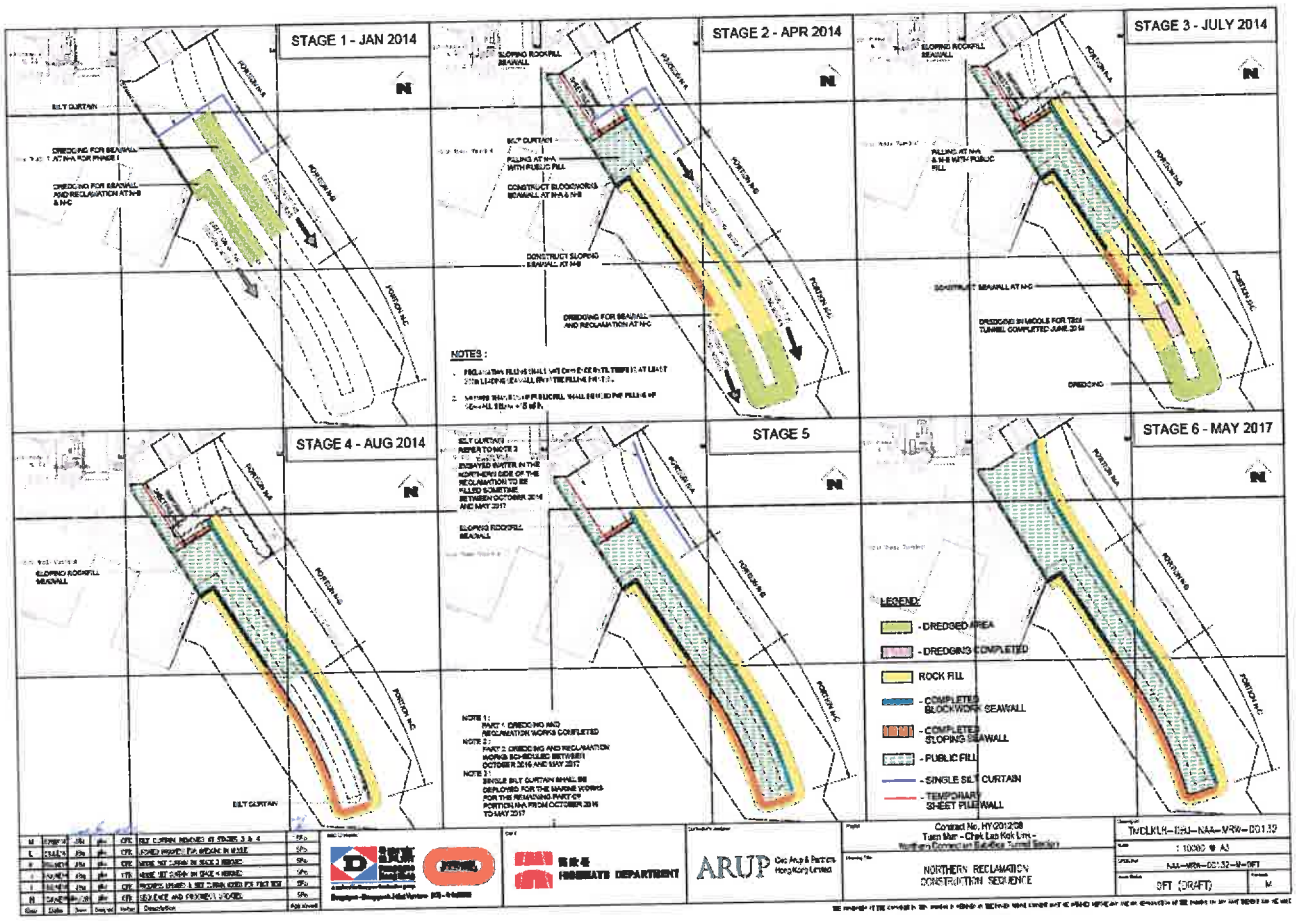
Rev N. Page N.	A	B	C	D	
1	X				
2	X				
3	X				
4	X				
APP. A	X				

TABLE OF CONTENTS

1.0 Proposed Changes

Pursuant to Condition 3.5 of the Environmental Permit EP-354/2009/B, we hereby give written notice that, due to changes in progress and methodology, "dredging in the middle" at Portions N-A and N-B, as specified under Condition 3.7(d) and Figure 3 of the EP-354/2009/B is no longer necessary. The latest construction sequence is illustrated in Figure 1 and Appendix A.

Figure 1 Latest Construction Sequence



2.0 Rationale for the Proposed Changes

It is proposed that the dredging in the middle of Portion N-A and Portion N-B to be deleted. The additional dredging in the middle of Portions N-A and N-B, as stated under VEP application (VEP-426/2014) and subsequently approved in the EP-354/2009/B, was intended to resolve buoyancy pressure of marine mud acting upon the TBM assembly, as well as other geotechnical and structural limitations.

An alternative solution of ground treatment will be implemented to speed up consolidation of the Northern Landfall, so that the TBM may safely drill through it. This solution involves the use of vibrocores. This method employs large vibrating rod, which vibrates into the ground to compact the wet soil. In the process, additional sand is pulled down to the ground, filling voids and forming compacted land. Once the land is compacted, drilling rigs will plow/drill into the ground at strategic locations to inject and mix cement grout into the soil. This will further bind the fill material and solidify the grounds to provide a stabilized substrate for the TBM to drill through, avoiding buoyant pressure acting upwards on the TBM unit.

The ground treatment works is land-based. It replaces the marine dredging works in the middle of Portions N-A and N-B and is carried out on top of the completed parts of the Northern Landfall reclamation. Therefore, it is considered that the reclamation method, as considered under the EIA assumption, will not change as a consequence of the proposed changes.

Like bored piling and other land-based foundation works, the ground treatment works will be wet-works and will not cause dust impact. Water recycling and treatment facilities will be provided as a normal practice and in compliance with discharge licenses to treat the water before discharge.

In the course of the ground treatment works, no open excavation for this work is envisaged. There will be no additional C&D materials to be excavated and the work is considered to remain within the scope of EP-354/2009/B and EIA Report requirements for normal land based civil works.

3.0 Potential Environmental Implication of the Proposed Changes

With the cancellation of dredging in the middle of Portions N-A and N-B, the overall dredging extent will reduce from that depicted in Figure 3 of EP-354/2009/B. The potential environmental impacts, due to the reduction of dredging, should be equal to or less than that expected under EP-354/2009/B. It follows that the impact should be no greater than that envisaged under the approved EIA Report. For the purpose of assessing potential environmental impacts against individual aspects under the approved EIA Report, the following environmental aspects are deemed to be relevant.

- Water quality;
- Marine ecology;
- Fisheries;
- Waste Management; and
- Landscape and visual.

Environmental aspects that are considered irrelevant to the present assessment are presented in Table 3.1, with justification of their exclusion from the assessment.

Table 3.1 Environmental Aspects Excluded from the Assessment

Environmental Aspect Excluded	Justifications
Air Quality	1. The works are predominantly marine-based. No significant dust nuisance is expected. 2. The ground treatment works that replaces some of the dredging works will be wet-works. 3. No additional open excavation works is envisaged as a result of the change.
Noise	1. No Noise Sensitive Receivers (NSR) is identified within the necessary proximity to works in the EIA Report. As such, the noise assessment is not relevant to the works.
Terrestrial Ecology	1. The works are predominantly marine-based. 2. The location of works is adjoined to a developed area and at least 200 m from any potentially sensitive habitats, e.g. plantation, stream and tall shrubs.
Cultural Heritage	1. The marine works and the work area was not identified as having marine archaeological potential in the approved EIA Report. 2. The nearest built heritage resources (Grave G1) is located near the toll plaza and will not be affected by the works.
Land Contamination	1. The marine works do not overlap with any potentially contaminated land.
Landfill Gas Hazard	1. The marine works are far away from any landfill sites.

3.1 Marine Water Quality

Dredging in the middle of Portions N-A and N-B are deleted from Figure 3 of EP-354/2009/B, with no concurrent changes to the dredging extent of Portion N-C. Accordingly, the overall dredging extent is reduced.

extent. As such, indirect impact to marine ecological resources due to the proposed change in the dredging scheme is anticipated to remain the same as that envisaged under the approved EIA Report.

- Acoustic disturbance to marine life – Since the overall dredging extent is reduced, it means that there will be less dredging works and associated dredging plant used in the concerned area of Portion N-A and N-B will not increase. The number and types of plant involved for dredging works is not expected to increase or decrease as these plant assets would be distributed to various other works within the site. It is considered that acoustic disturbances to marine life would be no worse than those deemed to be acceptable in the approved EIA Report.
- Injury/mortality or disturbance from construction phase marine traffic to marine life, specifically the Chinese White Dolphins (CWDs) – Since dredging between the 200m leading seawalls at Portions N-A and N-B has been cancelled, with no concurrent changes to the dredging extent of Portion N-C, it is considered that any impacts arising from the dredging activities and from the associated marine traffic, will be reduced. Therefore, disturbance to marine life would not be worse than those deemed to be acceptable in the approved EIA Report.
- As the dredging extent is reduced and the affected reclamation area remains within the site boundary under this Contract, potential impact to fisheries resources and operations is not expected to be unacceptable.

Overall marine ecological and fisheries impacts due to the proposed change in the dredging extent are not considered as unacceptable.

3.3 Waste Management

Under this notification, dredging in the middle of Portions N-A and N-B is cancelled. The dredging quantity at Portion N-C remains unchanged from that depicted under Figure 3 of EP-354/2009/B. As such, it is expected that the amount of dredged sediment generated will be no larger than that assumed in the EP-354/2009/B and the approved EIA Report.

In the course of the ground treatment works, no open excavation for this work is envisaged. There will be no additional C&D materials to be excavated and the work is considered to remain within the scope of EP-354/2009/B and approved EIA Report requirements.

3.4 Landscape and Visual

Since the concerned dredging works are within the site boundary under this Contract, it is envisaged that the related landscape impact would be no greater or any worse than that predicted in the approved EIA Report.

Referring to the approved EIA Report, impacts to marine water quality are attributable to sediment plumes, which are caused by the suspension of sediment during the process of dredging. A reduction in the overall dredging extent should result in a corresponding reduction in marine water quality impact.

Reclamation filling activities are proceeding concurrently at Portion N-B. However, no changes to reclamation filling extent are proposed under this notification. As all associated mitigations for reclamation filling (e.g. 200m leading seawall) are implemented in accordance with EP-354/2009/B requirements, it is considered that the impact of marine water quality due to the reclamation filling activities would be no greater or any worse than those predicted in the approved EIA Report.

Therefore, the net impact is considered to be solely due to the change in dredging extent. The associated water quality impact, due to the cancellation of dredging in the middle of Portions N-A and N-B, is considered to be no worse than that assumed in the approved EIA Report.

For the dredging in the middle of Portions N-A and N-B, the following additional mitigation measures were proposed under VEP application (VEP-426/2014) and subsequently specified under Condition 3.7(d) and Figure 3 of the EP-354/2009/B:

> *"Dredging in the middle of Portion N-A and Portion N-B shall only be carried out upon the formation of 50m leading seawall from the dredging location within Portion N-A / Portion N-B and a single layer of silt curtain shall also be deployed between the ends of the two leading seawalls to form an enclosed area as shown in Figure 3 of this Permit."*

Since no dredging will be undertaken in the middle of Portions N-A and N-B, the aforementioned mitigation measures in Condition 3.7(d) and Figure 3 of the EP-354/2009/B are no longer deemed necessary.

3.2 Marine Ecology and Fisheries

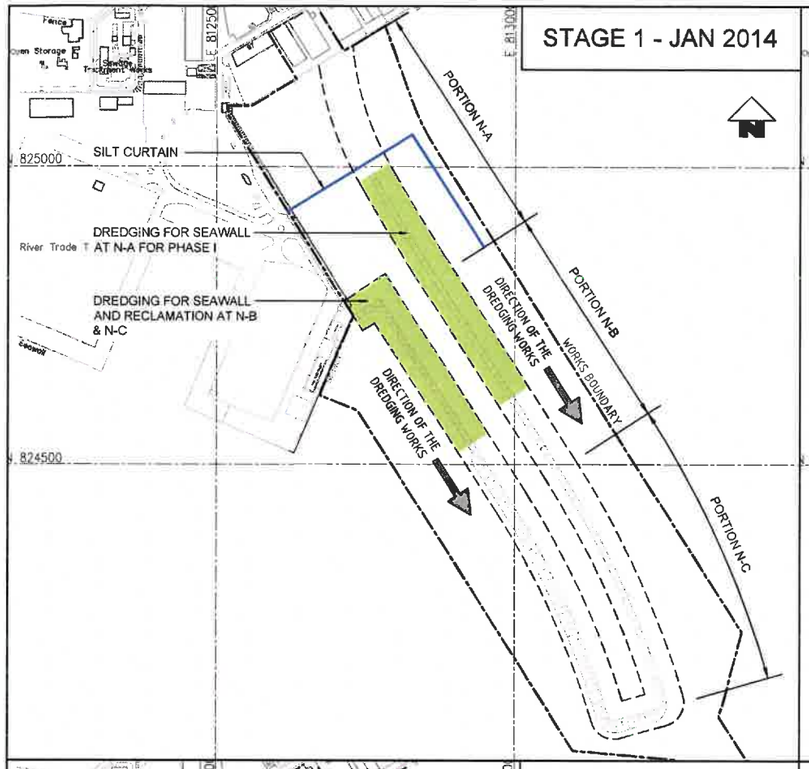
The potential impacts to marine ecology and fisheries are assessed as follow:

- Permanent loss of habitat – The reclamation footprint of the northern landfall will not be changed as a result of the proposed reduction in dredging extent. As such, the size and type of habitat loss would remain the same as those predicted in the approved EIA Report, as well as in both EP-354/2009/A and EP-354/2009/B. Corals at the concerned area, that were considered feasible for translocation, have already been translocated prior to the construction commenced on 1 November 2013. As such, unacceptable impacts to corals or other marine habitats are not expected to occur due to the change of dredging extent.
- Indirect impacts due to the change in water quality – As discussed in Section 3.1 above, unacceptable water quality impact is not expected as a result of the reduction of the dredging

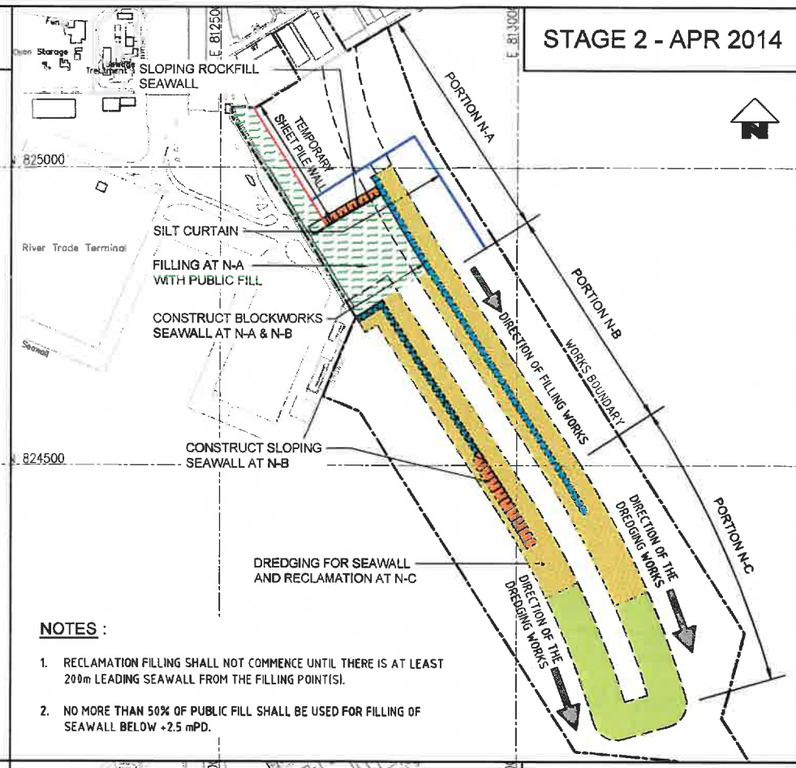
4.0 Conclusion

- In EP-354/2009/A, full dredging was permitted beneath the seawall construction and in Portion N-C.
- A variation to EP-354/2009/A was applied in December 2013 to permit the dredging in the middle of Portions N-A and N-B. EP-354/2009/B was issued on 28 January 2014.
- The additional dredging in the middle of Portions N-A and N-B, as stated in the EP-354/2009/B, was intended to resolve buoyancy pressure of marine mud acting upon the TBM assembly, as well as other structural limitations.
- Due to the ongoing progress and methodology changes, this notification addresses the cancellation of dredging in the middle of Portions N-A and N-B, as described in Clause 3.7(d) and illustrated in Figure 3 of EP-354/2009/B.
- An alternative solution of ground treatment will be implemented to speed up ground compaction and weight down the soil for TBM excavation. The ground treatment works will be solely land-based, carried out on top of the reclaimed land of the Northern Landfall. It will replace the marine dredging works in the middle of Portions N-A and N-B and will not affect the reclamation method, as considered under the EIA assumptions.
- The ground treatment method employed will involve wet-works and will not cause dust impact. Water recycling and treatment facilities will be provided as a normal practice and in compliance with discharge licenses to treat the water before discharge. This is considered to be in compliance with EP-354/2009/B and EIA Report requirements. In the course of the ground treatment works, no open excavation for this work is envisaged. There will thus be no additional C&D materials to be excavated and the work is considered to remain within the scope of EP-354/2009/B and approved EIA Report requirements.
- The dredging quantities estimated for the newly proposed dredging scope are all within the preliminary design of the Project assumed in the approved EIA Report and the EP-354/2009/B, given that no dredging will be undertaken in the middle of Portions N-A and N-B and the dredging extent of Portion N-C is the same as that assumed in the EP-354/2009/B.
- Comparison of potential environmental impacts between the proposed change in the dredging extent and the conditions in EP-354/2009/B indicated that the associated environmental impacts under the proposed change would be no greater or any worse than those predicted in the approved EIA Report.
- Overall, it is recommended that the cancellation of dredging at Portions N-A and N-B to be considered as conforming to the information and requirements contained in the EIA Report.

STAGE 1 - JAN 2014



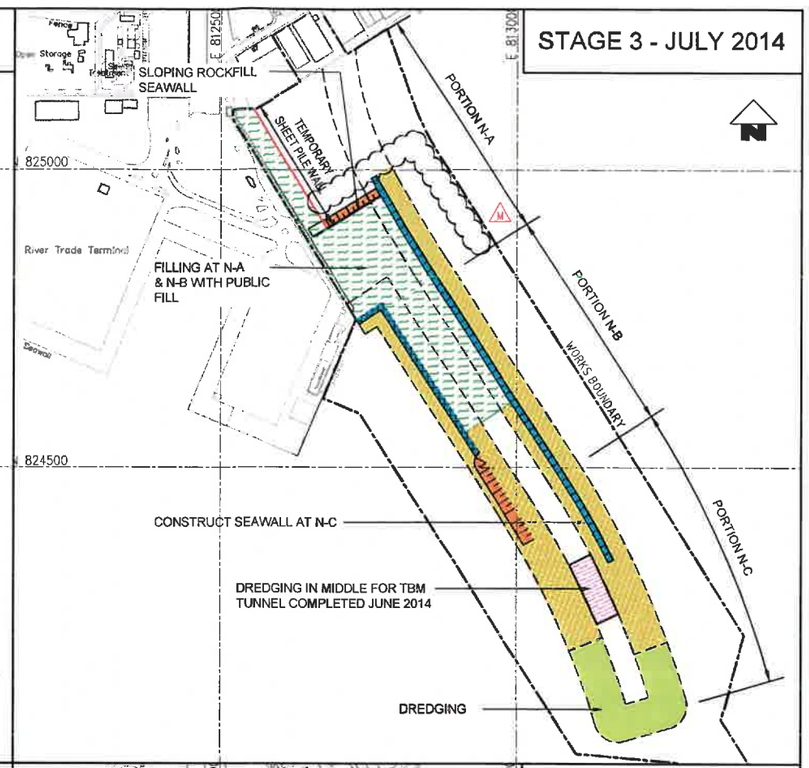
STAGE 2 - APR 2014



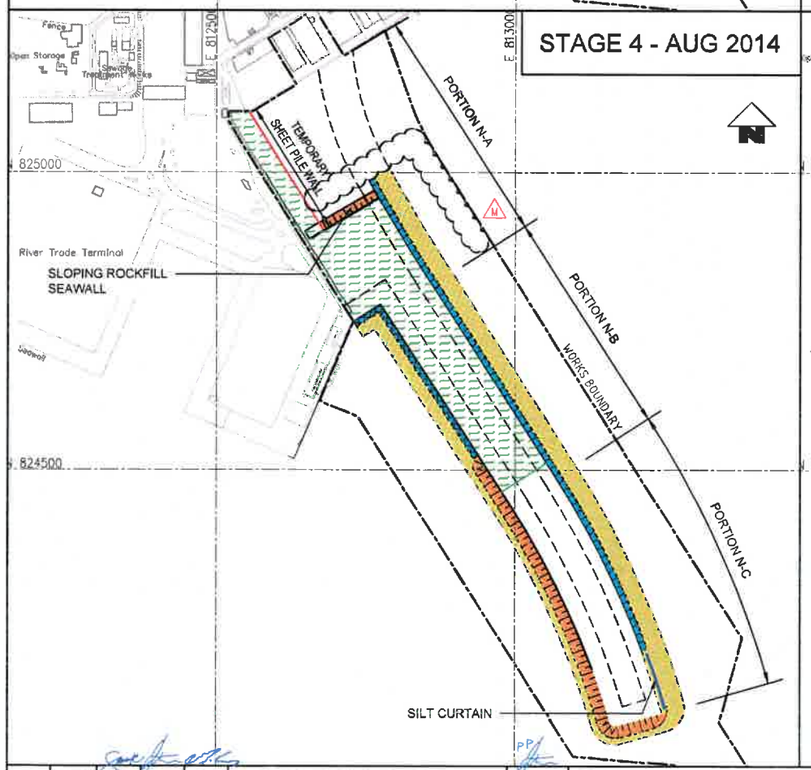
NOTES :

1. RECLAMATION FILLING SHALL NOT COMMENCE UNTIL THERE IS AT LEAST 200m LEADING SEAWALL FROM THE FILLING POINT(S).
2. NO MORE THAN 50% OF PUBLIC FILL SHALL BE USED FOR FILLING OF SEAWALL BELOW +2.5 mPD.

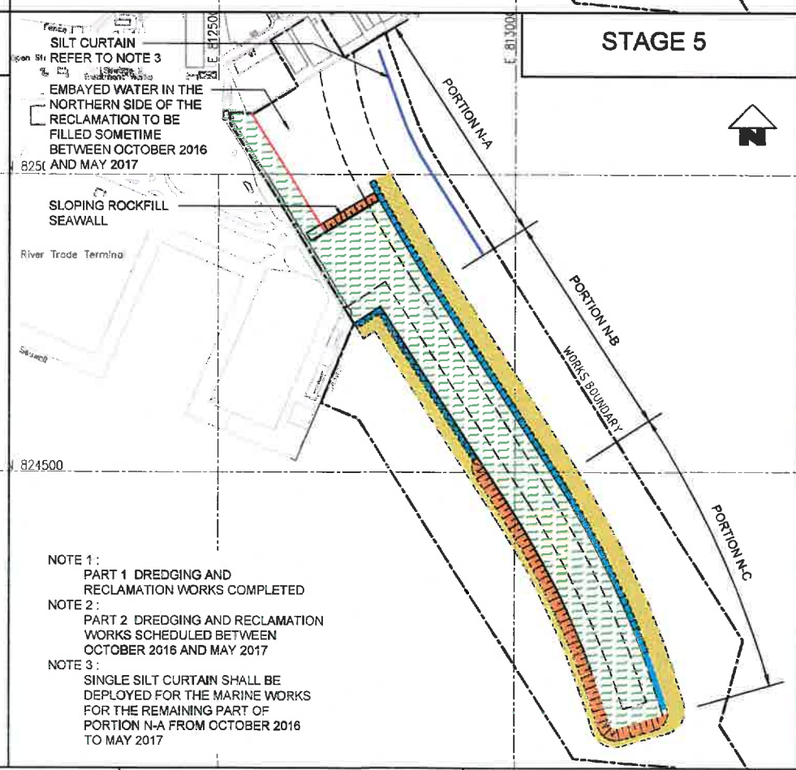
STAGE 3 - JULY 2014



STAGE 4 - AUG 2014

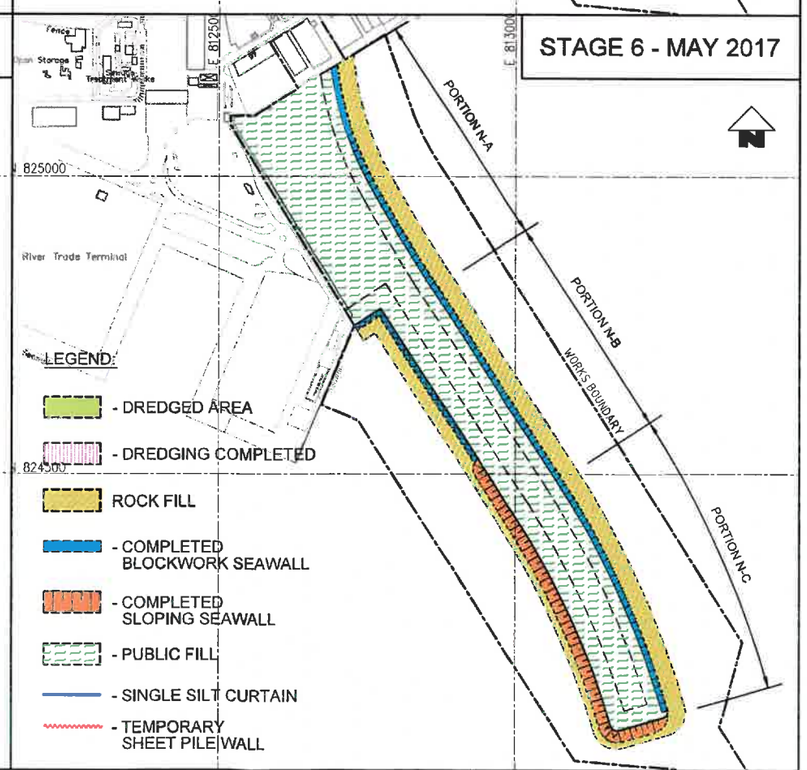


STAGE 5



NOTE 1 :
PART 1 DREDGING AND RECLAMATION WORKS COMPLETED
NOTE 2 :
PART 2 DREDGING AND RECLAMATION WORKS SCHEDULED BETWEEN OCTOBER 2016 AND MAY 2017
NOTE 3 :
SINGLE SILT CURTAIN SHALL BE DEPLOYED FOR THE MARINE WORKS FOR THE REMAINING PART OF PORTION N-A FROM OCTOBER 2016 TO MAY 2017

STAGE 6 - MAY 2017



LEGEND:

- DREDGED AREA
- DREDGING COMPLETED
- ROCK FILL
- COMPLETED BLOCKWORK SEAWALL
- COMPLETED SLOPING SEAWALL
- PUBLIC FILL
- SINGLE SILT CURTAIN
- TEMPORARY SHEET PILE WALL

Rev.	Date	Drawn	Designed	Verified	Description	Approved
M	02SEP14	JBu	pkv	CFK	SILT CURTAIN REMOVED AT STAGES 3 & 4	SPo
L	09JUL14	JBu	pkv	CFK	UPDATED PROGRESS FOR DREDGING IN MIDDLE	SPo
K	26JUNE14	JBu	pkv	CFK	MIDDLE SILT CURTAIN ON STAGE 3 REMOVED	SPo
J	23JUNE14	JBu	pkv	CFK	MIDDLE SILT CURTAIN ON STAGE 4 REMOVED	SPo
I	19JUNE14	JBu	pkv	CFK	PROGRESS UPDATED & SILT CURTAIN ADDED FOR PILOT TEST	SPo
H	10JUNE14	pkv/JBu	pkv	CFK	SEQUENCE AND PROGRESS UPDATED	SPo

Main Contractor: 香寶嘉 Dragages HongKong — A member of the Bouygues Construction group; BOUYGUES TRAVAUX PUBLICS
Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Client: 路政署 HIGHWAYS DEPARTMENT

Contractor's Designer: ARUP Ove Arup & Partners Hong Kong Limited

Project: Contract No. HY/2012/08
Tuen Mun - Chek Lap Kok Link -
Northern Connection Sub-Sea Tunnel Section

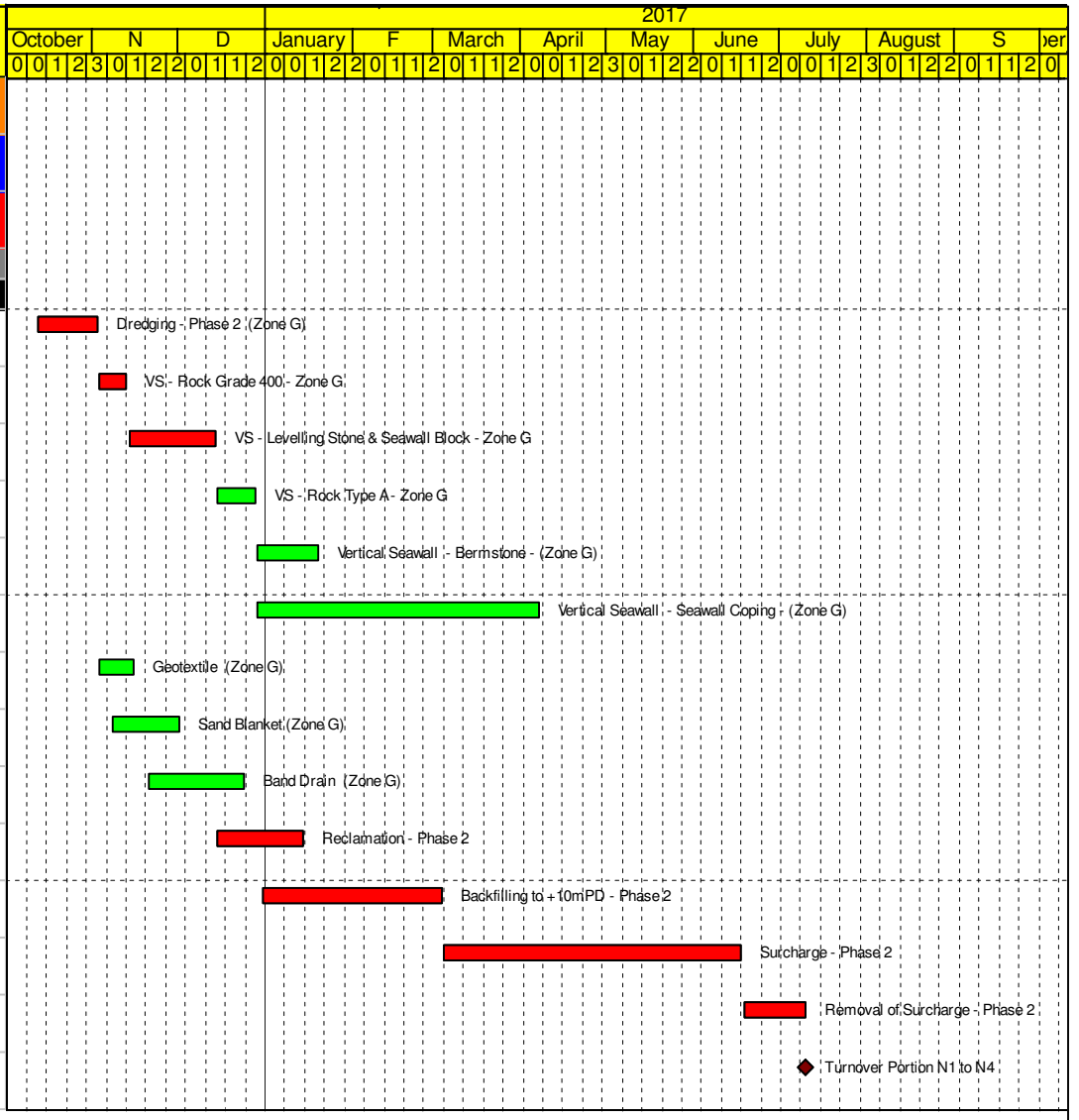
Drawing Title: NORTHERN RECLAMATION CONSTRUCTION SEQUENCE

Drawing no.: TMCLKL8-DBJ-NAA-MRW-00132
Scale: 1:10000 @ A3
CADD Ref.: NAA-MRW-00132-M-DFT
Issue Status: DFT (DRAFT)
Revision: M

Annex B

Construction Programme for Phase II Reclamation

Activity ID	Activity Name	Orig Dur	Planned Start	Planned Finish
TMCLK - Northern Connection Sub-Sea Tunnel Section				
Construction				
Northern Landfall				
North Reclamation (Phase 2)				
Construction				
DDP10390	Dredging - Phase 2 (Zone G)	18	13-Oct-16	02-Nov-16
DDP10405	VS - Rock Grade 400 - Zone G	9	03-Nov-16	12-Nov-16
DDP10407	VS - Levelling Stone & Seawall Block - Zone G	27	14-Nov-16	14-Dec-16
DDP10409	VS - Rock Type A - Zone G	10	15-Dec-16	28-Dec-16
DDP10410	Vertical Seawall - Bermstone - (Zone G)	18	29-Dec-16	19-Jan-17
DDP10420	Vertical Seawall - Seawall Coping - (Zone G)	78	29-Dec-16	07-Apr-17
DDP10430	Geotextile (Zone G)	11	03-Nov-16	15-Nov-16
DDP10440	Sand Blanket (Zone G)	21	08-Nov-16	01-Dec-16
DDP10450	Band Drain (Zone G)	30	21-Nov-16	24-Dec-16
DDP10460	Reclamation - Phase 2	24	15-Dec-16	14-Jan-17
DDP10470	Backfilling to +10mPD - Phase 2	48	31-Dec-16	04-Mar-17
DDP10480	Surcharge - Phase 2	105	05-Mar-17	17-Jun-17
DDP10490	Removal of Surcharge - Phase 2	18	19-Jun-17	10-Jul-17
DDP10500	Turnover Portion N1 to N4	0		10-Jul-17



Planned Bar
Planned Bar - Critical
Planned Milestone

TMCLK - Northern Connection Sub-sea Tunnel Section

North Reclamation Phase 2

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approv...
28-Jul-14	TMCLK/DBJ/GEN/PRG/98507/ Rev. C	CLa	WYu

Annex C

Specifications

FSI ACM-PLUS

Selectable 2 or 3 Dimensional Current Meter

Compact, cost-effective, high-accuracy meters with vector-averaged current speed and direction

Enhanced Design, Specifications, Performance

The Falmouth Scientific, Inc. enhanced Acoustic Current Meter delivers extremely precise 2 or 3 dimensional velocity measurements (user selectable) in a defined free field. The ***ACM-PLUS*** uses the most accurate and stable current measurement techniques available today and is configured with standard features that are options on competitive instruments such as **extended on-board data memory, fast download capability**, **high accuracy real-time clock, and high speed data sampling**.
The instrument incorporates an internal compass and tilt sensors to provide true current vector direction. The unit's compact size and light weight make the ***ACM-PLUS*** well suited for multiple meter arrays. Windows-based software for meter setup, data collection and data visualization make the FSI ***ACM-PLUS*** very user-friendly.

The ***ACM-PLUS*** is available in either shallow-water or deep-water housings. The device may also be equipped with an optional CTD module and can be configured to log up to two analog inputs from external sensors (e.g., DO, OBS, Fluorometer, Transmissometer).

FSI ACM-PLUS-200 with optional 5 ton frame

FEATURES

- Compact, lightweight, low-maintenance construction
- **User Selectable 2 or 3 axis** true cosine response velocity measurement
- Accurate velocity measurement with excellent low-velocity resolution
- Electronic magneto-resistive compass with 2-axis tilt sensor
- ***Fast Data Sampling up to 10 Hz***
- Water Temperature measurement
- Extremely long battery life with low-maintenance alkaline batteries
- Real-time output/display capability; ***Fast Data Download***
- Long-term data logging to ***2 GigaByte internal flash memory***
- ASCII serial data output via RS-232 or RS-485 (set at factory)
- Built-in ***High Accuracy*** real-time clock with on/off power control
- 1.5-ton working strength mooring frame standard; optional 5-ton mooring frame
- Optional conductivity, temperature, pressure sensor package (CTD) may be added
- Choice of epoxy shallow-water (200m) or titanium deep-water (7000m) housing

SPECIFICATIONS

Sensors

Parameter	Type	Range	Accuracy	Resolution
Velocity	Acoustic	0 to 600 cm/s	2% of Reading or 1 cm/s	0.01 cm/s
Direction	3 Axis Magnetometer	0 to 360°	±2°	0.01°
Tilt	2 Axis Accelerometer	0 to 30°	0.5°	0.01°
Temperature	Semiconductor	-2 to 35°C	0.5°C	0.01°C

Optional CTD

	Range	Accuracy	Resolution	Stability
Conductivity (mS/cm)	0 to 70	±0.01	.001	±0.0005 per month
Temperature (Celsius)	-5 to 32° ITS-90	±0.01°	.001°	±0.0005° per month
Pressure (dBar)	0 to 200 dBar 0 to 7000 dBar	±0.1% full scale	0.01% full scale	±0.01% per month

Instrument

External Power: 8 to 32 VDC

Current Draw: 15 mA at 1 Hz sample rate; 80 mA at 10 Hz sample rate; 150 uAmp sleep

Battery Power: Alkaline 5 D Cell Welded Pack, 10 AHR

Internal Memory: **2.0GB Standard**

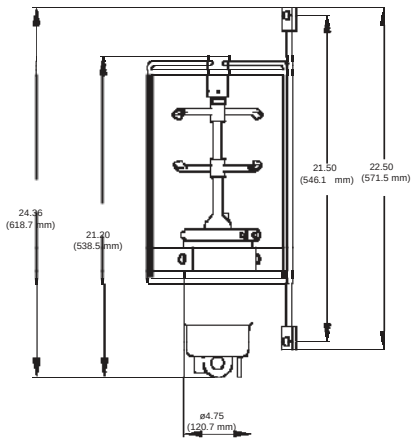
Sample Rate: **10 Hz Maximum**
Vector Averaging Period: **User Selectable up to** 59 Min:59 Sec
Real Time Clock: Programmable **High Accuracy** Sampling/Low-power Mode
Sampling Modes: Continuous, Interval, and Delayed Start (continuous or interval)
Clock Stability: +/- 2ppm (0-40 degrees C); +/-4ppm (-40 degrees C to +85 degrees C)

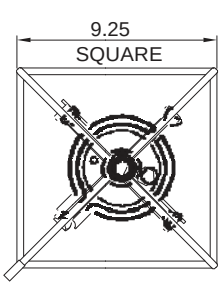
Input Channels: Two (2) 0-5V DC Input Channels with 12 bit A/D resolution available for external sensor input, such as; Transmissometer, DO, OBS (Regulated 12 VDC 1.5W provided to power external sensors)

Depth Rating/Physical Material: 200 Meter Epoxy Housing Standard, P/N: ACM-PLUS-200
7000 Meter Titanium Housing Optional, P/N: ACM-PLUS-7000

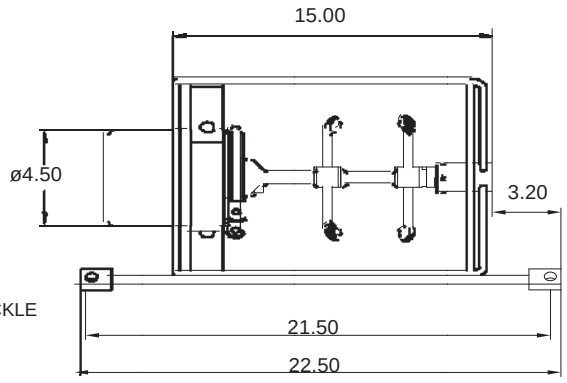
Mooring Frame: 1.5 Ton 316 Stainless Steel Mooring Frame (Standard, shown below)
5 Ton Stainless Steel Mooring Frame (Optional)

Specifications Subject to Change without Notice





3/8" DIA. SHACKLE



June 2012

Falmouth Scientific, Inc.
1400 Route 28A, PO Box 315, Cataumet, MA 02534-0315
fsi@falmouth.com • Tel: 1-508-564-7640 • Fax: 1-508-564-7643 • **www.falmouth.com**

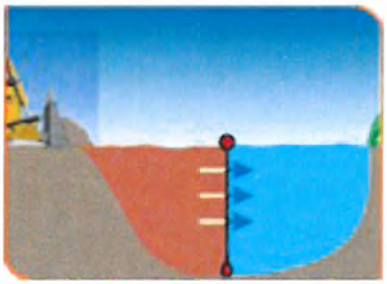
EMPTEEZY
working for the environment

TECHNICAL DATA

Code : SB16300
Color : Orange

SILT BOOM PVC - OVER HEIGHT 16300MM
FREEBOARD 300MM - DRAFT 16000MM

Silt Boom is designed to prevent silt contamination of waterways from manmade or natural erosion. Silt booms are suitable for use in sheltered and inland waters.
They are fast to assemble and deploy, tough and abrasion resistant.



- Boom Fabric: Nylon coated with PVC
- Skirt fabric: Terylene 220gms
- Float: Polystyrene (PS)
- Boom Color : Orange
- Freeboard: 300 mm - Draft: 16000 mm - Over height: 16300 mm
- Section length: 20m
- Boom & Skirts Connections: Lace-up
- Ballast 8 mm hot dipped galvanized chain - 1.9kg/m
- Operational Temperature: 0 ~ +40°C
- Excellent UV Resistance

MATERIAL SUBMISSION FORM

To: Supervising Officer's Representative

Title of Submission:	:	Silt Curtain (around dredger & cage type silt curtain)
Our ref.	:	TMCLKL8/MAS/000009/A
SOR ref.	:	

Description of contents :

Woven Polypropylene Geotextile Bontec SG110/110 Silt Boom PVC (SB6300) is to be used for cage type silt curtain.

REQUIRED INFORMATION		DETAILS PROVIDED
~~Supplier's~~ / Manufacturer's Name	:	Bonar Technical Fabrics NV/SA
~~Supplier's~~ / Manufacturer's Address	:	Industriestraal 39, B-9240 Zele, Belgium
Name of Product of service	:	Bontec SG 110/110
Type of Product of service	:	Woven Polypropylene Geotextile
Sample Submission	:	☒ As Attached ☐ Not required ☐ To be submitted separately ☐ Prev. submitted (CSM Ref. No).
Applicable Specification Clause	:	EM&A Manual Section 5, 5.2.1.1
Applicable Standard:	:	Nil
Test/backup Data provided	:	attached Technical Data
Previous history of use	:	Nil
Proposed location for use	:	Cage type silt curtain
Proposed duration for use	:	2013 - 2018

Purpose of Submission		☒ For Approval	☐ For Information	☐ For Record
Signature	:			
Name	:	Martin HO	Benjamin KITZIS	Corinne GUEDON	Seved ROBIN
Position	:	Reclamation Engineer	Gen. Construction Mgr.	Quality Manager	Project Director
Date	:	5/9/2013	5/9/13	5/9/13	5/9/13
		Originated by: MHo	Checked by: BKi	Reviewed by : CGu	Approved by: SRo

Distribution:
Cc: CE/NWNT,HyD – Mr. Stephen CHAN

TMCLKL8	42303	A

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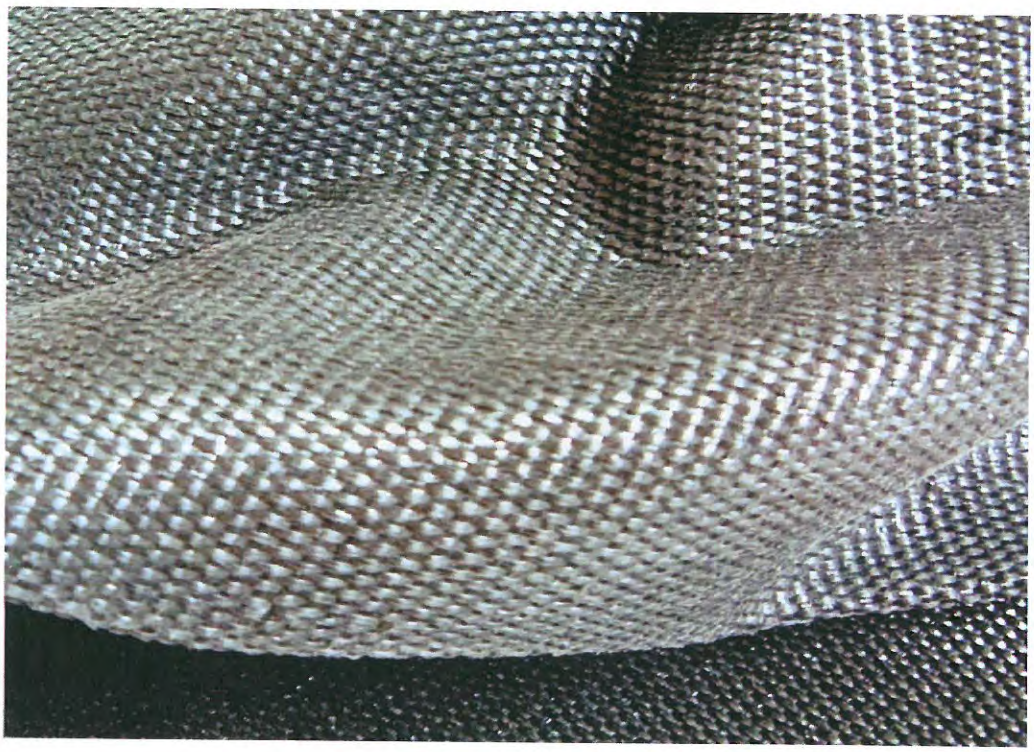
ENGINEERING

Material Submission

BONTEC SG110/110
Woven Polypropylene Geotextile

Contract no: HY/2012/08



G AND E COMPANY LIMITED

14/F., Kiu Yin Commerical Building,

361 - 363 Lockhart Road,

Wanchai, Hong Kong

Tel: 2570 0130 Fax: 2570 0089

website: www.g-and-e.com

Aug 2013

G & E
ENGINEERING

Table of Contents

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Bontec SG110/110

Woven Polypropylene Geotextile

Manufacturing Company Profile

ontinues to provide one of the main forms or domestic and industrial waste.

cations require high quality densely ched nonwoven geotextiles to protect the ive geomembrane liners.

provision of a very high puncture resis- / and VNW geotextiles offer protection h initial installation damage and longer cracking. In this sector, SNW grades in monstrate an extremely high performance petitive weights.

'NW needle punched geotextiles are also in a protection function to prevent damage to sable membranes used in the construction ervoirs, lakes and new tunnel linings.

Excess groundwater must be carefully controlled both during and after construction so as to ensure structural stability. Typical drainage systems include carriageway edge drains to protect the roadway, back of wall drainage to reduce hydrostatic pressure on the rear face of wall, or possibly a drainage mattress to provide the rapid escape of surplus water from the base of an artificial sports surface.

In these applications lightweight NW & SNW nonwoven geotextiles and HF woven geotextiles offering high water permeability and superior filtration characteristics provide the ideal filter layer for enclosing the drainage media.

By designing the hydraulic properties of the geotextile to the surrounding soil, the geotextile surface will provide a stable platform for the development of a natural soil filter and subsequent long lasting filtration performance.

Asphalt road surfaces crack with age and require essential repairs to extend the life cycle of the road. Placement of a new overlay offers a quick fix solution but may result in limited additional life due to the rapid propagation of the old cracks into the new overlay.

In an effort to maximize the service interval period, the inclusion of a reflective crack control geotextile, or SAMI (Stress Absorbing Membrane Interlayer), within the overlay has shown to substantially increase the service lifetime of the road.

Bonapave nonwovens have been specially designed for this application by offering an optimum combination of tensile strength, temperature resistance, bitumen absorption and flexibility.

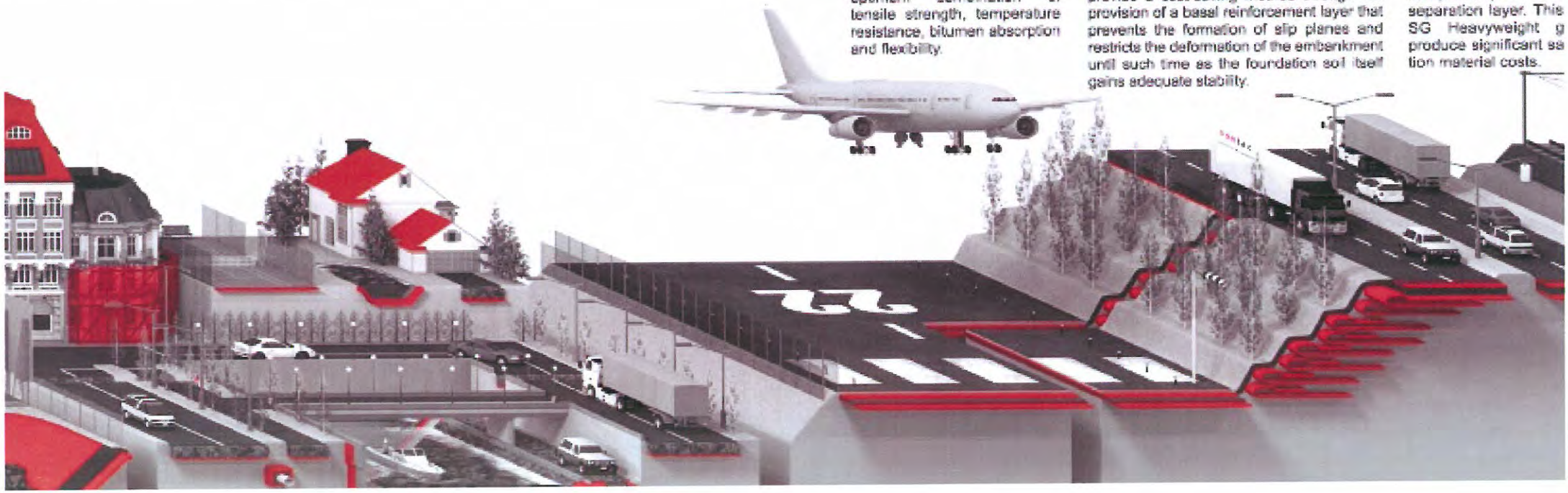
Traditional soil stabilization methods involving the construction of steep embankments or vertical retaining walls sometimes prove to be an expensive solution. Bontec® High Strength geotextiles now offer a new cost effective construction option. Through their outstanding tensile strength, high modulus of elasticity, low creep and excellent resistance to ultravio- let radiation, reinforcing geosynthetics offer one of the best guarantees of a durable and reliable construction.

During embankment construction over weak impervious soils, excess pore water pressures frequently develop and may lead to the formation of slip planes.

This can be a costly problem, involving either long construction delays while the ground is left to consolidate or expensive soil compaction and improvement works.Alternatively HS geotextiles can provide a cost-saving method through the provision of a basal reinforcement layer that prevents the formation of slip planes and restricts the deformation of the embankment until such time as the foundation soil itself gains adequate stability.

Contamination of t tion by underlying s reduces the load b and/or drainage chara granular fill material. woven and NW nonw offer an effective solut lem through the p bespoke separation geotextiles offer hi performance per unit maximize their resist tion damage and ens in-situ performance.

As road foundation m to get increasingly exp judicious use of geotextile can often re design thicknesses b margin. Rutting depth geotextile reinforcem both as a 'sounding b compaction, and as a separation layer. This SG Heavyweight g produce significant sa tion material costs.



SG WOVEN GEOTEXTILES

we under^{cover} the world

A TOTAL RANGE OF GEOTEXTILES

Headquarters:
BONAR TECHNICAL FABRICS NV/SA
Industriestraat 39
B-9240 Zele
BELGIUM
T.: +32 (0) 52 457 487
F.: + 32 (0) 52 457 495
E-MAIL: geotextiles@bonartf.com

For UK and Ireland:
BONAR YARNS & FABRICS Ltd
St. Salvador Street
Dundee Scotland
DD3 7EU
T.: +44 (0)1382 346102
F.: +44 (0)1382 229238
E-MAIL: geotextiles@bonaryarns.com

website: www.bonartf.com

WEIGHT (gr / m²)

SEPARATION

REINFORCEMENT

Other geotextiles available within the Bontec range include Highflow, High strength Wovens and Thermally Bonded & Needlepunched Nonwovens

Visit us at our website:
www.bonartf.com

For UK and Ireland: BONAR YARN
St. Salvador Street | Dundee | Sc
T.: +44 (0)1382 346102 | F.: +4
E-MAIL: geotextile

G & E
ENGINEERING

Bontec SG110/110
Woven Polypropylene Geotextile

Product Specification

bontec

a bonar technical fabrics product

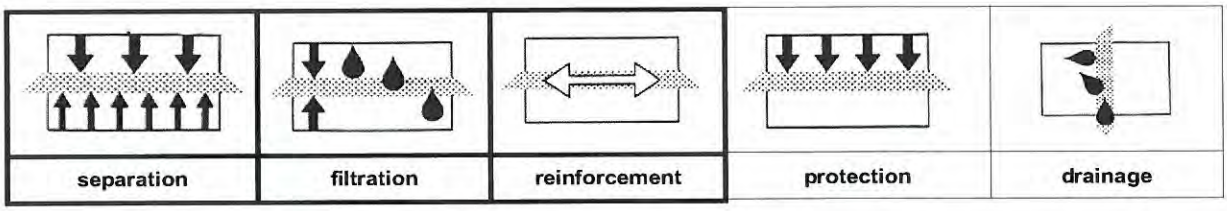
SG 110/110

Woven polypropylene geotextile made of slit film tapes

Technical data sheet according to internal specifications Bonar TF: version 08 dd. 20/12/11
Accompanying documents CE marking: version 11 dd. 01/01/12

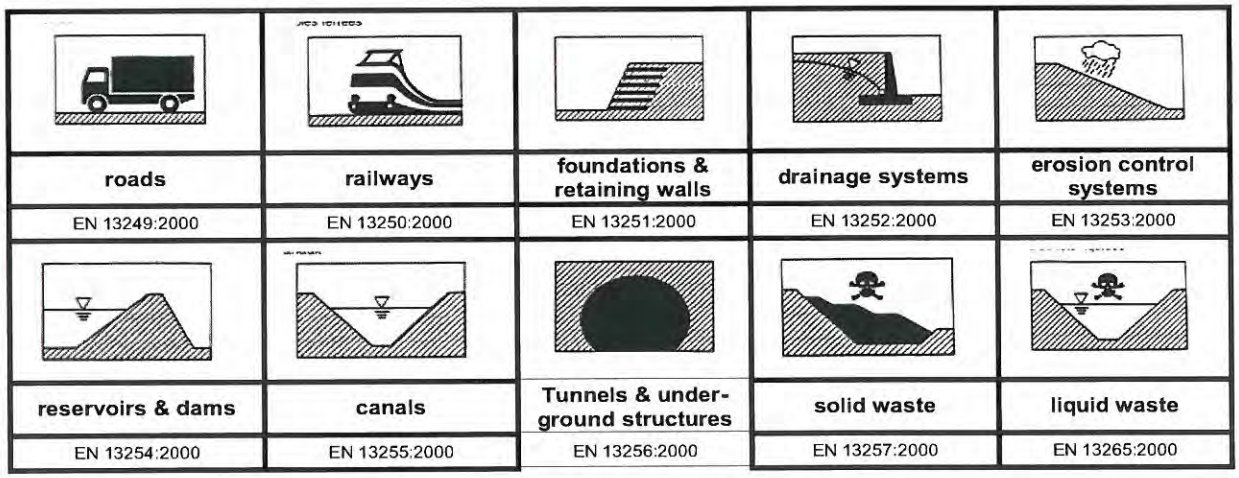
CE

1137-CPD-601
12



separation	**filtration**	**reinforcement**	**protection**	**drainage**

	test method	value	tolerance
Mechanical properties			
Tensile strength MD	EN ISO 10319	**110,0 kN/m**	-9,9 kN/m
Tensile strength CD		**110,0 kN/m**	-9,9 kN/m
Elongation MD	EN ISO 10319	**12,0 %**	+/-2,8 %
Elongation CD		**8,0 %**	+/-1,8 %
Static puncture resistance – CBR	EN ISO 12236	**12,50 kN**	-2,50 kN
Dynamic perforation resistance – cone drop	EN ISO 13433	**10,0 mm**	+2,0 mm
Hydraulic properties			
Water permeability normal to the plane	EN ISO 11058	**25x10-3 m/s**	-8x10-3 m/s
Water flow normal to the plane (*)		**25 l/m².s**	-8 l/m².s
Characteristic opening size (AOS)	EN ISO 12956	**230,0 µm**	+/-69,0 µm
Physical properties			
Thickness under 2 kPa (*)	EN ISO 9863-1	**1,53 mm**	+/-0,31 mm
Weight (*)	EN ISO 9864	**464,0 g/m²**	+/-46,4 g/m²
Composition	100 % polypropylene woven geotextile		
Durability	predicted to be durable for a minimum of 25 years in natural soil with 4 < pH < 9 and soil temperatures < 25° C		



roads	**railways**	**foundations & retaining walls**	**drainage systems**	**erosion control systems**
EN 13249:2000	EN 13250:2000	EN 13251:2000	EN 13252:2000	EN 13253:2000
reservoirs & dams	**canals**	**Tunnels & under-ground structures**	**solid waste**	**liquid waste**
EN 13254:2000	EN 13255:2000	EN 13256:2000	EN 13257:2000	EN 13265:2000

1. This geotextile is intended for use in both functions & applications highlighted with a bold border.
2. It is the responsibility of all users to satisfy themselves that the above data is current.
3. Roll dimensions are 5,25 m x 100 m. Other dimensions on demand.
4. Bonar Technical Fabrics reserves the right to alter product specifications without prior notice.
5. Although not guaranteed, these results do to the best of our knowledge offer a true and accurate record of the product's performance.
6. Bonar Technical Fabrics cannot accept responsibility for the performance of these products as the conditions of use are beyond our control.
7. Geotextile has to be covered within 2 weeks after installation

(*) Not mandated characteristics for CE marking.

BONAR TECHNICAL FABRICS invisibly good

BONAR Technical Fabrics nv/sa, Industriestraat 39, 9240 Zele, BELGIUM - ☎ +32(0)52 457411 - 🖷 +32(0)52 457495
BONAR Yarns & Fabrics Ltd, St. Salvador Street, Dundee DD3 7EU, UK - ☎ +44(0)1382 346102 - 🖷 +44(0)1382 202378

G&E
ENGINEERING

Bontec SG110/110

Woven Polypropylene Geotextile

Certification

QUALITY MANAGEMENT SYSTEM CERTIFICATE

ISO 9001 : 2008

The BQA, sa hereby declares that the quality management system of

Bonar Technical Fabrics NV – Site in Zele en Lokeren

BONAR TF

Low & Bonar

Performance materials engineered
to help build your business

located at Industriestraat 39 - 9240 Zele - Belgium, has been examined on 04-04-2011
and found in conformity with the ISO 9001, edition 2008, standard for the following application field:

Development, manufacture and sales of a standard range of fibres and textiles such as agrotextiles, building textiles and geosynthetics, as well as similar products especially designed to customer specifications

This certificate has been issued by the BQA, sa according to its quality manual concerning the certification of quality systems, and after concluding the contract of certification N° DS/AJ/CER/ 04-04-2011/301, under which the company accepts a regular control of its quality management system.

Certificate N° BQA_QMS019_C_2004301
Valid until 03-04-2014

BELAC
BQA N° 019-QMS

D.SIMOENS
Directeur

BQA

CERTIFICATE OF ENVIRONNEMENTAL MANAGEMENT SYSTEM

ISO 14001 : 2004

The BQA, nv hereby declares that the environmental management system of the company
Bonar Technical Fabrics NV – Site in Zele en Lokeren

BONAR TF

Low & Bonar
Performance materials engineered
to help build your business

located at Industriestraat 39 – 9240 Zele - Belgium, has been examined on 04-04-2011
and found in conformity with the ISO 14001, edition 2004, standard for the following application field:

Development, manufacture and sales of a standard range of fibres and textiles such as agrotextiles, building textiles and geosynthetics, as well as similar products especially designed to customer specifications.

This certificate has been issued by BQA, nv according to its quality manual EMS concerning the certification of environmental management systems, and after the contract of certification N° DS/AJ/CER/04-04-2011/02 under which the company accepts a regular control of its environmental management system.

Certificate N° BQA_EMS019_C_200402
Valid until 03-04-2014

BELAC

BQA N° 019-EMS

D. SIMOENS
Directeur

BQA

Zele, 22.11.12

CERTIFICATION OF COMFORMANCE

The undersigned supplier BONAR TECHNICAL FABRICS, hereby states under his responsibility that the following product complies with the indicated technical properties :

order 182958 : your PO 120427

Type SG 110/110 : 29.245,5 m²

Delivery docs : Packing list N. T1205096

Manufacturer : Bonar Technical Fabrics N.V.

BONAR TECHNICAL FABRICS N.V.

BONAR TECHNICAL FABRICS N.V.
Industriestraat 39
B - 9240 Zele

G&E
ENGINEERING

Bontec SG110/110

Woven Polypropylene Geotextile

Installation Guideline

RECOMMENDATION FOR THE INSTALLATION OF GEOTEXTILES

- The **BONTEC** geotextiles shall be kept in its original packaging in order to protect it from damaging UV-rays and high temperatures.

- The **BONTEC** geotextiles shall be stored protected from wind, rain, excess moisture or sunlight.

- The **BONTEC** geotextiles shall only be unpacked just before use. The material shall be covered within 1 week

- The **BONTEC** geotextiles shall be labelled and show the following data :

  - roll number
  - quality
  - name of the manufacturer
  - roll length & width
  - roll weight

- The **BONTEC** geotextiles shall be laid with the longitudenal ascis down slopes

- A minimum overlap of 500 mm between the different sheets shall be respected. Sewing of the different fabrics shall be done with a double prayer stitching technique with non deteriorating thread.

- Wherever visibility or installation of the BONTEC geotextile is poor an extra safety overlap of +/- 1 m shall be respected

- The surfaces to be covered with **BONTEC** geotextiles shall be smooth and free of sticks, roots, sharp objects, and all debris that may damage the fabric. The surface to be covered shall be firm and unyielding, with no sudden changes or brakes in grade.
- The compacted sub-base shall be maintained in a smooth, uniform and compacted condition during installation of the fabric.
- In area' s where wind is prevalent, fabric installation shall be started at the upwind side of the project and proceed downwind. The leading edgeof the fabric shall be secured at all times with sandbags or other means sufficient to hold it down during high winds. Sandbags or rubber tires may be used as required to hold the fabric in position during installation. Tires shall not have exposedsteel cords or other sharp edges which may snag or cut the fabric. Materials, equipment or other items shall not be dragged across the fabric or be allowed to slide down slopes on the fabric.

- Should the fabric be damaged during any step of the installation, the damaged section shall be repaired by covering it with a piece of fabric which extends at least 0,6 meter in all directions beyond the damaged area. The fabric shall be secured as directed by the engineer.

- Smoking shall not be permitted by personnel working on the fabric.

Bontec SG Range Woven Geotextile

Date	Project	Client	Consultant	Style	Qty
Aug-85	HY/84/28 Vehicular border link at Lok Ma Chau	China Construction Engineering Corporation		800g/sqm	
Oct-93	DC/93/03 Main drainage channels for Yuen Long and Kam Tin	Wan Hin & Co. Ltd		HS150/60 HS450/60 HS600/100	265,190 145,200 37,015
Feb-05	CV/2003/06 Stanley Waterfront Improvement Project - Construction Pier and Boardwalk	Sun Fook Kong (Civil) Ltd	Civil Engineering and Development Department	SG100/100 NW10	2,080 3,150
Feb-05	99/9028 Lamma Power Station	Wai Kee (Zens) Construction & Transportation Co Ltd	Maunsell Geotechnical Services Ltd	SG100/100	1,040
Feb-05	CV/2004/02 Reconst. of Wong Shek & Ko Lau Wan Public Piers	Kin Shing Construction Co Ltd	Civil Engineering and Development Department	SG100/100	4,680
Apr-05	CV/2002/04 Penny's Bay Reclamation Stage 2	Gammon Skanska Ltd Shun Tat Construction Engineering Ltd	Scott Wilson Ltd	SG100/100 SG100/100	4,160 3,150
Apr-05	HK/12/02 CED, Central Reclamation Phase III, Engineering Works	Best Leader Engineering Ltd Leighton - China State - Van Oord Joint Venture	Atkins China Ltd	SG100/100 SG100/100	1,040 2,615
May-05	03/8013 Lamma Island to Cyberport	Leader Marine Contractors Ltd Honwin Engineering Ltd	Maunsell Geotechnical Services Ltd	SG100/100 SG100/100	1,040 1,050
Jul-05	Shenzhen to Tai Po Twin Submarine Gas Pipeline Project	Honwin Engineering Ltd		SG100/100	3,675
Sep-05	TP37/03 Remaining Engineering Infrastructure Works for Pak Shek Kok Development Package 2A	Leader - Wai Kee (C&T) Joint Venture	Hyder Consulting Ltd	SG100/100	1,040
Nov-05	HY/2002/26 Stone Cutter's Bridge	Hong Kong River Engineering Co Ltd	Ove Arup & Partners HK Ltd	SG100/100	1,050
Feb-06	CV/2005/12 Fill Reception Facilities at Tseung Kwan O Area 137 Quarry Bay and Mui Wo	Penta-Ocean Construction Co Ltd	Civil Engineering and Development Department	SG100/100	525
Mar-06	Maintenance Dredging at Castle Peak Power Station (CPPS) Jetty	New Concepts Engineering Development Ltd	Civil Engineering and Development Department	SG100/100	525
Mar-06	CV/2004/04 Maintenance and Repairs to Government / Public Piers and Immersed Tubes of Hung Hom Cross-Harbor Tunnel	China Harbour Engineering Co (Group)	Civil Engineering and Development Department	SG100/100	1,050
Mar-06	HY/2005/06 Castle Peak Road Improvement West of Tsing Lung Tau	Shun Tat Construction Engineering Limited Chun Wo Construction & Engineering Co Ltd	Mouchel Halcrow JV	SG100/100 SG100/100	1,050 525

May-06	212 Main Works for the Proposed Third Golf Course Development at Kau Sai Chau, Sai Kung	China Harbour Engineering Co (Group)	Ove Arup & Partners HK Ltd	SG100/100	3,150
Jun-06	Hong Kong Convention and Exhibition Centre Project - Silt Screen for Intake Pipe	Wai Kee (Zens) Construction & Transportation Co Ltd	NA	SG100/100	2,100
		Kaden - Wai Kee (C&T) JV		SG100/100	2,100
Aug-06	EP/SP/52/06 Development of EcoPark in Tuen Mun Area 38	Kaden Construction Limited	Scott Wilson Ltd	SG100/100	1,050
Sep-06	CV/2004/06 Management and Capping of Contaminated Mud Pit IV at East of Sha Chau - Phase III	Kaden - Wai Kee (C&T) Joint Venture	Civil Engineering and Development Department	SG100/100	1,050
Oct-06	Lamma Island Cable Landing	United Marine Co Ltd	Hong Kong Electric Co Ltd	SG100/100	2,100
Nov-06	CV/2004/01 Maintenance and Repairs to Seawalls, Piers and Other Port Works	Kin Shing Construction Co Ltd	Civil Engineering and Development Department	SG100/100	2,625
Dec-06	Private project	Friendly Benefit Engineering Ltd		SG100/100	525
Feb-07	Prebored Socketted H-Piles at Hong Kong Convention & Exhibition Centre	Yee Hop Engineering Co Ltd	NA	SG100/100	3,623
May-07	HY/2005/06 Castle Peak Road Improvement - West of Tsing Lung Tau	Chun Wo Construction & Engineering Co Ltd	Mouchel Halcrow JV	SG100/100	525
May-07	CV/2004/05 Dredging Maintenance	China Harbour Engineering Co Ltd	Civil Engineering and Development Department	SG100/100	2,100
Aug-07	Dredging Project in Lai Chi Kok Shipyard	Maritime Mechanic Ltd	NA	SG100/100	525
Aug-07	6/WSD/06 Construction of Salt Water Supply System for Penny's Bay	Univic Engineering Ltd	Water Supplies Department	SG100/100	1,050
Nov-07	Permanent Aviation Fuel Facility Hong Kong International Airport (Contract No. H2104)	UDL Dredging Ltd	Babtie Asia Ltd	SG100/100	1,050
Dec-07	Seawall Modify, Tuen Mun Area 38	Cheer Engineering Ltd	Scott Wilson Ltd	SG100/100	525
May-08	DC/2007/10 Design and Construction of HK West Drainage Tunnel	Tapbo Civil Engineering Co Ltd	Ove Arup & Partners HK Ltd	SG100/100	5,486
Sep-08	CV/2006/05 Maintenance of Seawalls and Navigation Channels	China Harbour Engineering Co Ltd	Civil Engineering and Development Department	SG100/100	6,825
Sep-08	Marine Works at Maldives	Kwan Sing Engineering & Construction Co Ltd		SG100/100	525
Nov-08	DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River	Kwan Lee Construction Co Ltd	Maunsell Consultants Asia Ltd	SG100/100	10,500

Mar-09	DC/2007/01 Drainage Improvement Works in Ki Lun Tsuen, Kwu Tung, Ma Tso Lung and Sha Ling	Shanghai Urban Construction Group Corp	Mott Connell Ltd	SG100/100 SG40/40	7,875 71,400
Jun-09	CHEC247 Lamma Power Station - Navigation Channel Improvement	China Harbour Engineering Co Ltd	Civil Engineering and Development Department	SG100/100	7,350
Jan-10	Tsing Yi	Sam Woo Bore Pile Foundation Ltd		SG110/110	525
Feb-10	HY/2009/11 Central - Wanchai Bypass - North Point Reclamation	China Harbour Engineering Co UDL Ship Management Ltd	AECOM Asia Co Ltd	SG110/110 SG110/110	21,541 1,050
Mar-10	KL/2009/01 Site formation for Kai Tak Cruise Terminal Development	Penta-Ocean Construction Co. Ltd Kwan Sing Construction Ltd Crown Asia Engineering Ltd	Scott Wilson	SG110/110 SG110/110 SG110/110	28,875 5,775 1,050
Apr-10	TK/2009/01 Infrastructure Works at Town Centre South and Tiu Keng Leng, Tseung Kwan O	Shun Tat Construction Engineering Ltd	Meinhardt (C&S) Ltd	SG110/110 SG40/40	9,450 1,050
Apr-10	Lau Fau Shan	Wang Hip Iron Works Wirks Co Ltd		SG110/110	525
May-10	HK/2009/01 Wan Chai Development Phase II Central Wanchai Bypass	Leader Civil Engineering Corp Ltd Chun Wo-Leader Joint Venture	AECOM Asia Co Ltd	SG110/110 SG110/110	5,250 28,875
Jun-10	9/WSD/08 Laying of Western Cross Harbour Main and Associated Land Main Form West Kowloon to Sai Ying Pun	Shun Tat Construction Engineering Ltd	Mott Connell Limited	SG110/110	10,470
Oct-10	DC/2007/12 Design and Construction of Tsuen Wan Drainage Tunnel	Shun Tat Construction Eng Ltd	Hyder Consulting Ltd	SG110/110	2,100
Oct-10	TP/2010/02 Cycle Tracks from Sheung Shui to Ma On Shan	Services Ltd Richwell Machinery Eng Ltd	Civil Engineering and Development Department	SG110/110	525
Dec-10	CV/2010/03 Maintenance Contract for Seawalls and Navigation Channels	China Harbour Eng Co Ltd	Civil Engineering and Development Department	SG110/110	10,500
Dec-10	HK/2009/02 Wan Chai Development Phase II	Tung Wo Engineering Co Ltd Chun Wo-CRGL Joint Venture	AECOM Asia Co Ltd	SG110/110 SG110/110	4,200 2,625
Jan-11	HY/2009/15 Central-Wanchai Bypass-Tunnel Causeway Bay Typhoon Shelter	Shun Tat Construction Eng Ltd China State Engineering Co Ltd Tung Wo Engineering Ltd Hong Kong River Engineering Co Ltd	AECOM Asia Co Ltd	SG110/110 SG110/110 SG110/110 SG110/110	35,175 2,100 1,050 10,830.75
Jan-10	DC/2008/09 Submarine outfall Aberdeen	Paul Y Construction Co Ltd	AECOM Asia Co Ltd	SG110/110	525
Jan-10	KL/2008/07 Kai Tak Development - Advance Infrastructure Works for Developments at the Southern Part of the Former Runway, Stage 1	Crown Asia Engineering Ltd	AECOM Asia Co Ltd	SG110/110	1,050
Jan-11	CV/2009/02 Handing of Surplus Public Fill	China Harbour Eng Co Ltd	Civil Engineering and Development Department	SG110/110	525

Mar-11	HK/2010/06 Wanchai Development Phase II-Central-Wanchai Bypass over MTR Tsuen Wan Line	Leader Civil Engineering Corp Ltd Gammon Construction Ltd	AECOM Asia Co Ltd	SG110/110 SG110/110	8,400 1,575
Apr-11	HY/2009/19 Central-Wanchai Bypass-Tunnel (North Point Section)	S W Marine Works Ltd Chun Wo Foundations Ltd	AECOM Asia Co. Ltd	SG110/110 SG110/110	3,150 19,950
May-11	DC/2009/13 Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwu Wan	Leader Civil Engineering Corp Ltd	Scott Wilson CDM Joint Venture	SG110/110	1,575
May-11	DC/2009/22 Drainage Improvement Works in Shuen Wan, Tai Po- Contract 1	Kwan Lee-Kuly Joint Venture	AECOM Asia Co. Ltd	SG110/110	2,625
Jul-11	SIL (E) 903 Stage 2 Ocean Park Station Wong Chuk Hang Station, Viaducts and Aberdeen Channel Bridge	Leighton Contractors (Asia) Ltd Cheer Engineering Ltd	Vector International Ltd	SG110/110 SG110/110	4,725 1,050
Aug-11	KL/2010/02 Kai Tak Approach Channel Improvement Works Stage 1	Kwan Sing Contractors Ltd	AECOM Asia Co. Ltd	SG110/110	7,350
Sep-11	DC/2010/02 Drainage Improvement Works in Shuen Wan And Shek Wu Wai	Kwan Lee-Kuly Joint Venture	Drainage Services Department	SG110/110	6,300
Oct-11	DC/2007/16 Design and Construction of Lai Chi Kok Transfer Scheme	Fortress Ltd	Maunsell Consultants Asia Ltd	SG110/110	2,100
Dec-11	HY/2010/02 HK-Zhuhai-Macau Bridge - HK Boundary Crossing Facilities Reclamation Works	China Harbour Engineering Co Ltd Sharon Asia Waste Sorting Eng Ltd	Ove Arup & Partners HK Ltd	SG110/110 SG110/110	66,675 525
Jul-12	GSPD/SP/TKW-NP/089/2011 Installation of Submarine Gas Pipeliners and Associated Facilities from to Kwa Wan to North Point	Macdow - Kaden Joint Venture	Mott Connell Limited	SG110/110	3,150
Aug-11	HY/2011/03 HK-Zhuhai Macau Bridge - Hong Kong Link Road - Scenic Hill and Hong Kong Boundary Crossing Facilities	China Harbour Engineering Co Ltd Hong Kong River Eng Co Ltd	Ove Arup & Partners HK Ltd	SG110/110	6,300

G & E
ENGINEERING

Bontec SG110/110
Woven Polypropylene Geotextile

List of Project Reference

G&E
ENGINEERING

Bontec SG110/110
Woven Polypropylene Geotextile

Photo References

G AND E COMPANY LIMITED

14/F Kiu Yin Commercial Building
361 - 363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	June 2013
Project	Contract No: HY/2011/03 HK-Zhuhai Macau Bridge Hong Kong Link Road - Scenic Hill and Hong Kong Boundary Crossing Facilities
Client	Highway Department
Consultant	Ove Arup & Partners HK Ltd
Main Contractor	China State Construction Engineering
Works	Tailor-made Silt Protector
Material	Woven Geotextile Bontec SG110/110

G AND E COMPANY LIMITED

14/F Kiu Yin Commercial Building
361 - 363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	Dec 2011
Project	Contract No. HY/2010/02 HK-Zhuhai-Macau Bridge - HK Boundary Crossing Facilities
Client	Highway Department
Consultant	Ove Arup & Partners HK Ltd
Main Contractor	China Harbour Engineering Co Ltd
Works	Tailor-made Silt Protector
Material	Woven geotextile Bontec SG110/110

G AND E COMPANY LIMITED

14/F., Kiu Yin Commercial Building,
361 - 363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	May-09
Project	Contract No. HY/2004/02 Stonecutters Bridge Temporary Jetty
Client	Highway Department
Consultant	Ove Arup & Partners HK Ltd
Main Contractor	Dragages - China Harbour JV
Materials	Bontec SG110/110
Works	Silt Curtain

G AND E COMPANY LIMITED
14/F Kiu Yin Commercial Building
361 - 363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	May 2011
Project	Contract No. DC/2009/22 Drainage Improvement Works in Shuen Wan, Tai Po
Client	Drainage Service Department
Consultant	AECOM (Asia) Ltd
Main Contractor	Kwan Lee - Kuly Joint Venture
Works	Separation
Material	Woven geotextile SG110/110

G AND E COMPANY LIMITED

14/F Kiu Yin Commercial Building
361 - 363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	June 2013
Project	Contract No. HY/2009/15 Central-Wanchai Bypass-Tunnel (Causeway Bay Typhoon Shelter Section)
Client	Highway Department
Consultant	AECOM Asia Co. Ltd
Main Contractor	China State Construction Engineering (HK) Limited
Works	Silt Protector
Material	Woven Geotextile Bontec SG110/110

G AND E COMPANY LIMITED

14th Floor, Kiu Yin Commercial Building
361-363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	March, 2010
Project	Contract No. HK/2009/01 Wan Chai Development Phase II -Central - Wanchai Bypass at Hong Kong Convention and Exhibition Centre
Client	Civil Engineering and Development Department
Consultant	AECOM Asia Co. Ltd
Main Contractor	Chun Wo - Leader Joint Venture
Materials	Woven Geotextile SG110/110
Size	4,200 sqm
Application	Intake Silt Curtain

G AND E COMPANY LIMITED

14th Floor, Kiu Yin Commercial Building
361-363 Lockhart Road
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	March 2010
Project	KL/2009/01 Site formation for Kai Tak Cruise Terminal Development
Client	CEDD
Consultant	Scott Wilson Ltd
Main Contractor	Penta-Ocean Construction Co. Ltd
Materials	SG100/100
Size	1,050 sqm

G AND E COMPANY LIMITED
14/F, Kiu Yin Building Commerical,
361 - 363 Lockhart Road,
Wamchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	Mar-10
Project	Contract No. DC/2007/01 Drainage Improvement Works in Ki Lun Tsuen, Kwu Tung, Ma Tso Lung and Sha Ling
Client	Drainage Services Department
Consultant	Mott MacDonald
Main Contractor	Shanghai Urban Construction (Group) Corporation
Works	SG 100/100

G AND E COMPANY LIMITED

14th Floor, Kiu Yin Commercial Building
361-363 Lockhart Road
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	Feb-10
Project	Contract No. HY/2009/11 Central - Wanchai Bypass - North Point Reclamation
Client	Highways Department
Consultant	AECOM
Main Contractor	China Habour Engineering Company
Works	Silt Curtain
Materials	Woven Geotextile SG100/100
Size	3,675 sqm

G AND E COMPANY LIMITED
14th Floor, Kiu Yin Commercial Building
361-363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	October 2006
Project	Lamma Island Cable Landing
Client	Hong Kong Electric Co Ltd
Consultant	Hong Kong Electric Co Ltd
Main Contractor	United Marine Co Ltd
Works	Silt Curtain
Size	2,100 sqm

G AND E COMPANY LIMITED

14th Floor, Kiu Yin Commercial Building
361-363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	March 2006
Project	Contract No. HY/2005/06 Castle Peak Road Improvement West of Tsing Lung Tau
Client	Highway Department
Consultant	Mouchel Halcrow JV
Main Contractor	Chun Wo Construction & Engineering Co., Ltd.
Works	Silt Curtain
Size	1,050 sqm

G AND E COMPANY LIMITED

14th Floor, Kiu Yin Commercial Building
361-363 Lockhart Road
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	November 2005
Project	Contract No. HY/2002/26 Stone Cutter's Bridge
Client	Highway Department
Consultant	Ove Arup and Partners HK Ltd
Main Contractor	Hong Kong River Engineering Co Ltd Maeda - Hitachi - Yokogawa - Hsing Chong Joint Venture
Works	Silt Curtain
Size	1,050 sqm

G AND E COMPANY LIMITED
14th Floor, Kiu Yin Commercial Building
361-363 Lockhart Road
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	February 2005
Project	Contract No. CV/2003/06 Stanley Waterfront Improvement Project - Construction Pier & Broadwalk
Client	Civil Engineering and Development Department
Consultant	Civil Engineering and Development Department
Main Contractor	Sun Fook Kong (Civil) Ltd
Works	Silt Curtain - SG100/100
Size	2,080 sqm

G AND E COMPANY LIMITED

14/F Kiu Yin Commercial Building
361 - 363 Lockhart Road,
Wanchai, Hong Kong
Tel: 852-2570 0103 Fax: 852-2570 0089
website: www.g-and-e.com

Date	May 2011
Project	Contract No. DC/2009/13 Construction of Sewage Treatment Works at Yung Shue Wan and Sok Kwu Wan
Client	Drainage Service Department
Consultant	Scott Wilson CDM Joint Venture
Main Contractor	Leader Civil Engineering Corp Ltd
Material	Bontec SG110/110 woven geotextile
Works	Silt Curtain

G&E ENGINEERING

Bontec SG110/110

Woven Polypropylene Geotextile

Approval Letters

Drainage Services Department
Drainage Projects Division
44/F, Revenue Tower, 5 Gloucester Road,
Wan Chai, Hong Kong

渠務署
排水工程部
香港灣仔告士打道 5 號
稅務大樓 44 樓

來函檔號 Your Ref: KLKJV/DC201002/T40/0173
本署檔號 Our Ref: ( ) in DP/8/4109CD/DC1002/30
電 話 Tel: (852) 2435 7031
傳 真 Fax: (852) 2827 8700

By fax and post
(Fax No. 2674 6688)

29 August 2011

Kwan Lee – Kuly Joint Venture
Unit 6, 16/F Yuen Long Trading Centre,
33 Wang Yip Street West,
Yuen Long, N.T.

(Attention: Mr. CHAN Wing-kai – Project Manager)

Dear Sirs,

Contract No. DC/2010/02
Drainage Improvement Works in Shuen Wan and Shek Wu Wai

Material Submission – Type B Geotextile

I refer to your above quoted letter dated 19 August 2011 and the attached email dated 29 August 2011 enclosing further information in response to the comments given in my letter dated 25 August 2011 regarding the captioned subject.

Please be advised that I have no objection to your proposal of using "Bontec SG110/110 Woven Polypropylene Type B Geotextile" manufactured by "Bonar Technical Fabrics" and supplied by "G and E Company Limited" as the geotextile filter Type B / Geotextile Type 2 for this Contract subject to its satisfactory performance on site.

Yours faithfully,

(W. L. YIP)
Engineer's Representative
Drainage Projects Division
Drainage Services Department

Encl.
cc. DC/2010/02 Site Office

Internal (to note in file): E/D19

WLY/

AECOM
8/F Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road
Shatin, Hong Kong
www.aecom.com

+852 2605 6262 tel
+852 2691 2649 fax

D1045

RECEIVED
0 8 JUN 2011
BY:.....

Your Ref.: KLKJV/DC200922/M60/1498
Our Ref. : (DC/2009/22)/R20/106(0019)

8 June 2011

Kwan Lee – Kuly Joint Venture
Unit 6, 16/F, Yuen Long Trading Centre
33 Wang Yip Street West, Yuen Long
New Territories, Hong Kong

Shuen Wan RE's Office
Fo Chun Road , Pak Shek Kok , Tai Po, H.K.
T +852 2603 6933
F +852 2603 7998

Attn : Mr. WONG Ching Lung (Site Agent)

Dear Sirs

Contract No. DC/2009/22
Drainage Improvement Works in Shuen Wan, Tai Po – Contract 1

Material Submission – Type B Geotextile

I refer to your above referenced letter dated 31 May 2011 enclosing further information in response to the comments given in my letter ref. (0017) in the same series dated 27 May 2011 on the captioned material submission for my approval.

Please be advised that I have no objection to your proposal of using "Bontec SG 110/110" manufactured by "Bonar Technical Fabrics Company" and supplied by "G & E Company Limited" "as the geotextile filter Type B / Geotextile Type 2 for this Contract subject to its satisfactory performance on site.

You are reminded to strictly follow the manufacturer's guidelines on storage, handling and installation procedures for application of the material.

Yours faithfully,
For and on behalf of
AECOM Asia Co. Ltd.

Eddie LUK
Resident Engineer
Water & Urban Development

cc AECOM - Attn : Mr. Joseph HO
M/F

EL/VH/pc

土木工程拓展署
CEDD Civil Engineering and Development Department

Web site 網址 : http://www.cedd.gov.hk
E-mail 電子郵件 :
Telephone 電話 : (852) 2760 5737
Facsimile 傳真 : (852) 2714 2054
Our reference 本署檔號 : ( ) in PW WC/CV0402/R20/340 Pt.1
Your reference 來函檔號 : KS330/2005

土木工程處
Civil Engineering Office

香港九龍公主道101號
土木工程拓展署大樓四樓
4/F, Civil Engineering and Development Building,
101 Princess Margaret Road,
Kowloon, Hong Kong

RECEIVED 27 JAN 2005

24 January 2005

BY MAIL & FAX No. 2780 2085

Kin Shing Construction Company Limited
1/F,
27 Yin Chong Street,
Mong Kok
Kowloon
(Attn.: Mr. Patrick P K Chau – Site Agent)

Dear Sirs,

Contract No. CV/2004/02
Reconstruction of Wong Shek and Ko Lau Wan Public Piers

Material Submission – Geotextile for Silt Curtain

I refer to your letter of 14.1.2005 enclosing the particulars of the geotextile for fabrication of silt curtain.

In accordance with PS Clause 26.08(2), the proposed "SG 100/100" woven geotextile manufactured by Bonar Technical Fabrics is approved to be used under the captioned Contract.

Pursuant to PS Clause 26.08(1), you are required to submit details of the silt curtains 3 weeks before their deployment.

Contract No. CV/2004/02			
Post	Initial	Copy	Action
CM			
PM			
SA			
Sub-A			
Eng.(1)			
Eng.(2)			
C.F.			
Foreman			
Q.S.			
Safety			
Material			
Survey			

Yours faithfully,

(W H LEE)
Engineer's Representative
Port Works Division
Civil Engineering and Development Department

c.c.
SIOW/P2B – Site Copy

cls

土木工程拓展署
CEDD Civil Engineering and Development Department

Web site 網址 : http://www.cedd.gov.hk
E-mail 電子郵件 :
Telephone 電話 : (852) 2762 5035
Facsimile 傳真 : (852) 2714 2054
Our reference 本署檔案 : (15) in PW WC/CV0306/R20/340 Pt.01
Your reference 來函檔號 : CIV:002091/1.2/HW/SY/CC/mc(S0087), CIV:002091/1.2/HW/SY/CC/mc(S0118)

土木工程處
Civil Engineering Office

香港九龍公主道101號
土木工程拓展署大樓4樓
4/F, Civil Engineering and Development Building,
101 Princess Margaret Road,
Kowloon, Hong Kong

112

18 February 2005

Sun Fook Kong (Civil) Limited
Rms. 3207-10,
Great Eagle Centre,
23 Harbour Road,
Wan Chai,
Hong Kong
(Attn: Mr. Howard KONG - Fax No.2827 6275)

Dear Sirs,

Contract No. CV/2003/06

Stanley Waterfront Improvement Project –
Construction of Pier and Boardwalk

Fabric for Silt Curtain

I refer to your above letters dated 21.1.2005 and 15.2.2005 proposing the SG100/100 fabric supplied by "Bonar Technical Fabrics" for silt curtain.

I have no objection to your proposed material for silt curtain.

Yours faithfully,

(Paul Y K MA)
Engineer's Representative
Port Works Division
Civil Engineering and Development Department

c.c.
Site Office (Attn: SIOW/P1A)
CEG/P1A

File PW WC/CV0306/M10/300

YKM/klm

Post-it® Fax Note 7671 | Date 24/2/05 | # of pages ▶ 1
To MR. STANLEY WAN | From CHAN SZE-HO
Co./Dept. G&E | Co. SFK
Phone # 25060028 | Phone # 68471709
Fax # 25700089 | Fax #

TOTAL P.01

MAUNSELL | AECOM

Maunsell Consultants Asia Ltd
8/F Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, N.T., Hong Kong
茂盛(亞洲)工程顧問有限公司
香港新界沙田鄉事會路 138 號新城市中央廣場第 2 座 8 樓
T +852 2605 3282 F +852 2691 2648 www.maunsell.aecom.com
SRE's Office T +852 2669 0708 F +852 2631 2889 E sre@itriv.com.hk

Your Ref. : DC0706/M1.2/1512 & 1529
Our Ref. : (DC/2007/06)/R20/106(0023)

RECEIVED
13 NOV 2008
BY:.....

Chiu Hing Construction & Transportation Co. Ltd.
Room 201, 2/F Fuk Shing Commercial Building
28 On Lok Mun Street
On Lok Tsuen, Fanling
New Territories, Hong Kong

Attn : Mr. Roger Lau (Site Agent)

13 November 2008

Dear Sir,

Contract No. DC/2007/06
River Improvement Works in Upper Lam Tsuen River,
She Shan River and Upper Tai Po River

Proposed Geotextile at Gabion Wall in She Shan River and Upper Tai Po River

I refer to your letter dated 7 November 2008 and 12 November 2008 respectively.

Please be advised that since the water flow rate of the proposed geotextile model Bontec SG100/100 meets the requirements in accordance with P.S. Clause 7.150, I have no further objections to your proposed use of woven geotextile model Bontec SG100/100, supplied by "G and E Company Ltd." at gabion wall in She Shan River and Tai Po River, subject to its satisfactory performance on site.

Yours faithfully,

Adrian Ng
Resident Engineer

cc MCAL - Attn : Mr. Conder Yan
Chiu Hing H.O.

AN/BC/ek

G & E
ENGINEERING

Bontec SG110/110
Woven Polypropylene Geotextile

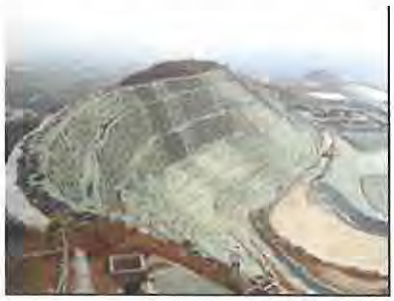
About the Supplier - G and E Company Limited

G AND E COMPANY LIMITED

14/F Kiu Yin Commercial Building
361 – 363 Lockhart Road,
Wanchai, Hong Kong
Tel: 2570 0103 Fax: 2570 0089 website: www.g-and-e.com

G and E Company – a Perspective

G and E, founded in 1984, is a geosynthetics specialist who distributes a wide variety of geosynthetics from a global list of renowned manufacturers. The Company also manages a competent installation contracting service. To better serve our clients, design and engineering service have also been established in our portfolio. It is our goal that we can provide comprehensive engineering solutions to our clients, from technical application and design, the supply of materials and their installation, as well as the conformance testing and system commissioning.



G and E takes a strong vision on geosynthetics application and development by working closely with international consultants, academics, professional organizations, research institutions and worldwide manufacturers in the industry, a mission to broaden the versatility of geosynthetics and its innovation.

Our product range covers:

Geotextile, geomembrane, geodrain, geogrid, geoblock, band drain, erosion control synthetic, Geosynthetic clay liner, rockfall barrier, gabion HDPE geopipe with extended application in waterproofing and environmental control as well as silt curtain, and geotextile container fabrication.

We offer our clients:

- Extensive product experience
- Comprehensive services, application, design, installation and commissioning
- Highly attentive and superior professional work
- High quality products
- Flexible & competent management

Recognized as a member of the International Association of Geosynthetic Installers and a VSRS registered subcontractor, G and E had maintained a remarkable successful working relationship with a long list of clients, the Government, project owners, contractors, designers, consultant engineers, overseas distributors and traders. The client base extends to Macau, Southeast Asia and Southern China.

Talk to us today and see how we can work together for cost-effective and time saving solutions. We are stepping into the 27th year in the field and have vast experience to share with you.

THE GEOSYNTHETICS SPECIALIST

G and E is a distribution network and sourcing agent of geosynthetics as well as a provider of professional installation services.

SG110/110 woven geotextile use as silt protector at Wanchai Development Phase II, Oct 2010

The company handles a comprehensive range of geosynthetic materials:

GEOTEXTILE:	PP, PET woven, non woven, thermal bonded, needle punched
GEOMEMBRANE:	HDPE, LLDPE, PVC, keyed preformed, tunnel lining, concrete protection liner, gas barrier, basement waterproofing, leakage collection & fluid containment
GEODRAIN:	Geonet, geocomposite, band drain, sheet drain
GEOGRID:	HDPE, PET for reinforced slope and wall, MSEW, rockfall barrier
EROSION CONTROL:	Erosion mat, concrete mat, coir mat, geocell, reno-mattress, gabion, rockfall mesh, flexible rockfall fence, concrete form
MARINE ENGINEERING:	Silt curtain, sound attenuation system and turbidity control, trash boom, geotextile container
GCL:	Geosynthetic clay liner, bentonite liner and composite
HDPE PIPE:	Sewer pipe, Spirolite, submarine outfall
OTHERS:	Steel fiber, polypropylene fiber
SPECIAL SERVICE:	Geomembrane leak location survey

G AND E COMPANY LIMITED
Room B, 13/F, Cheung Lee Industrial Bldg, 9 Cheung Lee Street, Chaiwan, Hong Kong
Tel: 2508 0058 / 2570 0103 Fax: 25700089 e-mail: wing@g-and-e.com website: www.g-and-e.com

Nov 2010

A VSRS Registered Subcontractor


bontec
a bonar technical fabrics product
bontec
woven and nonwoven geotextiles
SG 110/110
G AND E COMPANY LIMITED
14/F Kiu Yin Commercial Building,
361-363 Lockhart Road,
Wanchai, Hong Kong
Tel: 2570 0103 Fax: 2570 0089
Website: www.g-and-e.com
G & E
ENGINEERING
Woven geotextiles: Standard Grade - High Flow - High Strength
Non woven geotextiles: thermobounded (NW)-needlepunched (SNW & VNW)
Geocomposites: LG
Concrete mattresses: TM

Annex D

Examples of Calibration Certificates

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

Performance Check of Turbidity Meter

Equipment Ref. No. : ET/0505/010 Manufacturer : HACH

Model No. : 2100Q Serial No. : 11110 C 014260

Date of Calibration : 07/07/2014 Due Date : 06/10/2014

Ref. No. of Turbidity Standard used (4000NTU)	005/6.1/001/6

Theoretical Value of Turbidity Standard (NTU)	Measured Value (NTU)	Difference % *
20	20.2	1.00
100	104	4.00
800	794	-0.75

(*) Difference = (Measured Value – Theoretical Value) / Theoretical Value x 100

Acceptance Criteria

Difference : -5 % to 5 %

The turbidity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Prepared by : _____ Checked by : _____

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

Internal Calibration Report of Dissolved Oxygen Meter

Equipment Ref. No.	:	ET/EW/008/006	Manufacturer	:	YSI
Model No.	:	Pro 2030	Serial No.	:	12A 100554
Date of Calibration	:	17/09/2014	Calibration Due Date	:	16/12/2014

Temperature Verification

Ref. No. of Reference Thermometer : ET/0521/008

Ref. No. of Water Bath : ---

	Temperature (°C)			
Reference Thermometer reading	Measured	20.6	Corrected	20.0
DO Meter reading	Measured	19.8	Difference	0.2

Standardization of sodium thiosulphate ($Na_2S_2O_3$) solution

Reagent No. of $Na_2S_2O_3$ titrant	CPE/012/4.5/001/8	Reagent No. of 0.025N $K_2Cr_2O_7$	CPE/012/4.4/001/27

	Trial 1	Trial 2
Initial Vol. of $Na_2S_2O_3$ (ml)	0.00	10.40
Final Vol. of $Na_2S_2O_3$ (ml)	10.40	20.80
Vol. of $Na_2S_2O_3$ used (ml)	10.40	10.40
Normality of $Na_2S_2O_3$ solution (N)	0.02404	0.02404
Average Normality (**N**) of $Na_2S_2O_3$ solution (N)	0.02404	
Acceptance criteria, Deviation	Less than ± 0.001N	

Calculation: Normality of $Na_2S_2O_3$, **N** = 0.25 / ml $Na_2S_2O_3$ used

Lineality Checking

Determination of dissolved oxygen content by Winkler Titration *

Purging Time (min)	2		5		10	
Trial	1	2	1	2	1	2
Initial Vol. of $Na_2S_2O_3$ (ml)	0.00	11.90	23.60	0.00	6.60	10.10
Final Vol. of $Na_2S_2O_3$ (ml)	11.90	23.60	30.20	6.60	10.10	13.60
Vol. (**V**) of $Na_2S_2O_3$ used (ml)	11.90	11.70	6.60	6.60	3.50	3.50
Dissolved Oxygen (**DO**), mg/L	7.68	7.55	4.26	4.26	2.26	2.26
Acceptance criteria, Deviation	Less than + 0.3mg/L		Less than + 0.3mg/L		Less than + 0.3mg/L	

Calculation: DO (mg/L) = **V** x **N** x 8000/298

Purging time, min	DO meter reading, mg/L			Winkler Titration result *, mg/L			Difference (%) of DO Content
	1	2	Average	1	2	Average	
2	7.71	7.67	7.69	7.68	7.55	7.62	0.91
5	4.20	4.18	4.19	4.26	4.26	4.26	1.66
10	2.36	2.38	2.37	2.26	2.26	2.26	4.75
Linear regression coefficient				0.9988			

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

Internal Calibration Report of Dissolved Oxygen Meter

Zero Point Checking

DO meter reading, mg/L	0.00

Salinity Checking

Reagent No. of NaCl (10ppt)	CPE/012/4.7/002/25	Reagent No. of NaCl (30ppt)	CPE/012/4.8/002/25

Determination of dissolved oxygen content by Winkler Titration **

Salinity (ppt)	10		30	
Trial	1	2	1	2
Initial Vol. of $Na_2S_2O_3$ (ml)	0.00	12.20	24.50	35.40
Final Vol. of $Na_2S_2O_3$ (ml)	12.20	24.50	35.40	46.30
Vol. (**V**) of $Na_2S_2O_3$ used (ml)	12.20	12.30	10.90	10.90
Dissolved Oxygen (**DO**), mg/L	7.87	7.94	7.03	7.03
Acceptance criteria, Deviation	Less than + 0.3mg/L		Less than + 0.3mg/L	

Calculation: DO (mg/L) = **V** x **N** x 8000/298

Salinity (ppt)	DO meter reading, mg/L			Winkler Titration result**, mg/L			Difference (%) of DO Content
	1	2	Average	1	2	Average	
10	7.79	7.81	7.8	7.87	7.94	7.91	1.40
30	6.92	6.94	6.93	7.03	7.03	7.03	1.43

Acceptance Criteria

(1) Differenc between temperature readings from temperature sensor of DO probe and reference thermometer : < 0.5 °C
(2) Linear regression coefficient : >0.99
(3) Zero checking: 0.0mg/L
(4) Difference (%) of DO content from the meter reading and by winkler titration : within ± 5%

The equipment complies # / ~~does not comply~~ # with the specified requirements and is deemed acceptable # / ~~unacceptable~~ # for use.

Delete as appropriate

Calibrated by : _____ Approved by : _____

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

Performance Check of Salinity Meter

Equipment Ref. No.	: ET/EW/008/006	Manufacturer	: YSI
Model No.	: Pro 2030	Serial No.	: 12A 100554
Date of Calibration	: 17/09/2014	Due Date	: 16/12/2014

Ref. No. of Salinity Standard used (30ppt)	S/001/5

Salinity Standard (ppt)	Measured Salinity (ppt)	Difference %
30.0	30.3	1.0

(*) Difference (%) = (Measured Salinity – Salinity Standard value) / Salinity Standard value x 100

Acceptance Criteria

Difference : -10 % to 10 %

The salinity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Checked by : _____ Approved by : _____

Annex E

Risk Assessment

Document No.: TMCLK8/DBJ/NTH/MST/99009/B

Status of Document: Issue for construction

Location: Northern Reclamation

Title of Work: Method Statement for Silt Curtain Installation

ACTIVITY	HAZARD/RISK	EXISTING RISK LEVEL			ELIMINATION/ MITIGATION MEASURES	IMPLEMENTED BY	RESIDUAL RISK LEVEL			MONITORED BY
		LH	S	RR			LH	S	RR	
General	Trip and slip	2	3	6	• Keep access or workplace tidy, non-slippery and without obstruction • Proper stacking of materials and equipment • Provide adequate lighting at access or workplace	DBJV and Sub contractors (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
	Fall from portable access ladder	2	3	6	• Home-made access ladder not allowed • Portable access ladder over 2m long to be used with fall protection measures installed prior to mobilization • All portable access ladder required registration and inspection • Portable access ladder not to be used as a working platform • Securely fix the ladder or hold by co-worker when use.	Subcontractor (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
	Injury when using power tools	3	2	6	• Inspection prior to use • All power tools operated at 110V • Guarding to power tools in safe working order • Waterproof sockets, plugs, cable, etc. used • Registration on arrival to site, and check once every quarter • PPE used, e.g. goggles, gloves in accordance with JV policy	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer
	Injury when using hand tools	2	2	4	• Home-made hand tools not allowed • Use hand tools suitable for the tasks • Hand tools properly maintained; visual check prior to use • Use appropriate PPE. E.g. hand protection etc.	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer

LH = Likelihood		S = Severity		RR = Risk Rating	Priority
1	Low (seldom)	1	Slight	1	No action
2	Medium (frequent)	2	Serious	2	Low priority action
3	High (certain or near certain)	3	Major	3 or 4	Medium priority action
				6	High priority action
				9	Urgent action

ACTIVITY	HAZARD/RISK	EXISTING RISK LEVEL			ELIMINATION/ MITIGATION MEASURES	IMPLEMENTED BY	RESIDUAL RISK LEVEL			MONITORED BY
		LH	S	RR			LH	S	RR	
	Dust	2	2	4	• Dust suppression by water spraying or enclosure • Wear dust masks/ respirator	DBJV and Sub contractors (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer
	Noise	2	2	4	• Use quiet machines • Carry out occupational noise assessment and report • Erect noise enclosures when working near residential or other sensitive receivers • If require wear ear protectors	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer
	Fire Hazard	3	3	9	• Keep site clean and tidy; proper storage of combustible materials • Provide and maintain proper type of fire extinguishers and water hoses where appropriate • Identify the fire exit routes and display evacuation procedures • Appoint Fire Wardens • Organize periodic fire drills	DBJV and Sub contractors (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
	Hygiene and health	2	2	4	• Observe personal hygiene • Provide refuse skips with cover and remove regularly • Provide and maintain sanitation equipment/ facilities in clean condition • Organize pest control if required • No alcoholic drinks allowed on Site • Follow reporting procedures when dead birds are found on Site	DBJV and Sub contractors (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer

LH = Likelihood		S = Severity		RR = Risk Rating	Priority
1	Low (seldom)	1	Slight	1	No action
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ACTIVITY	HAZARD/RISK	EXISTING RISK LEVEL			ELIMINATION/ MITIGATION MEASURES	IMPLEMENTED BY	RESIDUAL RISK LEVEL			MONITORED BY
		LH	S	RR			LH	S	RR	
	Heat stroke	2	2	4	• Provide adequate drinking water and shelter • Arrange rest periods if necessary	DBJV and Sub contractors (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer
	Skin allergy to contaminated marine mud	2	2	4	• Nitrile gloves and coverall to be provided	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer
	Electric shock	3	3	9	• Installation of electrical apparatus done by registered electrician. Cabinet locked at all times • Use of IP55 waterproof sockets, plugs, etc • Provide and ensure proper earthing in place • Cables run at above ground level or properly protected against tripping and vehicle hazard • Do not work at high ground or remain exposed during thunderstorm warning • Proper maintenance and periodic inspection by registered electrician	DBJV and Sub contractors (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
	Back injury	2	2	4	• Perform assessments to manual handling operations and prepare report. Train at risk employees. • Identify weights of regularly used items • Use mechanical means for heavy lifting • Use appropriate PPE. e.g. hand protection etc	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer

LH = Likelihood		S = Severity		RR = Risk Rating	Priority
1	Low (seldom)	1	Slight	1	No action
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				6	High priority action
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Document No.: TMCLK8/DBJ/NTH/MST/99009/B

Status of Document: Issue for construction

Location: Northern Reclamation

Title of Work: Method Statement for Silt Curtain Installation

ACTIVITY	HAZARD/RISK	EXISTING RISK LEVEL			ELIMINATION/ MITIGATION MEASURES	IMPLEMENTED BY	RESIDUAL RISK LEVEL			MONITORED BY
		LH	S	RR			LH	S	RR	
Derrick Lighter / Grab Dredger in Lifting Operation	Broken of Derrick Lighter / Grab Dredger lifting gear	2	3	6	• Do not overload Beware of sea condition at time of lifting (i.e. sea wave, strong wind)	Subcontractor (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
	Collapse of lifting crane	3	3	9	• Crane to be certified and inspected prior to use on site • Beware of contacting overhead objects or cranes nearby during lifting • Beware of strong wind at time of lifting	Subcontractor (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
	Failure of lifting appliance and lifting gear	2	3	6	• Supervisor by competent person (i.e. derrick operator) • Use licenced and experienced operator • Use certified lifting gears • Use experienced slinger for lifting operation • Always do a visual check on lifting gears and loads prior lifting • Check certificates of lifting appliances, lifting gears and relevant forms • Hands signal and PA system will be used as communication system for derrick operator and crew • A banksman would be appointed to supervise lifting operation if necessary • Provision of fencing, warning sign, flashing or blaring against derrick operation area • The steel grab would be properly examined and marked with its loading on the structure No diver in the sea or near work place during any lifting operation	Subcontractor (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer

LH = Likelihood		S = Severity		RR = Risk Rating	Priority
1	Low (seldom)	1	Slight	1	No action
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ACTIVITY	HAZARD/RISK	EXISTING RISK LEVEL			ELIMINATION/ MITIGATION MEASURES	IMPLEMENTED BY	RESIDUAL RISK LEVEL			MONITORED BY
		LH	S	RR			LH	S	RR	
	Hit by moving object	2	3	6	• Don't disturb the operator's eyesight in lifting • Siren and flashing light installed on the lifting appliance/crane as a warning while moving/turning. • Use a guide rope attached to the load • Worker wearing life jacket	Subcontractor (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
Plant & Machinery	Trap by moving parts	3	3	9	• Provide proper machine guarding • Warning notice displayed • Implement lockout system to avoid unauthorized person if necessary • Regular inspection and maintenance	DBJV and Sub contractors (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
	Hit by loose air hoses/ pipes	3	2	6	• Shut off air supply prior connection or disconnection of air hoses/ pipe /couplers Air hoses connection installed with whip check and check connection prior to re-start	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer
	Fire hazard	3	3	9	• Maintain plant and machinery in good condition without oil or grease spillage • Combustible material shall be stored properly accordance with requirements • Connection of electrical apparatus conducted by a registered electrician • Ensure that proper type and adequate number of fire extinguishers are provided near plant & machinery, and on the barges • Display notices at the locations of extinguishers. • Do not put any clothing on or nearby the heat exhaust point	Subcontractor (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer

LH = Likelihood		S = Severity		RR = Risk Rating	Priority
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ACTIVITY	HAZARD/RISK	EXISTING RISK LEVEL			ELIMINATION/ MITIGATION MEASURES	IMPLEMENTED BY	RESIDUAL RISK LEVEL			MONITORED BY
		LH	S	RR			LH	S	RR	
	Plant Failure	3	3	9	• Maintain plant and machinery in good condition	Subcontractor (Foreman, supervisor, site engineer)	1	3	3	DBJV foreman, supervisor, site engineer
Work over water	Falls of persons into the sea	2	3	6	• Where adequate handrails cannot be provided then crew shall wear a suitable automatically inflating lifejacket. • All persons including crew travelling two and from the work place to shore will wear a life jacket • Rescue / passenger boat to remain on standby at all times work over water is in progress • At least 2 workers together when work near or over water • Life buoy with 30m long rope should be provided at every workspace	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer
	Collision at sea	1	3	3	• Mooring lines of vessels are to be identified by floating buoys at an appropriate distance from the vessel. These are to be fitted with solar lighting for night and flags for daytime. • All vessels will display night and navigation lights • All craft are to remain within designated navigation channels and support craft are to approach moored vessels adopting standard maritime procedure.	Subcontractor (Foreman, supervisor, site engineer)	1	2	2	DBJV foreman, supervisor, site engineer

LH = Likelihood		S = Severity		RR = Risk Rating	Priority
1	Low (seldom)	1	Slight	1	No action
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ACTIVITY	HAZARD/RISK	EXISTING RISK LEVEL			ELIMINATION/ MITIGATION MEASURES	IMPLEMENTED BY	RESIDUAL RISK LEVEL			MONITORED BY
		LH	S	RR			LH	S	RR	
Marine Diving for installation of silt curtain	Diving equipment failure / asphyxiation / diver hurt by plant	3	3	9	• Identify the works are with warning signs to avoid entrance of other marine vessels. • Works to be carried out by trained, certified and competent divers. • Produce a valid certificate of medical fitness to dive. • Diver should not be allowed diving operation of sick. • Drugs or alcohol taking is prohibited prior to diving if impairing the safety of themselves or other diving team members. • Fault apparatus detected shall report to the diving supervisor, and labeled for repair. • Diver shall check condition of compressor supplying air before use. • Diver shall check the air from contamination by exhausted air before use. • Check the breathing apparatus and communication system is in a affective working condition before use. • Diver is not allowed underneath any operation when working in the sea. • An assigned look-out man should be employed to look after each diver. • Independent life line attached to the diver should be provided. • Communication channels between divers and vessel should always be available. • Depending on the nature of the underwater works, the communication will be done by string signal or walkie-talkie.	Subcontractor (Foreman, supervisor, site engineer)	2	2	4	DBJV foreman, supervisor, site engineer

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